An International Consultation on Integrated Crop-Livestock Systems for Development *The Way Forward for Sustainable Production Intensification*

Technical Workshop, Sete Lagaos, Minas Geráis, Brazil, 23-26 March 2010

Consolidated blog of contributions submitted during the electronic Consultation

1 February to 7 March 2010

.oOo.

Week 1 Contributions

Contributions in Week 1 of the crop-livestock e-consultation

From the Moderators

-----Original Message-----
From: Crop-Livestock
Sent: Sun 1/31/2010 10:17 PM
To: Crop-Livestock-L@mailserv.fao.org
Subject: Welcome to Week 1 (February 1-5) of the e-consultation on Integrated Crop-Livestock System for Development

February 1, 2010

Welcome to Week 1 (February 1-5) of the e-consultation on Integrated Crop-Livestock System for Development: the way forward for sustainable production intensification.

Our theme this week is on Promising integrated crop-livestock systems and innovations that merit mainstreaming and scaling, and tactics for implementation.

While agriculture may be making a comeback in the international sustainable development arena, farmers never stopped innovating around integrated farming systems to enhance productivity and income sources, decrease external inputs, and increase system resilience both environmentally and economically.

Growing demand for food for a dramatically increasing population, food price rises, energy source transitions and increasing concerns over the role of livestock (and agriculture) in environmental degradation and climate change are demanding that farmers explore win-win-win solutions. Agriculture must play a role in feeding greater numbers, providing a fair income to farmers, providing nutrition to consumers at an affordable price, reducing water use, enhancing our natural resource base, supporting employment and communities all while providing a means to mitigate and adapt to climate change.

If you witnessed the popular days of farming systems in the 1980's you are either appreciative of the prospect of a renewed interest in integrated crop-livestock systems or concerned that - for some reason - we are not making progress. Research has shown that integrated farms can be more productive and profitable than non-integrated farms, particularly if productivity includes diversity of outputs as well as overall system production. Integrated systems often have a richer diversity of species (plants and animals), capitalize upon on-farm ecosystem processes (nutrient cycles, pest management) and help optimize benefits of external inputs, resulting in improved productivity and environmental services. Integrated livestock-crop systems at both farm and area-wide level offer a means for going forward with sustainable production intensification.

Let's kick off the discussion with some scoping questions.

From your perspective:
- Do you believe that integrated crop-livestock systems are an answer for sustainable intensification? Do they have a place in our strategy for feeding 9 billion people in 2050?

- What have we learned about integrated crop-livestock systems since the 1980's? Please describe innovative crop-livestock systems that you are familiar with (please remember to let your readers know the geographic/agroecological area that you are referencing).

- What are the key benefits that arise from these systems? economically, environmentally, and socially? From a production standpoint, what are the gains in terms of functional biomass, multiple purpose production?

- How are these innovations being scaled up? What are the mechanisms for sharing knowledge (Farmer Field Schools, Farmer Cooperatives, Farmer interest groups or associations)?

- What are the key constraints to implementing integrated crop-livestock systems? What about constraints to scaling up/out?

- How best do we integrate these sustainable intensive production systems into a landscape scale approach?

We look forward to your responses to any or all of these questions as well as to any other questions and issues that you may feel are relevant.

The inputs and insights shared this week will also set the stage for going deeper in the coming weeks on market chains, policy, and research needs.

Please do keep in mind the three overall objectives of the consultation (what do we know about integrated crop-livestock systems for development – what works and what does not; define next steps for key stakeholders; and guide and empower FAO to better support member countries to harness the development potential of integrated crop-livestock systems) towards which the discussions must aim at over the next four weeks. Also, each week's topic should be addressed in the context of two cross-cutting issues – the role of stakeholders, and capturing public goods and incentives for action.

For the technical background document and other related information, please visit the website:

http://www.fao.org/agriculture/crops/core-themes/theme/spi/iclsd

With that we thank you and welcome your responses.

All the best,

The Moderators
Amir Kassam
Constance Neely
Theodor Friedrich
Eric Kueneman
E-mail: Crop-Livestock@fao.org

Conribution 1 from Stephen Twomlow, UNEP, Nairobi, Kenya

-----Original Message-----
From: Stephen Twomlow [mailto:Stephen.Twomlow@unep.org]
Sent: 01 February 2010 13:48
To: Crop-Livestock
Cc: Crop-Livestock-L@mailserv.fao.org
Subject: Week 1 - Contribution from Stephen Twomlow, UNEP, Nairobi, Kenya

Dear All

I will try and respond to the questions listed below a little later. But I thought I would share with you a paper we published last year looking, i admit short sightedly, as the cropping systems in southern Zimbabwe - key point coming out is that, even for the best resourced households the cropping system only met household needs one season in three. So from a systems perspective how do households survive - is it their livestcok enterprise, off farm activities or greater exploitation of the common resource base? As agricultural scientists are making full use of the life cycle approach in our smallholder systems analyses? - This alas does mean that the different disciplines that fall under the umbrella of agricultural science have to talk/ no wrong word - communicate with each other!

More later

Best

Steve
Stephen Twomlow PhD
Senior Program Officer Biodiversity and Land Degradation
Division of GEF Coordination
United Nations Environmental Program (UNEP)
PO Box 30552 (00100)
Nairobi
Kenya

Direct line: +254 20 7625076
Work Cell Phone: +254 728604550 (International Roaming)
Private Cell phone: +254 726593285 (Kenya only)
skype: steve.twomlow
e-mail: stephen.twomlow@unep.org
web site: www.unep.org

Contribution 2, from José Guillermo Velásquez Penagos at Corpoica, Columbia – In Spanish and English

-----Original Message-----
From: José Guillermo Velásquez Penagos
[mailto:joseguillermovelasquezpenagos@gmail.com]
Sent: 02 February 2010 00:47
To: Crop-Livestock
Subject: Week 1 - Contribution from José Guillermo Velásquez Penagos at Corpoica, Columbia

From your perspective:

- Do you believe that integrated crop-livestock systems are an answer for sustainable intensification? Do they have a place in our strategy for feeding 9 billion people in 2050?

Colombia:

La expectativa del productor es obtener una ganadería rentable para ello los productores actualmente son consientes del manejo ambiental y han incursionado en el manejo de los pastos y el establecimiento de sistemas silvopastoriles que le generan un mejor ambiente de confort a sus ganaderías lo que conlleva a una mayor productividad, ha incluido además la

parte de cultuvos para la suplenetación en épocas criticas generando un nuevo componente en el sistema.

Uno de los aspectos importantes que se debe tratar, es el desconocimiento de la producción ganadera actual, ya hay conciencia por parte de los productores del manejo sostenible, no hay que satanizar la ganadería ni generarle gran culpabilidad por la deforestación y por muchos otros males ocasionados al ambiente.

La ganadería, es una excelente fuente de proteína para la alimentación humana. Lo importante es su explotación en forma controlada y eficiente para reducir al mínimo su impacto sobre el medio ambiente. Un punto importante es considerar las razas criollas o nativas para lograr esta eficiencia y posiblemente reducir este impacto. sería interesante evaluarlo

The expectation of the producer is to obtain a profitable cattle raising, for it the producers at the moment are you consent of the environmental handling and they have intruded in the handling of the grasses and the establishment of systems silvopastoriles that generate him a better atmosphere of comfort to their cattle raising. The above-mentioned bears to a bigger productivity, it has also included the part of cultivations for the suplementación in times you criticize generating a new component in the system.

One of the important aspects that should be, is the ignorance of the current cattle production, there is already conscience on the part of those producing of the sustainable handling, there is not that satanizar the cattle raising neither to generate him great guilt for the deforestation and for many other wrongs caused to the atmosphere.

The cattle raising, is an excellent protein source for the human feeding. The important thing is their exploitation in controlled form and efficient to reduce to the minimum their impact on the environment. An important point is to consider the Creole or native races to achieve this efficiency and possibly to reduce this impact. it would be interesting to evaluate it

- What have we learned about integrated crop-livestock systems since the 1980's? Please describe innovative crop-livestock systems that you are familiar with (please remember to let your readers know the geographic/agroecological area that you are referencing).

·Colombia:

Los sistemas agrosilvopastoriles y silvopastoriles, vienen ganando espacio en nuestro país, se vienen adelantando estudios que resaltan estos sistemas y las bondades que se obtienen. Existe una excelente respuesta del productor a la introducción de estos sistemas en sus explotaciones ganaderos

He systems agrosilvopastoriles and silvopastoriles, come winning space in our country, they are come advancing studies that stand out these systems and the kindness that are obtained. An excellent answer of the producing to the introduction of these systems exists in its exploitations cattlemen

The systems agrosilvopastoriles and silvopastoriles, come winning space in our country, they are come advancing studies that stand out these systems and the kindness that are obtained. An excellent answer of the producing to the introduction of these systems exists in its exploitations cattlemen

- What are the key benefits that arise from these systems? economically, environmentally, and socially? From a production standpoint, what are the gains in terms of functional biomass, multiple purpose
production?

La respuesta que se ha obtenido en estos sistemas muestra una mejor producción y productividad de las ganaderías. Es importante resaltar el confort que generan estos sistemas a las ganaderías, este confort contribuye positivamente en la producción y productividad. Se han encontrado diferencias en producción de fincas con sistemas agosilvopastoriles que superan el 15 %

The answer that has been obtained in these systems sample a better production and productivity of the cattle raising. It is important to stand out the comfort that you/they generate these systems to the cattle raising, this comfort it contributes positively in the production and productivity. They have met differences in production of properties with systems agosilvopastoriles that overcome 15%

- How best do we integrate these sustainable intensive production systems into a landscape scale approach?

Un punto importante es la formación y continua capacitación en donde un actor principal son los niños, esta formación debe venir desde el colegio. Otro aspecto importante es la difusión con visita a fincas exitosas con sistemas sustentables por parte de los productores esto

An important point is the formation and continuous training where a main actor is the children, this formation should come from the school. Another important aspect is the diffusion with visit to successful properties with sustainable systems

José Guillermo Velásquez Penagos.
Colombia, Corpoica

Contribution 3, from Salwa Amber at the FAO Subregional Office for West Africa, Accra, Ghana

-----Original Message-----
From: Amber, Salwa (FAOSFW)
Sent: 02 February 2010 13:46
To: Crop-Livestock
Cc: Mbenga, MusaSaihou (FAOSFW)
Subject: Weeek 1 - Contribution from Salwa Amber at the FAO Subregional Office for West Africa, Accra, Ghana

Do you believe that integrated crop-livestock systems are an answer for sustainable intensification? Do they have a place in our strategy for feeding 9 billion people in 2050?

What have we learned about integrated crop-livestock systems since the 1980's? Please describe innovative crop-livestock systems that you are familiar with (please remember to let your readers know the geographic/agroecological area that you are referencing).

Yes I believe that a WELL integrated crop-livestock systems will be the answer for sustainable intensification provided that the right technical principles are applied. Let me tell you about South Yemen experience in this issue. I was supervising 8 cows' state farms plus other animal institutions. We bought about 6,000 heads of Frisians Cows from Kenya to raise them in South Yemen (down Saudi Arabia) an arid or semi arid area. We divided them among 4 farms. At the beginning the production was great, but then quickly decreased until all farms of the Frisians are dismantled by 1990, why, because of the followings:

Many developing countries have many limitations in Land Tenure, giving the right land ratio per head (it requires one Acre per head), legal context for supporting rural development policies and above all cost of the animal feed and health is so expensive beside many other factors. I do not think that even with government support, a typical developing country would be able to provide all conditions required to have a well integrated crop-livestock systems for effective sustainable intensification at this stage. Thinking of small farmer holdings of livestock, the problems would be intensified to him. No doubts the need is there for a sound strategy is badly needed but requires strong funding institutions to back it. In the west sub region of Africa, most of farmers disputes incurred from livestock farmers because of land trespassing. The Land Tenure is so weak in this sub region but as sub sector in Agriculture, Livestock is quite promising in terms of trade.

Thank you with best Regards

Salwa Amber
Senior Policy Officer
Accra, Ghana

Contribution 4, from Jagadish Timsina at IRRI Bangladesh Office.

-----Original Message-----
From: Timsina, Jagadish (IRRI) [mailto:J.Timsina@cgiar.org]
Sent: 02 February 2010 14:20
To: Crop-Livestock
Subject: Week 1 - Contribution from Jagadish Timsina at IRRI Bangladesh Office.

From your perspective:

- Do you believe that integrated crop-livestock systems are an answer for sustainable intensification? Do they have a place in our strategy for feeding 9 billion people in 2050?

Yes. There is high degree of interdependency between crops and livestock. Undoubtedly, livestock rely on crop bi-products and residue and tree leaves and fodder trees for their survival and crops rely on livestock manure. Although chemical fertilizers are essential for increasing productivity to feed 9 billion people in 2050, manures and organic matters become an integral component of integrated plant nutrition systems and for the sustainability of any crop production systems. The ultimate fate of human survival depends on sustainability of integrated crop and livestock production systems.

- What have we learned about integrated crop-livestock systems since the 1980's? Please describe innovative crop-livestock systems that you are familiar with (please remember to let your readers know the geographic/agroecological area that you are referencing).

The integrated crop-livestock-tree systems form a close loop, especially in small subsistence farming systems. Our work on integrated farming systems during early 90s in Nepal revealed that crop-livestock-tree systems are highly successful and innovative in the subsistence farms of mid-hills and Terai of Nepal. Crop residues were used for livestock and other purposes, livestock products were used for humans and crops and trees, tree products were used for livestock and humans, etc. These systems have been highly sustainable and successful in the rural communities even now. Successful farmers' associations and farmers' clubs were the keys for success of these systems.

References:

Timsina, J., 1998. Working with farmer groups - experiences, benefits, and problems. J. for Farming Systems Research and Extension (special issue of the journal).

Timsina, J., Singh, S.B., Timsina, D., 1991. Integration of crop, animal and tree in rice-based farming systems of hills and Terai of Nepal: some successful cases. Proceeding of Crop-livestock integration workshop, 1991. Asian Rice Farming Systems Network, IRRI, Los Banos, Philippines.

- What are the key benefits that arise from these systems? economically, environmentally, and socially? From a production standpoint, what are the gains in terms of functional biomass, multiple purpose production?

The main benefit is in terms of ecological resilience of the system.

These systems are ecologically/environmentally sound because all biproducts are being recycled by crops and livestock within the farm and hence there is no waste or polluted materials flowing outside the system and no or very less emissions of greenhouse gases from these systems. They are socially acceptable especially in the rural areas with small farms and farming systems. They are economically profitable due to internal recycling of crop and tree residues and manures for use by crops and livestock within the systems. Biomass from crop, livestock, and tree will increase and products will have multiple purpose production.

- How are these innovations being scaled up? What are the mechanisms for sharing knowledge (Farmer Field Schools, Farmer Cooperatives, Farmer interest groups or associations)?

Our experiences in Bangladesh reveal that Farmer Field Schools are the best means of scaling up/out of these innovations. Our early experiences in hills and Terai of Nepal reveal that Farmer associations or Farmer groups are keys for sharing knowledge and for diffusion of innovations. Through such mechanisms short-duration rice varieties are being spread in northern Bangladesh. In the hills of Nepal, through farmers' traditional/indigenous knowledge, they were able to control pests and diseases in crops and livestock and through their associations they were able to scale up such local innovations to the wider communities.

- What are the key constraints to implementing integrated crop-livestock systems? What about constraints to scaling up/out?

Crop residues are not enough for raising large number of livestock as they are also left on the soil for improving soil fertility. Conservation agriculture (CA) requires that part of the crop residues be retained on soil to reduce soil degradation/erosion and improve soil fertility and conserve soil moisture. Residues are also used for cooking and for making fences and thatches, etc. in rural areas. Residues have multiple uses and hence there tends to be competition for its use for different purposes. Crop-livestock systems are of varying types and scales. For example, farmers could raise livestock varying in number from none to many with varying species of crops and cropping intensity. These all factors pose difficulties in scaling-up/out the integrated crop-livestock systems.

- How best do we integrate these sustainable intensive production systems into a landscape scale approach?

Both qualitative and quantitative models are required for best integration and scaling-up of sustainable intensive production systems. In our earlier work in Nepal (Timsina et al., 1991, Timsina, 1998), we have provided 2 diagrams showing successful and innovative crop-livestock-tree systems for hills and Terai of Nepal. Greater degree of crop, livestock and tree integration, use of farmers' indigenous/traditional knowledge, strong local

institutional/organizational support, and effective farmers associations were key factors for the hill farms to be suatainable. However, these studies were qualitative and hence can't be efficiently scaled-up. Quantitative techniques/models will be required for optimization of crop-livestock systems with and without trees. Such models can be developed and validated for different family and farm sizes considering the need of CA for sustaining soil resource base and improving crop and livestock productivity and for overcoming the impacts of global climate change. Once such models are developed, they can be used for scaling-up/out the key, innovative crop-livestock systems in large landscape approach.

Jagadish Timsina
Senior Cropping System Agronomist
IRRI Bangladesh Office

Contribution 5, from Felix Bachmann in Switzerland

-----Original Message-----
From: Bachmann Felix [mailto:felix.bachmann@bfh.ch]
Sent: 02 February 2010 16:16
To: 'Crop-Livestock-L@mailserv.fao.org'
Subject: Week 1 - Contribution from Felix Bachmann in Switzerland

Dear Colleagues

I would like to reply to the questions below as follows, whereby putting - wherever possible - my reflections into the context of the paper of Ncube et al. 2009: "Resource flows, crops and soil fertility management in smallholder farming systems in semi-arid Zimbabwe", which has been forwarded to us by Steven Twomlow:

- Do you believe that integrated crop-livestock systems are an answer for sustainable intensification? Do they have a place in our strategy for feeding 9 billion people in 2050?

Yes; as long as you can accept a term like "sustainable intensification" and don't see a contradiction in it itself. For me, I have no problem accepting this term and working towards "sustainable intensification".

Yes; but integrated crop-livestock systems, if they want to contribute to the feeding of the world's still growing population, have to have a clear market focus. Here I slightly disagree with the conclusion of Ncube et al. who identify household food security as the goal in farming. Agreed, food security is in the forefront and the first objective to achieve in many smallholder farm households. Nevertheless, for me food security is not a referral target, and farmers cannot even rely on it. In good years, production is "above" food security and farmers want to sell the marketable surplus. In bad years, production is below own food requirements and households are forced to look for additional food and sources of income.

Hence, if integrated crop-livestock systems shall contribute to food production, they must set goals which go beyond the food security of the system's own population. But I agree, some of the systems are located in such resource poor environments, where it is difficult to produce enough food even for the farm households themselves as the paper from Zimbabwe shows.

- What have we learned about integrated crop-livestock systems since the 1980's? Please describe innovative crop-livestock systems that you are familiar with (please remember to let your readers know the geographic/agroecological area that you are referencing).

Leaving pastoralists and agro-pastoralists beside, smallholders concentrate on crop farming; and resource poor farmers stick even more to cropping than the ones who are a bit better off (also indicated in the paper of Ncube et al. 2009). On the other hand, livestock in this context is seen as an indicator for assets and wealth. Hence, if we focus on improving crop-livestock systems, we may try to improve the resource base, where among other tracks we then end up with livestock. Promoting and introducing or strengthening small-scale dairying in India and in East Africa has been in the past one way to improve the resource base of smallholders. Results have been encouraging on one hand, on the other hand, investments into livestock came along risks which not every household could bear. In this regard, the latest developments concerning livestock insurances are encouraging as they help farmers to increase their (livestock) resource base and intensify livestock production at a reduced risk level.

It is worthwhile to mention that all these steps towards intensification of livestock production took place in landed farm households, and hence, can be seen as intensification of existing farming systems, sometimes even turning them into integrated crop-livestock systems. (For further reference, you find some of my experiences in small-scale dairying on: http://www.intercooperation.ch/offers/download/s-ic-4-bachmann-livelihood-livestock-eng.pdf/view)

- What are the key benefits that arise from these systems? economically, environmentally, and socially? From a production standpoint, what are the gains in terms of functional biomass, multiple purpose production?

Economic benefits in crop-livestock systems with a strengthened livestock component are the additional income from the sale of animals and livestock products. The increased availability and use of farm yard manure has an economic value, but is also an environmental benefit through better nutrient cycling leading to improved soil fertility (but be aware, a crop-livestock system, even if it is very well integrated, is not a perpetuum mobile). The close links between farming systems and livelihoods result in positive social benefits for the farm household.

From the various small-scale dairy projects in India and Tanzania, I would rank the benefits from (improved livestock keeping towards) sustainable intensification of integrated crop-livestock systems as follows:

1. Higher crop yields and more different crops grown on farm due to increased availability of farm yard manure

2. Additional cash income from sale of animals and livestock products

3. Improved diet for farm household itself due to increased availability of animal source food

- How are these innovations being scaled up? What are the mechanisms for sharing knowledge (Farmer Field Schools, Farmer Cooperatives, Farmer interest groups or associations)?

One of the best means to scale up innovations is through producer groups. However, such groups should be formed and centered around a specific economic activity like e.g. dairying where dairy cooperatives in India have been promoted under Operation Flood or the dairy farmers groups we promoted in Tanzania. (Don't form groups simply because you think doing things together is better than walking alone.) Exchange in groups goes much easier, but groups need a driving force behind, which in most case is expressed through a benefit. And it's often an economic benefit which stands out for the stakeholders, even if they may come along other benefits like social and environmental ones.

- What are the key constraints to implementing integrated crop-livestock systems? What about constraints to scaling up/out?

The natural resource base is limited; and it starts depleting, when and where pressure has become too much.

Especially for crop-livestock systems in semi-arid areas water quickly becomes the limiting factor, as shown in the Zimbabwe case. In this regard, it is interesting to note that the paper refers to rainfall (amount and pattern), but is silent on any water harvesting and/or conservation measures.

Perhaps the watershed approach and water harvesting techniques as promoted in the 80's and 90's in India with the objective to sustain and improve crop production will soon face a revival in other countries.

There are voices pointing at poor soil fertility and insufficient application of fertilizer as reasons for low crop yields in sub-Saharan Africa, but I still think that water is the limiting factor in many areas (I write on purpose water and not rainfall).

- How best do we integrate these sustainable intensive production systems into a landscape scale approach?

(I leave this question open. What is exactly meant by a "landscape scale approach"?)

Kind regards
Felix Bachmann
Berner Fachhochschule
Schweizerische Hochschule für Landwirtschaft
Agronomie

Felix Bachmann
Wissenschaftlicher Mitarbeiter
felix.bachmann@bfh.ch <mailto:felix.bachmann@shl.bfh.ch>
www.shl.bfh.ch
Tel +41 31 910 22 85 (direkt)

Contribution 6, from Maria Izabel Radomski at EMBRAPA FLORESTAS, Brazil

-----Original Message-----
From: Maria Izabel [mailto:izabel@cnpf.embrapa.br]
Sent: Tue 2/2/2010 6:36 PM
To: FAO crop-livestock
Subject: Week 1 - Contribution from Maria Izabel Radomski at EMBRAPA FLORESTAS, Brazil

Agrosilvopastoral systems

The several impacts of the rural integration activities is an important point to discussion. Social, economical and environmental aspects are relevant. In Brazil efforts are made to expand agrosilvopastoral systems to small and big farmers. Studies has discussed the very low adoption of these systems mainly among small farmers. In this sense, we think the participatory research is an important tool to discuss, to valid and to diffuse the new technologies and integration systems that involves small farmers. The farmers objectives and

the local knowledge must be identified and systematized to serve as a tool in decision making for future agrosilvopastoral projects. On the other hand the payment for environmental services of these systems also may be discuss, including the carbon sequestration, and the conservation of the weather, soil and biodiversity. The use of native species must be priorized like the multipurpose leguminous and fruit trees. The indigenous livestock also must be rescue and integrated to the production systems. The Spanish "dehesa" is an interesting example that link production and nature conservation. In Southern Brazil, the "faxinal" system is another example of traditional silvopastoral developed by small farmers linking the Araucaria forest and livestock production.

Following link and attached papers to collaborate with the discussion.

http://www.watershedmarkets.org/casestudies/Silvopastoril_Central_America.html

Best regards.

Maria Izabel Radomski
Agroforestry Systems
EMBRAPA FLORESTAS
Colombo - Parana - Brazil

Contribution 7, from Roberto Peiretti at AAPRESID, Argentina

-----Original Message-----
From: Ing. Agr. Roberto A. Peiretti [mailto:sdrob@idi.com.ar]
Sent: 03 February 2010 03:45
To: Crop-Livestock; Crop-Livestock-L@mailserv.fao.org
Subject: Week 1 - Contribution from Roberto Peiretti at AAPRESID, Argentina

Dear Colleagues:

- Do you believe that integrated crop-livestock systems are an answer for sustainable intensification? Do they have a place in our strategy for feeding 9 billion people in 2050?

R Peiretti: For the future global scenario, we must be fully aware that "Sustainable Intensification" is absolutelly needed to be able to increase total global food production and also that it must be prioritized over the second mechanism to enlarge food production namely: area expansion. Also, keeping in mind our American experience of having more than 50 millions hectares cultivated under No-Till and the MOSHPPA Model Principles (see attached paper), we feel in shape to state that the "Intensification can be achieved under a Sustainable and even Improvement Pattern" not necessarilly by implementing crop-livestock system but by intensifing grain production. Even so I am not saying or meaning that is the only way and perfectly in many other situations the cobine activity may fit better.

Yes; but integrated crop-livestock systems, if they want to contribute to the feeding of the world's still growing population, have to have a clear market focus. Here I slightly disagree with the conclusion of Ncube et al. who identify household food security as the goal in farming. Agreed, food security is in the forefront and the first objective to achieve in many smallholder farm households. Nevertheless, for me food security is not a referral target, and farmers cannot even rely on it. In good years, production is "above" food security and farmers want to sell the marketable surplus. In bad years, production is below own food requirements and households are forced to look for additional food and sources of income.

Hence, if integrated crop-livestock systems shall contribute to food production, they must set goals which go beyond the food security of the system's own population. But I agree, some of the systems are located in such resource poor environments, where it is difficult to produce enough food even for the farm households themselves as the paper from Zimbabwe shows.

R Peiretti: I agree with the above comment in repect to the market oriented idea. For agriculture (including any agric. model or system as for example the one we are discussing - Integrated Crop-Livestock system-, to be developed under the Sustainability idea it must be able to match the three main axes of the sustainability concept; namelly the economic, the environmental and the social one. If any of them are not matched we can not say a system is sustainable and hence it will not last as worldwide reallity has proven us repeteadly. To clarify my previous statement:

1.) If we don´t match the environmental axis, sooner or later the productivity will decline, agroecosystem will deteriorate as well as negative impacts on the general ecosystem may occur.

2.) If the economic (profit) axis is not matched we will need subsidization (which is not a sustaimable economic model in itself) or other economic source will have to suppor the system which is not the case either.

3.) The social axis should also be matched otherwise starting by the basic it will imply that not enough production or income will be generated to be self sufficient from the economic and hence from the food sufficiency standpoint.

The bottom line is that all these three points or requierements are equally valid and constitute the necessary conditions both from a global prospective as well as from a particular and small scale perspective, focusing on the small farmer of a self-subsistance scale. We must match these requirements at any scale if we are going to be able to feed humanity in the near future. Even considering the agroecosystems with extremelly poor resources (as the one described and analyzed on the Zimbabwe paper), the efficiency of utilization of the natural as well as the economic and human resources, ought to be maximized in a sustainable way.

To enlarge the level of efficiency we must do our best efforts to improve the technology applied on any system - including the one we are discussing (crop-livestock). Better technologies than the one currently used in many areas can be sucessfully introduced to improve the efficiency of the whole operation. (As an example see the attached report: Drought Tolerant Soils). To achieve this, among many other issues, as for example those related with pollitical, economical cultural and social decisions and characeristics of a given location, region, country (or even continent), should be taken into consideration. The most modern technologies that simultaneously allow to increase productivity and efficiency in a wide sense, should be locally tested and adapted and then, when proven adequate, heavily promoted. Along this pathway we should not forget "the basic". When we focus from a global prospective and watch the general trends, any agorecosystem that is suitable to raise crops of any type, will have to be cultivated in the future to generate the largest possible ammount of biomass (this is an absolutelly global trend) and then decide which is the most efficent and possible or "feseable" way to utilize the "photosynthesis product" obtained. In the general strategy it must be taken into consideration issues like the "alimentary capacity and efficency" of the products obtained. Example - how many "human daily basic diets" can be obtained from a Kg of grain (as for example a mix of corn, soy etc.)? and compare this figure with the number of "human daily diets" that can be obtained from the ammount of beef that can be produced feeding that same Kg of grain mix to a steer. Even though we must not diminish at all the capacity of the ruminants to digest cellulose and coarser hydrocarbons we must keep looking for the better (most efficient) ways to produce beef from the standpoint of the "alimentary opportunity cost" . Of course it is not so simple to figure out and come out with

the solutions for "this equation". At this point my intention is only to stimulate the discussion about this basic and central issues while looking to improve the human aliemntary status from a global prospective .

Last but not least important of all is the following. At the moment of deciding wether to feed cows with the crop stoover or "to feed the soil" to keep it productive over time, represents another difficult decision related to finding a break even point¡¡¡¡(See attached pictures taken by myself in South Africa where the competition between the crop stover utilization for sheep heavily competes with the desire and determination of covering and feeding the soil to harness the No-Till advantages, amongst them the improvement in the water management and nutrient cycling for the following crops.

We must be aware that for the soil to remain productive it must be "FED" basically with Carbon" as well as returning the nutrients that we are taking out with our harvests . If we don't do so, a sustainable stage is not possible to be achieved¡ ¡¡

Indeed we are in front of a very complex issue and huge task but not not necessaril imposible to be solved (or at least improved) and used as a feasible and appropriate agroecosystem operation models for many agroecosystems of the world.

- What have we learned about integrated crop-livestock systems since the 1980's? Please describe innovative crop-livestock systems that you are familiar with (please remember to let your readers know the geographic/agroecological area that you are referencing).

R Peiretti: If we focus first in the agriculture of the developed world, the clear trend (except on the countries that subsidize the cattle raising activity as many of the EU countries do) is to use the soils to grow crops rather than to raise cattle wherever the agroecosystem characteristics allows to develop them. Within the developing countries (where I include my country, Argentina where subsidization does not exist and on the opposite the agricultural activity -grain and oilseeds raising- is strongly "penalized" by a heavy taxation), the economic forces derived basically from the international markets namelly: the prices, clearly orient the activity toward an increase of cropped area (cereals and oilseeds) replacing the cattle grazing activity. Focusing on the poorer countries scenarios, this trend may not be so noticeable probaly because grain and oilseed (and other crop production) can not be efficently developed so they can not compete with the animal husbandry of different types.

I do not pretend this to be a full, deep and even right explanation or model, but observing what is happening in the world I had noticed this "kind of trend" has certain degree of prominence around the globe. With the exeptions I had just mentioned, the borderline or boundary that divides the crops raising from the pasture grazing areas looks like determined by the capacity of the agroecosystem to allow raising a crop with a proper level of profit which after all means to be capable to generate a better profit than other agroecosystem allocation alternatives.

Even with what I have just said, there is not necesarily a clear boundary and there are ways to integrate both activities according to the extraodinary number of different scenarios across the entire world. I am only talking or mentioning what I will call a MACRO GENERAL TREND that of course has plenty of execptions.

- What are the key benefits that arise from these systems? economically, environmentally, and socially? From a production standpoint, what are the gains in terms of functional biomass, multiple purpose production?

R Peiretti: I agree with the above comments. Also, as I said, under my understanding and providing that the MOSHPPA principles are considered, adapted locally and then adopted, the three main axes of sustainability can be simultaneously achieved.

- How are these innovations being scaled up? What are the mechanisms for sharing knowledge (Farmer Field Schools, Farmer Cooperatives, Farmer interest groups or associations)?

R Peiretti: I agree with the above comments. The identification of leaders, the promotion of them as well as the promotion of innovative farmers groups (always mobilized under the idea of promoting the self-empowerment) is the way followed where agricultural innovations had quickly adopted around the world. Of course the proposed new farming model should be economically feasible and be able to render a better level of profit than the previous model or the one that is been attempted to be improved.

- What are the key constraints to implementing integrated crop-livestock systems? What about constraints to scaling up/out?

R Peiretti: The key constraint is located around the finding of a proper break even point for the utilization of the biomass produced in a given agroecosystem: TO FEED THE SOIL OR TO FEED THE ANIMALS. The best point for this unstable and dellicate equillibrium is that which allows to maximize the food production in a SUSTAINABLE way taking always into account the three axes of sustainability¡¡¡(See the attached my pictures taken in somehow extremelly limited agroecosystems)

- How best do we integrate these sustainable intensive production systems into a landscape scale approach?

R Peiretti: If I properly understand the question, the best landscape can be considered the one that allows to better satisfy the human needs as a first priority and condition but always within the frame imposed by the sustainability concept¡¡¡

Regards

Roberto A Peiretti
AAPRESID
CAAPAS

Contribution 8, from Salwa Amber at the FAO subregional office for West Africa in Accra, Ghana

-----Original Message-----
From: Amber, Salwa (FAOSFW)
Sent: 03 February 2010 10:16
To: Crop-Livestock-L@mailserv.fao.org
Subject: Week 1 - Contribution from Salwa Amber at the FAO subregional office for West Africa in Accra, Ghana

Dear All,

The following is my contribution which was copied to my Coordinator (SFW), Mr Musasaihou Mbenga. The below contribution talks about South Yemen, my homeland and that is why a clarification is needed.

I would like to address the following 2 questions:

Do you believe that integrated crop-livestock systems are an answer for sustainable intensification? Do they have a place in our strategy for feeding 9 billion people in 2050?

What have we learned about integrated crop-livestock systems since the 1980's? Please describe innovative crop-livestock systems that you are familiar with (please remember to let your readers know the geographic/agroecological area that you are referencing).

Yes I believe that a WELL integrated crop-livestock systems could be the answer for sustainable intensification provided that the right technical principles are applied for a profitable enterprise. Let me tell you about South Yemen experience in this issue. I was supervising 8 cows' state farms plus other animal institutions. We bought about 6,000 heads of Frisians Cows from Kenya to raise them in South Yemen (down Saudi Arabia) an arid or semi arid area. We divided them among 4 farms. At the beginning the production period i.e the first 2 years, results were great, but then quickly decreased until all farms of the Frisians are dismantled by 1990, why, because of the followings:

Many developing countries have many limitations in Land Tenure, water resources; giving the right land ratio per head (it requires one Acre per head), legal context for supporting rural development policies and above all the cost of the animal feed and health which are so expensive beside many other factors for low income countries.

I do not think that even with government support of investment for even more than 2 years, a typical developing country would be able to provide all conditions required to have a well integrated crop-livestock systems for effective sustainable intensification at this stage. Thinking of small farmer holdings of livestock, the problems would be more hard to him. No doubts the need is there for a sound strategy but requires strong funding institutions to back it. In the western sub region of Africa, most of farmers disputes incurred from livestock farmers because of land trespassing and land limitation to their herds. The Land Tenure is so weak in this sub region; but as a sub sector in Agriculture, Livestock is quite promising in terms of trade food security.

Best Regards to all.

Salwa Amber
Senior Policy Officer
Accra, Ghana

Contribution 9A, from Frank Place at the World Agroforestry Centre, Nairobi, Kenya

-----Original Message-----
From: Place, Frank (ICRAF) [mailto:F.PLACE@CGIAR.ORG]
Sent: 03 February 2010 09:32
To: Crop-Livestock-L@mailserv.fao.org
Subject: Week 1 – Contribution from Frank Place at the World Agroforestry Centre, Nairobi, Kenya

I agree with all others on the value of integrated crop livestock systems and their undoubted importance in agricultural development. I wanted to add one comment on the aspect of constraint or challenge. In Africa, where farm sizes are small (about 0.2 hectares per capita in most countries, World Development Report 2008) and shrinking, a key aspect is how to increase productivity of biomass to accommodate the food-feed-soil-energy needs of households. Already tradeoffs are being made, for example, the use of dung for cooking in

Ethiopia or reductions in number of livestock (or shifts from cows to goats). Added to these needs are 'new' uses for biomass such as biochar and even the payment for its retention rather than use (carbon payments, watershed protection payments). Currently, although there are examples of integrated approaches (e.g. dual purpose legumes), there is still a strong emphasis on sectoral approaches to tackle the different problems of soils or energy. What is needed is to look at the systems together and identify whether and how more biomass could be produced, what types, for what purpose, where on farm or landscape, and how its use can be made more efficient. And this then brings up the elements of the health of soils and water availability as fundamental to biomass productivity.

Frank

Frank Place
Economist and Head of Impact Assessment
World Agroforestry Centre
UN Avenue
PO Box 30677
Nairobi Kenya 00100
phone: +254-20-722-4155
fax: +254-20-722-4001

Contribution 9B, from Tilahun Amede at ILRI/IWMI in Addis Ababa, Ethiopia

-----Original Message-----
From: Amede, Tilahun (ILRI-IWMI) [mailto:T.Amede@CGIAR.ORG]
Sent: 03 February 2010 15:07
To: Crop-Livestock; Crop-Livestock-L@mailserv.fao.org
Subject: Week 1 -- Contribution from Tilahun Amede, ILRI/IWMI in Addis Ababa, Ethiopia

Dear All,

Thanks for initiating this discussion on Crop-Livestock systems. I would like to highlight few issues on Crop-Livestock systems from the perspective of Eastern African highlands.

1) Do you believe that integrated crop-livestock systems are an answer for sustainable intensification? Do they have a place in our strategy for feeding 9 billion people in 2050?

The crop-livestock systems are in transition with different paths of intensification. The change is hugely influenced by external drivers (e.g. markets) or internal drivers (population pressure and associated land shortage) including changing household priorities. They are here to stay. If we interpret sustainable intensification in terms of efficient use of resources (land, water, nutrient and labour) for producing enough food and income while minimizing environmental degradation, functional and integrated crop-livestock systems are the most practical strategies. However, for these systems to be functional and feed the 9 billion they require policy shift from sectoral to integrated decision making, improved rainwater management at plot, farm and landscape scales, reliable markets (including input delivery) and enabled farmers in terms responsiveness to climatic and market shocks and local capacity to produce, process and market their products.

2) What have we learned about integrated crop-livestock systems since the 1980's? Please describe innovative crop-livestock systems that you are familiar with (please remember to let your readers know the geographic/agro-ecological area that you are referencing).

From the perspective of subsistence systems of the African highlands, where erosion-induced land degradation is apparent, crop choice is dictated mainly by food habits and traditional farming practices are still predominant, the following could be listed as key lessons learned since the 1980s.

i) These systems are not static; they respond to technologies and external pressure. For instance, the expansion of maize from a garden crop to a major crop replacing sorghum, wheat, teff of the crop-livestock systems of the Ethiopian highlands was due to its high biomass for dry season feed, high grain yield for the people, government policy to subsidize seeds and fertilizer and its plant architecture allowing intercropping. Here, crop residue is becoming an incentive, particularly because of the competing and growing needs.

ii) Crop-livestock systems are also changing because of investments on land, water and watersheds. For instance, new irrigation schemes are converting dry season grazing to a command area, growing mainly high value vegetables with limited feed supply, pushing the livestock to hill sides. This could work only if irrigation designs are considering livestock into the design and water management scenario. In situations where these hillsides are protected (e.g. area exclosures) and SSI is excluding livestock these crop-livestock systems are under huge pressure; encouraging nutrient mining, and decreasing system productivity.

iii) Applying chemical fertilizers, alongside with water management, improved the integration and productivity of crop-livestock systems, minimizing the pressure and maximizing the returns, particularly where market incentives function.

3) What are the key constraints to implementing integrated crop-livestock systems? What about constraints to scaling up/out?

Crop-livestock systems are not new to our region. The Crop-livestock systems in the Ethiopian highlands are as old as history, ongoing with different intensity in different places. In regions where perennial crops are grown (Coffee-banana/enset-tree systems) crop-livestock integration is intensive and complementary (the trees need the manure to grow), and commonly market oriented (fattening, dairy), while in the extensive cereal systems the integration is loose aggravating land degradation. In systems where livestock is kept beyond economic uses (risk insurance, social values..) there is limited chance to implement a well balanced crop-livestock system. The system didn't produce enough biomass to feed the livestock in the system; soil fertility is under decline, investment on land and water is limited and intensification principles are not commonly adopted.

Scaling-up of the various interventions is also a challenge because of the diversity of assets, priorities and needs of communities in these diverse systems. The packaging approach is less effective and participatory research with every community is very expensive and undoable. Moreover, changing policies and instability of institutions at local levels are weakening the scaling-up efforts.

4) How best do we integrate these sustainable intensive production systems into a landscape scale approach?

The question is: what is the entry point to intensify these systems; at farm level or at a landscape level. Experiences show that simultaneous engagement at a landscape level through collection action, and farm level intensification through technology integration works best. As the upstream-downstream interaction is strong in many landscapes, managing the integrators (e.g. run-off management, erosion control, hill side vegetation cover, livestock feed) could be critical to intensify the crop-livestock systems across scales.

Tilahun Amede, PhD

Scientist, Livestock water and nutrient productivity
International Livestock Research Institute (ILRI) / International Water Management Institute (IWMI), P.O.Box 5689, Addis Ababa, Ethiopia
Bus: +251 116463215
Mobile: +251 911 230135
Bus Fax: +251 116461252
E-mail: <mailto:T.Amede@CGIAR.ORG> T.Amede@CGIAR.ORG
Web Page: <http://www.iwmi.org/> http://www.iwmi.org <http://www.iwmi.org/> / http://www.ilri.org <http://www.ilri.org/>

Contribution 10, from Stephen Twomlow at UNEP, Nairobi, Kenya

-----Original Message-----
From: Stephen Twomlow [mailto:Stephen.Twomlow@unep.org]
Sent: 03 February 2010 15:34
To: Crop-Livestock
Subject: Week 1 -- Contribution from Stephen Twomlow at UNEP, Nairobi, Kenya

Dear All

I am pleased that my initial contribution raised some comments and would like to respond, add to the comments made by Felix and Roberto and endorse those made by Frank Place today.

Best

Steve

Stephen Twomlow PhD
Senior Program Officer Biodiversity and Land Degradation
Division of GEF Coordination
United Nations Environmental Program (UNEP)
PO Box 30552 (00100)
Nairobi
Kenya

Direct line: +254 20 7625076
Work Cell Phone: +254 728604550 (International Roaming)
Private Cell phone: +254 726593285 (Kenya only)
skype: steve.twomlow
e-mail: stephen.twomlow@unep.org
web site: www.unep.org

Contribution 11, from John Baker of Crossslot, New Zealand.

-----Original Message-----
From: John Baker [mailto:baker@crossslot.com]
Sent: Wed 2/3/2010 8:57 PM
To: Kassam, Amir (AGPC)
Subject: Week 1 – Contribution from Dr. C.J Baker of Crossslot, New Zealand

From Dr C J Baker, New Zealand, 02 February 2010

Almost all of New Zealand's cropping involves intensive integration with livestock systems. I doubt if there is a single arable-only farmer in New Zealand. So integration is a way of life for New Zealand farmers although that country's favourable climate may mean that the opportunities for downsizing what NZ farmers do for less fortunate climates is rather limited. Nonetheless here is an outline of some of the systems and their advantages and constraints.

(1) Number 1 is a relatively new system that has only been made possible by the recent availability of "fail-safe" no-tillage technologies. It involves replacing all permanent pastures on a farm with a succession of short-rotation forage crops for animal finishing (cattle, lambs or farmed deer). The forage crops range from annual hybrid grasses through a range of forage brassicas (including forage canola), forage cereals to herbs such as chicory and plantains. Since new crops are established at least once per year and often more frequently in any one field, tillage is simply not a sustainable option. And since the risks associated with the failure of any one crop would be serious, the system relies heavily on no-tillage technologies and systems that have a very low failure rate. Currently the most frequently used no tillage system has a 95-99% success rate according to surveys.

The results have been spectacular. One leading farmer who previously finished 8,000 lambs on permanent pasture now finishes 24,000 lambs on the same area and regularly gets 400 grams of weight-gain per day with lambs and up to 2 kg/day with cattle. The trick is in planning when and what crops to sow to suit dry and wet (or hot and cold) times of the year and the stages of growth of the animals. When prices are attractive, the system also allows the farmer to substitute arable crops for forage crops from time to time on an opportunity basis.

The big issue is how well the soil will stand up to this intensity of animal traffic. Some farmers limit themselves to finishing lambs (rather than cattle) for this reason. Either way, this aspect favours the sole use of no-tillage for establishment although long-term soil effects have yet to be studied.

(2) Another integrated system involves arable farmers growing a range of summer crops for harvest and then no-tilling a forage crop into the lying residues immediately after harvest in autumn. The farmer then either buys in stock of his/her own to finish over the winter of contracts the break-feeding (behind daily-shifted electric fences) of the crop to a nearby dairy farmer who wishes to winter his/her pregnant cows or young stock off-farm. The cows usually stay on these forage crops until calving in late winter or early spring. If the farmer is finishing stock of his own for slaughter, these stock may stay on the property until killing weight is reached or the prices of the next season's arable crops are determined in which case the farmer may make a late decision to retain the stock or sell them before killing weight is reached and grow another arable crop.

In order to retain this level of flexibility, no-tillage is the preferred method of establishment. Even then, in order to protect the soil as much as possible from treading damage over the wet winter period, a no-tillage drill that can handle heavy residues (in excess of 10 t/ha) makes the system more sustainable (from a soil point of view) than if the farmer has to either burn the residues (which is still allowed in New Zealand, believe it or not) or even worse, till the soil.

(3) Almost all predominantly-livestock farmers renew their pasture periodically. Often this involves sowing a forage crop that is fed in situ behind an electric fence, followed by sowing of the new pasture. But other farmers choose to go from old pasture to new pasture directly. Both tillage and no-tillage is used for this purpose although no-tillage is rapidly becoming the technique of choice, mainly because of cost, reduced exposure to erosion, and quicker utilization of the new pasture.

(4) Another technique centres on harvesting grass for silage. Often the last utilization of a deteriorating pasture is to shut the field up for silage production. About 4 days before harvest, the field is sprayed with Roundup, which actually increases the sugar content of the grass about to be mown anyway. The grass is harvested and the field is immediately no-tilled into a new pasture or forage crop, knowing that the existing species will not recover after harvest. Sometimes the silage is sold off-farm as a cash crop. Other times it is retained on farm for use by stock at a later date.

(5) A specialist variation of the above is for arable farmers or contractors to lease or buy land specifically to grow specialist silage crops (usually grass, maize, wheat, triticale or forage barley, sometimes in association with forage peas or other legumes such as tic-beans). These silage crops are invariably sold off-farm, usually to dairy farmers. Where the crop is a perennial (such as grass) the same land may then be leased to dairy farmers for winter grazing of pregnant cows as in the first system described above, or a new forage crop is sown specifically for this purpose as in (2) above.

There are other local variations on the above which suit specific circumstances. But there are infrastructural requirements that are common to all examples. For example, all New Zealand farm are fenced into individual fields with 7 or 9-wire fences, each of which is also supplied with reticulated water. While this makes integration of livestock and arable cropping enterprises both simple and effective it is a model that may not be easily transported to, or downsized in other countries.

Contribution 12, from Bruno Gerard, CGIAR Systemwide Livestock Programme, ILRI in Addis Ababa, Ethiopia

-----Original Message-----
From: Gerard, Bruno (ILRI) [mailto:B.Gerard@CGIAR.ORG]
Sent: 04 February 2010 10:01
To: Crop-Livestock
Subject: Week 1 - Contribution from Bruno Gerard, CGIAR Systemwide Livestock Programme, ILRI in Addis Ababa, Ethiopia.

Dear colleagues,

Thanks for the interesting contributions and background information shared so far in the e-consultation.

Q: Do you believe that integrated crop-livestock systems are an answer for sustainable intensification? Do they have a place in our strategy for feeding 9 billion people in 2050?

Small scale mixed crop-livestock farming systems will certainly play a role in feeding world population in the foreseeable future. However their evolution/trajectories and their role in food security is very much region, agro-ecology and site specific and influenced by drivers at different scales. Some systems are evolving/changing very rapidly toward specialization and moving away from integration at the farm/landscape scale (i.e. China). Other countries in South Asia like Vietnam might see rapid changes toward specialization as well and national policies (to respond to increase demand for animal products) will certainly play a major role in transforming rural systems (see below). Foreseeing/understanding those changes and evolutions should guide research priorities and development investments. Mario Herrero (ILRI will certainly tell us more on that).

HCM CITY — The animal husbandry and poultry sectors will be reviewed and restructured so that they develop in a sustainable and competitive manner, an official said at a conference in HCM City yesterday.

Hoang Kim Giao, head of the Ministry of Agriculture and Rural Development's Animal Husbandry Department, said under the Livestock Development Strategy, the country would increase the ratio of livestock production to 38 per cent of the total agricultural output by 2015 and 42 per cent by 2020 from the current 30 per cent.

By 2020 the livestock industry targets production of 5.5 million tonnes of meat, 14 billion eggs, and more than 1 million tonnes of milk. This translates into 56 kilogrammes of meat, 140 eggs, and more than 10 kilogrammes of milk per capita per year.

By then the populations of pigs, chicken, and dairy cattle are expected to increase respectively by 2 per cent, 5 per cent, and 11 per cent to 35 million pigs, 300 million chicken and 500,000 dairy cattle.

Apart from meeting the domestic demand, the livestock industry also would target overseas markets in the future, Giao said.

To achieve these targets and to meet the increasing food demand, the country would modernise its animal husbandry and poultry sectors, shifting from household-based to industrial farming, he said.

It would also focus on breeding hygiene and safety and reducing diseases to improve productivity and quality, he said. Slaughterhouses and meat processing plants would be required to install waste treatment systems, he said.

Improving the quality of animal strains and developing the animal feed industry were also vital to the sector's development, he said.

Courses providing farmers information on farming techniques and food safety and hygiene would be organised, he added.

The livestock sector plays an important role in Viet Nam since 72 per cent of its population lives in rural areas.

However, the small scale of its operations and outdated production techniques have led to high costs, rendering the country's livestock produce less competitive than that of other countries.

The volatility in animal feed prices and high risk of disease are also causing difficulties for animal breeders. — VNS

Source: http://www.worldpoultry.net/news/vietnam-livestock-and-poultry-industry-under-review-6997.html

See also the SLP/RWC funded study lead by CIMMYT in the Indo-Gangetic plains, illustrating the diversity of challenges and opportunities within a region which is very much intensified and influenced by national policies.

http://www.vslp.org/vslp/upload/pdf/CLISS%20synthesis%20-%20Final.pdf

Are intensified small scale mixed-systems transient goal to more specialized systems everywhere in the world or do they in are some regions/agro-ecologies a stable, sustainable

and efficient way to produce crop and livestock products while providing improved livelihood to people (the best option for achieving MDG)?

In SSA Africa, intensification, better integration of crop-livestock and sustainable use of resources at the farm and landscape scale appears as a necessary step for further development.

Few words on scaling out innovations related to integrated crop-livestock systems:

- Research wise: complex issues, requiring study scales ranging from plant/animal to landscape regions and global and the need for good inter and multi-disciplinary approaches and interactions (see Steve Twomlow's first contribution)

- Mechanisms for sharing knowledge:

o No silver-bullet solutions and need for adaptive research

o In most cases, tools and approaches used so far are too prescriptive and lacks the opportunity for some integrative approaches. To our knowledge FFS have been conducted mostly at the field scale and looking at technical solutions (local and exogenous knowledge/options). Some of the critical problems faced by smallholders are not and cannot be addressed exclusively by a rigid FFS approach. Those include several issues related to animal production, resources allocation (labor, land, inputs) decisions at the farm/household level, market access, integrated soil fertility management and sustainability issues, risk management, knowledge and information dissemination, nutrition. Thus the need to (re)think participatory development, innovations, co-learning and co-experimentation at scales beyond plants/animal/fields and get inspiration from successful past and on-going efforts (lessons learnt for integrative R4D initiatives).

o Integration at the landscape scale: what is beneficial a farm scale can be detrimental at the landscape scale, and/or create/increase inequities

On sustainability and nutrient cycling in mixed systems in Africa, ILCA 1993 conf. proceedings contain a lot of very valuable scientific information still valid today:

http://dspace.ilri.org:8080/jspui/handle/10568/401

Best wishes,

Bruno Gerard
CGIAR Systemwide Livestock Programme
ILRI
Addis Ababa

Contribution 13, from the Moderators

-----Original Message-----
From: Crop-Livestock
Sent: Thu 2/4/2010 2:04 PM
To: Crop-Livestock-L@mailserv.fao.org
Subject: Week 1 -- Contribution from the Moderators

Dear Colleagues,

The following is a message from the Moderators.

Should the R & D community re-examine alley cropping?

One recalls the innovative work on alley cropping in the late 70's and early 80's where rows of leguminous trees were planted about 10 meters apart and food crops were planted (generally no-tillage) in between the tree alleys. Small, young branches were cut from the legume trees and used to mulch the soils for the food crops and were also used as cut-and-carry feed for confined animals. IITA and ILCA worked together on this in West Africa. The biology of the systems looked robust but the adoption in West Africa was close to zero. Most of the work was done on research stations or occasionally on farmer fields run by researchers who may have not really turned the discovery and adaptation process over to the farmers.

One wonders if some version of this crop/tree/livestock integration merits re-appraisal, perhaps using adult education approaches like Farmer Field Schools to involve farmers in finding appropriate solutions to make it work in their local context.

Could someone comment on these experiences and on the merit of re-visiting the alley cropping concepts with greater farmer involvement in tweaking the system?

Regards.

Moderators
Crop-Livestock-L

Contribution 14, from Terry Wolllen at Heifer International, USA

-----Original Message-----
From: Terry Wollen [mailto:Terry.Wollen@heifer.org]
Sent: 04 February 2010 15:27
To: Crop-Livestock
Subject: Week 1 - Contribution from Terry Wolllen at Heifer International, USA

Dear Colleagues:

Here are my perspectives working with Heifer International families and communities:

--- Do you believe that integrated crop-livestock systems are an answer for sustainable intensification? Do they have a place in our strategy for feeding 9 billion people in 2050?

Feeding the world cannot be achieved by any one food system. Each set of market value chains, landscape resources, livestock characteristics and cultural perspectives call for an approach that best suits these resources and opportunities.

Heifer International works at the community level. Our development program is primarily with limited resource men and women farmers who first form strong local community groups that identify shared values and commit to sharing resources. Training and capacity building in agro-ecological practices are emphasized, such as continuous group strengthening, managing natural resources and improving technical assets and resources. Crops and livestock that are resourcing each other are essential to sustainable rural development. Appropriate financial tools are incorporated in the community project, such as micro-credit or another group lending mechanism.

Appropriate livestock health and husbandry, crop and grazing management systems are all parts of the training and are well documented by others in this forum.

--- What have we learned about integrated crop-livestock systems since the 1980's? Please describe innovative crop-livestock systems that you are familiar with (please remember to let your readers know the geographic/agro-ecological area that you are referencing).

One practice that has benefitted Heifer's livestock farmers in grassland areas is improved grazing management. These practices have received a lot of critical study with excellent recommendations on how to assess vegetative resources and how to define correct stocking rates and grazing duration. Good management leads to improved vegetative re-growth as well some extension of grazing seasons. Livestock give back to the lands with the natural stirring / cultivating action of their hooves and an abundance of dung and urine to help restore the nitrogen balance and soil tilth.

--- What are the key benefits that arise from these systems - economically, environmentally, and socially? From a production standpoint, what are the gains in terms of functional biomass, multiple purpose production?

With diminishing grazing land and the environmental problems associated with overgrazing, availability of improved pastures can become a critical problem. Successful communal grazing operations require community management. With proper management, biomass and biodiversity of the vegetation can be enhanced to provide more abundance and broader nutrient quality. However, the community management piece of open grazing is the most difficult challenge.

--- How are these innovations being scaled up? What are the mechanisms for sharing knowledge (Farmer Field Schools, Farmer Cooperatives, Farmer interest groups or associations)?

Heifer uses our Learning Centers for practical, hands-on training programs in the US for local farmer organizations. Internationally, farmer field schools and community-based animal health care training are the major means of training.

--- What are the key constraints to implementing integrated crop-livestock systems? What about constraints to scaling up/out?

While it may initially seem off-target, Heifer has found that the formation of strong community groups is key to any success. Great ideas taken on independently from community buy-in last only as long as some one individual is bankrolling them and do not consider the broad agro-ecology of the food sheds. Partnering is a great idea; successful accomplishment takes team building of all parties to share goals, work and resources.

****

Terry S. Wollen, DVM
Director of Livestock Advocacy

Heifer International
1 World Avenue | Little Rock, AR 72202 | USA
www.heifer.org; terry.wollen@heifer.org

Contribution 15, from Judson Ferreira Valentim, Embrapa, Brazil

-----Original Message-----
From: Judson [mailto:judson@cpafac.embrapa.br]
Sent: 04 February 2010 13:25

To: Crop-Livestock
Cc: Crop-Livestock-L@mailserv.fao.org
Subject: Week 1 -- Contribution Judson Ferreira Valentim, Embrapa, Brazil

Colleagues,

I believe that there were 2 main problems that prevented wide adoption of alley cropping technologies:

1) Labor is a scarce resource in many rural regions of the world and alley cropping technologies are very labor demanding. If most of the research had been done at farm level including the participation of producers, this problem would have been noticed where labor was a relevant factor and these technologies would have been widely adopted where there was no opportunity cost of labor, meaning that it would have been adopted where farmers had no other economic, social or cultural activity competing for the labor force available.

2) In many parts of the world small farmers have agricultural activities side by side with livestock. Alley cropping technologies require that the areas are kept isolated from animals grazing either private or community lands. Fencing technologies are expensive and labor demanding.

I believe that participatory R&D for development and validation of technological innovations on crop rotation and crop-livestock-trees with a wide variety of arrangements, including annual food crops, livestock and trees (fruits, wood) would lead to wide adoption of these technologies world wide considering the environmental, social, economic and cultural characteristics of specific farmers and farmer's communities.

Judson Ferreira Valentim
Chefe Geral da Embrapa Acre
Rodovia BR-364, km 14, Caixa Postal 321
CEP: 69908-970 - Rio Branco-Acre, Brasil
E-mail: judson@cpafac.embrapa.br
Fone: (068) 3212-3205 / 3212-3200 - Fax (068) 3212-3284

Contribution 16, from John Landers, APDC, Brazil

-----Original Message-----
From: John Landers [mailto:john.landers@uol.com.br]
Sent: 04 February 2010 14:23
To: Crop-Livestock
Subject: Week 1 -- Contribution from John Landers, APDC, Brazil

Dear Moderators,

In reply to the question "Should the R & D community re-examine alley cropping? "

I believe that the concept of alley cropping should be extended to include Crop-Livestock-Forestry integration, as we are successfully doing with Eucalyptus, teak and other timber spp. in Brazil

Best regards,

JNL
John N. Landers, OBE

Relações Internacionais / Novos Projetos
Associação de Plantio Direto no Cerrado - APDC
Fone: 55 (61) 3366-5307 / 3366-1984
Fax: 55 (61) 3366-5307
E-mail: john.landers@uol.com.br
End: SMDB - Conjunto 9 - Lote 5
Lago Sul - CEP: 71680-090
Brasília - DF

Contribution 17A, from Maria Izabel Radomski, Embrapa, Brazil

-----Original Message-----
From: Maria Izabel [mailto:izabel@cnpf.embrapa.br]
Sent: 04 February 2010 16:47
To: FAO crop-livestock
Subject: Week 1 - Contribution from Maria Izabel Radomski, Embrapa, Brazil

About alley-cropping

I subscribe to the response of our co-partner Judson, from Embrapa Acre. I also made a comment in Contribution 6 that participatory research is a fundamental tool to validate and diffuse new or ancient technologies like the alley-cropping. The technology "per se" is not a problem, the inadequate use is the problem. So it is relevant to consider the social, economical, cultural and environmental differences in crop-livestock-forestry integration research.

Izabel

Maria Izabel Radomski
Agroforestry Systems
EMBRAPA FLORESTAS
Colombo - Parana – Brazil

Contribution 17B, from Jagadish Timsina at the IRRI Bangaldesh Office

-----Original Message-----
From: Timsina, Jagadish (IRRI) [mailto:J.Timsina@cgiar.org]
Sent: 04 February 2010 17:06
To: Crop-Livestock
Subject: Week 1 -- Contribution from Jagadish Timsina at the IRRI Bangaldesh Office

I do agree with Judson Validson and John Landers that perhaps we shouldn't promote alley cropping. Instead, we have several forms/intensities of crop-livestock-tree integration. Such integrations are diverse with diverse species of crops and trees in hilly ecosystems of Nepal, Bhutan and Indian hills as well as in flat lands and low-lying areas of Bangladesh. We should characterize the diversities and develop innovative research and development strategies for successful and sustainable intensification of crops, livestock and trees and for up- or out-scaling of the successful cases.

Jagadish Timsina
Cropping System Agronomist
IRRI Bangladesh Office

Contribution 18, from Geraldo Martha and Lourival Vilela of Embrapa, Brazil

-----Original Message-----
From: Geraldo Martha, Jr. [mailto:gbmartha@cpac.embrapa.br]
Sent: 04 February 2010 18:07
To: Crop-Livestock
Cc: lvilela Vilela; macena@cpac.embrapa.br
Subject: Week 1 - Contribution from Geraldo Martha and Lourival Vilela of Embrapa, Brazil

Dear Moderators,

Crop-livestock systems in the Brazilian Cerrado, in spite of not being the only one option for a sustainable agricultural intensification, are certainly an outstanding strategy to increase food, fiber and biofuel production and to avoid further encroachment into native vegetation in the coming decades.

Crop-livestock systems represented a significant share of pasture establishment in the Brazilian Cerrado during the 70's and the 80's. After trees were cut down, rice was generally cultivated for one up to three seasons and then cultivated pastures, mainly Brachiaria spp., were established. Limited fertilizer amounts were used in the rice phase as well as during the pasture establishment; in fact, in large areas no fertilizer at all was used in the pasture phase. Given the low-fertility of the Cerrado's acid soils, and the absence of fertilizer use, the pasture degradation process was intensified after three or four years from the establishment.

In the last 15 years, and especially in the last decade, crop-livestock systems in the Brazilian Cerrado have changed considerably. Now, the focus is on high-yielding crops and pastures, which means that corrected, high-fertility soils are needed. Under this condition, production and economic risks might be significantly reduced because the system as a whole is much more buffered against droughts, for example, and much more prone to quickly adapt to market signals, for example, to introduce corn instead of pasture as a second crop or vice-versa.

Research in the Brazilian Cerrado has found that well-managed, highly productive integrated crop-livestock systems emerge as a tremendous promise toward the sustainability of farming systems. In integrated crop-livestock systems, nutrient use efficiency is potentially improved because of enhanced soil fertility (chemical, physical and biological), increased soil organic matter and a more efficient nutrient recycling and more effective soil and water conservation and use. Consequently, the risks associated with nutrient losses are minimized whilst bioeconomic performance might be sustained or even increased. The potential to reduce the business risk and to boost crop and pasture productivity are clearly associated with economic benefits. The better soil and water management on these systems and their huge sparing-land effect potential are key-points under an environmental perspective. The system has the potential to increase year-round demand for labor in comparison to only-crop regions; compared to only-pastures sites, especially when degraded pastures are an issue, the overall amount of jobs can be significantly increased. And, given the likely effect of increased labor productivity, wages can be augmented. Additionally, in this scenario, is expected that with adequate public policies and private/public investments, multiplier effects in rural areas – in terms of better income and job creation, on-farm and in local commerce and industry –, would potentially be boosted.

By now, farmers in many sites in the Cerrado are rapidly adopting the use of pasture as soil cover for no-till planting. Including the animal component in the system is also increasing. More research and extension efforts are obviously a big issue to prompt the scaling up of

crop-livestock systems. Adequate training and financing, to overcome system's complexity and high-costs, respectively, are needed for a significant widespread adoption in the near future.

Cheers,

Geraldo Martha and Lourival Vilela

Geraldo Martha, Jr.
Pesquisador - Embrapa Cerrados
Integração Lavoura-Pecuária/Economia Agrícola

Contribution 19, from Frank Place at the World Agroforesty Centre, Nairobi, Kenya

-----Original Message-----
From: Place, Frank (ICRAF) [mailto:F.PLACE@CGIAR.ORG]
Sent: 04 February 2010 18:51
To: Crop-Livestock
Subject: Week 1 -- Contribution from Frank Place at the World Agroforesty Centre, Nairobi, Kenya

Some principles or aspects of the system are certainly worth continued exploration. I hear from a colleague that alley farming (with nitrogen fixing species) is being practiced by several communities in Flores Indonesia where it spread and persisted without much external intervention. We have found systems with higher densities of trees to perform better, either in a rotation (i.e. fallow) or in an intercrop system in sub-humid/humid sites in Africa. In the intercrop system, preventing light competition seems to be very important and thus these are managed with very low-to- the-ground cutting. As noted in the question, technically these perform very well. There appears to be some promise in terms of adoption with intercropping systems in Malawi, but it is early days.

Apart from alley farming as a soil fertility strategy, as John Landers notes, there are many instances of creating alleys using other plants of high value – e.g. animal feeds, fruits or timbers.

Frank Place

World Agroforestry Centre

Contribution 20, from John Landers, APDC, Brazil

-----Original Message-----
From: John Landers [mailto:john.landers@uol.com.br]
Sent: 04 February 2010 20:28
To: Crop-Livestock
Subject: Week 1 -- Contribution from John Landers, APDC, Brazil

Dear Moderators,

As this is an e-consultation, I am giving you a contribution in bullets to answer the question : Do you believe that integrated crop-livestock systems are an answer for sustainable intensification? Do they have a place in our strategy for feeding 9 billion people in 2050?

In tropical Brazil, integrated crop-livestock systems using Zero Tillage (ICLZT) with wide-spaced Eucalyptus spp. or teak are working well between latitudes 3º S and 18º S and probably further South. They are reported to sequester an average of 6 ton/ha/year of carbon with Eucalyptus planted in year 1, a rotation of mechanized upland rice 1 or 2 years, soybeans 1 or 2 years and Brachiaria intersown, undersown or oversown in the third year, thereafter grazed between the Eucalyptus until it is cut at 8 years old: stocking rate about 1.5 to 2 AU/ha. By Brazilian law, crop drying energy must come from firewood, which the Eucalytus logs are used for, besides construction etc. Satisfying energy needs is part of the equation for feeding the world.

Soybean farmers in Mato Grosso adopting ICLZT have adapted cheap designs for water and feed troughs and salt shelters on skids, see fotos courtesy Rogerio Arioli, Campo Novo dos Parecis-MT. The feed troughs are made with one ton fertilizer bags and the water troughs are made from strong black plastic of the type for lining reservoirs,

"Without Zero Tillage, ICLZT is uneconomic" says Alysson Paolinelli ex-minister of agriculture of Brazil, an adopter of ICLZT for over 5 years...

Finally, in his book "Eat More, Kill Less" (ca, 1985) Robert Goodland, the first ecologist in the World Bank, advocated vegetarianism as the best ecological solution to loss of biodiversity, as all the pastures would then be converted to crops, with many times more human carrying capacity. A fork for your thoughts.

JNL

John N. Landers, OBE
Relações Internacionais / Novos Projetos
Associação de Plantio Direto no Cerrado - APDC
Fone: 55 (61) 3366-5307 / 3366-1984
Fax: 55 (61) 3366-5307
E-mail: john.landers@uol.com.br
End: SMDB - Conjunto 9 - Lote 5
Lago Sul - CEP: 71680-090
Brasília - DF

Contribution 21, from Farhad Mirzaei, Iran

-----Original Message-----
From: Farhad Mirzaei [mailto:farmir2005@gmail.com]
Sent: 04 February 2010 20:23
To: Crop-Livestock
Subject: Week 1-- Contribution from Farhad Mirzaei, Iran

Dear Friends,

I will be very grateful if some of you scientists and researchers can give me and others an applied framework of crop-livestock farming systems because as you are seeing in this e-forum, we are looking at so many examples from different countries, but I am feeling the absence of analysts to give the readers a common definition of this topic.

Finally, I have to say that this forum is one of the most interesting ones for me as a researcher who is working on this topic.

Best regards,

Farhad Mirzaei,
Ph.D Research Scholar From Iran,
Dept. of Livestock production and Management,
National Dairy Research Institute (N.D.R.I.), Karnal, 132001, India (<http://www.ndri.res.in> http://www.ndri.res.in)
Member of Department of Animal Production Management, Animal Science Research Institute of Iran.
<http://www.asri.ir/biography/MIRZAEI.mht> http://www.asri.ir/biography/MIRZAEI.mht

---

Contribution 22, from Markus Ascher, IICA-PROCITROPICOS, Brazil

-----Original Message-----
From: Markus Ascher [mailto:markus.ascher@procitropicos.org.br]
Sent: 04 February 2010 21:19
To: Crop-Livestock
Subject: Week 1-- Contribution from Markus Ascher, IICA-PROCITROPICOS, Brazil

Dear Colleagues,

In addition and support to the contribution from Geraldo Martha and Lourival Vilela of Embrapa, Brazil, I would like to add some quite interesting figures I found in a very recent IICA-Publication (in Spanish) on the prospective demand for agricultural land in the Latin America and Caribbean Region (LAC) (Gazzoni, Decio Luiz: Biocombustibles y alimentos en América Latina y el Caribe. San José, C.R.: IICA, 2009). As Geraldo and Lourival pointed out (Contribution 18), intensification of livestock production systems in Brasil allready is taking place for some 10 to 15 yeras. Estimates show that there is no future demand for extending the pasture area in the LAC-Region (which is good, though! in order to "avoid further encroachment into native vegetation", here, of course, the Amazon Basin), at the contrary pasture land is expected to be reduced at a scale of about 65 million ha over the next 2 decades, while the prospective demand for annual crops, perennial crops, planted forests and biofuels adds up to a demand of about 143 million hectares for the region.

Table: Latin America and the Caribbean. Prospective demand for area used for agriculture - 2010 – 2030 (in million ha)

Year	Biofuels	Annual crops	Perennial crops	Pasture land	Woods	Total	Expansion area still available
2005		144,0	19,8	550,0	12,0	**728,8**	599,9
2010	5,0	175,0	20,0	557,0	13,3	**770,3**	558,4
2015	7,0	197,0	22,0	5530,	14,7	**793,7**	535,0
2020	11,8	215,0	24,4	539,0	16,2	**806,4**	522,3
2025	12,0	234,0	26,9	516,0	17,9	**806,8**	521,9
2030	12,5	260,0	29,7	485,0	19,7	**806,9**	521,8
Increase 2005 to 2030	**9,5**	**116,0**	**9,9**	**-65,0**	**7,7**	**78,1**	

Source: Gazzoni, Decio Luiz. Biocombustibles y alimentos en América Latina y el Caribe. San José, C.R.: IICA, 2009.

Best regrads
Markus Ascher

Markus Ascher
Assessor Técnico
IICA-PROCITROPICOS
SHIS QI 01, Conjunto 01, Casa 20 – Lago Sul Brasília, DF, 71605-010 Brasil
Tel.: (++55-61) 3365-2908 / 3365-2907
Fax: (++55-61) 3365-5093

<mailto:markus.ascher@procitropicos.org.br> markus.ascher@procitropicos.org.br
markus.ascher@cimonline.de
<mailto:procitropicos@procitropicos.org.br> procitropicos@procitropicos.org.br
<http://www.procitropicos.org.br/> www.procitropicos.org.br

This position is supported by German development cooperation //

Centre for international Migration and Development – <http://www.cimonline.de/>
http://www.cimonline.de

Contribution 23, from Lieven Claessens, CIP-Nairobi, Kenya

-----Original Message-----
From: Claessens, Lieven (CIP-Nairobi) [mailto:l.claessens@CGIAR.ORG]
Sent: 05 February 2010 05:22
To: Crop-Livestock
Subject: Week 1 -- Contribution from Lieven Claessens, CIP-Nairobi, Kenya

Dear colleagues,

Besides intercropping and alley farming as possible strategies for sustainable smallholder crop-livestock system intensification, I would like to bring in research on dual-purpose crops into the discussion. Besides earlier work by ILRI on adoption of dual-purpose cowpea in the dry savannah in west Africa (Kristjanson et al., 2002, in attach), at CIP, together with ILRI and NARS, we've recently done some studies on the possibilities of dual-purpose sweet potato in East Africa (Peters et al., 2006; Claessens et al., 2009, in attach) and in Vietnam (Leon Velarde et al., links to presentations below). There definitely seem to be some interesting possibilities, although there are still plenty of challenges for breeders as well as for scientists assessing the reasons or failures of actual adoption. Regards, Lieven Claessens

http://www.cipotato.info/docs/abstracts/SessionIX/OP-68_C_Leon_Velarde.pdf

http://www.cipotato.info/docs/abstracts/SessionIX/OP-69_C_Leon_Velarde.pdf

Dr. Lieven Claessens
Environmental Scientist
International Potato Center - SSA regional office
Production Systems and the Environment
P.O. Box 25171
00603 Nairobi
Kenya

Tel: +254 20 422 3612
Fax: +254 20 422 3001
Web: www.cipotato.org

Contribution 24, from Scott Day, Manitoba, Canada

-----Original Message-----
From: Scott Day [mailto:treelane@mts.net]
Sent: 05 February 2010 06:27
To: Crop-Livestock
Subject: Week 1 -- Contribution from Scott Day Manitoba, Canada

First of all let me say what an honour it is to be included in these consultations, the discussion has been fascinating and I am somewhat intimidated to join in but I will still share my thoughts regardless: I farm in the Southwest Corner of Manitoba near the exact centre of North America, I am also an agronomist and an ag researcher for our Provincial Government in this region of the Canadian Prairies. Integration of Livestock/and cropping systems has always been a passion of mine having grown up on a small integrated swine and grain farm - the farm that I now manage with my father. In my other job with the Province I work with 100's of farmers with all types of operations in this part of the country, my perspective will be from my local region here in the heart of the Continent.

From this background I have observed that those that raise livestock and those that raise crops are two different types of people, often very different. As you all know this is not a new observation but it is sometimes as distinct as a doctor from a dentist. Now I have seen livestock producers evolve into crop producers but it is very rare to see a person that raised crops evolve into a livestock producer. Even on those Prairie farms that have both livestock and grain you will find people on that farm that concentrate on grain and others that look after the livestock. It is very rare to find someone that has good command of both types of enterprises. However, this does not mean we can't have a vibrant integrated crop/livestock farming model or system.

So with this in mind maybe the best option is to encourage those that successfully raise crops to continue to do so and those that raise livestock to continue on as well. Don't try and encourage them to be something they are not, but instead look for ways for them to utilize each others skills and resources. In some of the research we have been doing we have been trying to find ways to incorporate livestock and forages into large acreage grain farms. We are fully aware of the soil building, nutrient building, and pest control benefits from including forages and livestock into our annual cropping rotations. However, these benefits are not nearly substantial enough for most crop producers to go out and buy a herd of cattle and all the necessary infrastructure that goes with them, and vice versa. So how do you get them to work together? Dr. John Baker (Contribution 11) has mentioned many ideas that are already in play in New Zealand. We certainly have the obvious examples here of grain farmers growing feed and forage for their livestock producing neighbours, and in return gaining access to the manure and other benefits. However, we have one system that takes this a bit further, it involves grain farmers sowing (everything is always 0-till in my area) some of their fields to alfalfa (lucerne), or some type of high production pasture. Then these fields are rented out to livestock producers to intensively graze these fields for 2 or 3 years before being brought back into annual crop production. In some cases the crops farmer is paid an allowance per pound of gain on the animals - that way the livestock owner knows exactly what their costs will be. The grain farmer knows he is getting the extra benefits from having alfalfa/forages in the rotation so he is willing to take a bit more of the risk in not knowing what the actual pounds of gain will be until the end of the season. In other cases it is just a fee per acre basis between the two parties. The grain farmer gets to have livestock/forage in

his farming system without having to learn(or endure the risks) to be a livestock farmer and the livestock producer gains access to an easy to manage increase in feed supplies, leading to greater capacity and efficiency for his operation. With modern high tensile electric fences, and pasture pipeline plows, 100's of hectares can be fenced in a day, so rotating these "livestock fields" is not difficult. This also allows a grain farmer to add acres to their farm without having to add more grain producing resources. Of course the key to all of this is economics, each party needs to have a tangible benefit! However, in Canada the livestock industry has basically collapsed over the past few years while grain has become very strong, so I now see very few examples of this sort of symbiotic relationship, but as economics change and the livestock sector rebounds I expect to see these relationships start again. So first and foremost; there has to be a clear economic gain for both parties not just a perceived or expected benefit of better soil and better pest control, or more "sustainability". And secondly; rather than encouraging crop producers to get some cattle or stockmen to buy some grain land maybe first find ways for them to work together. This has maybe been your intent all along but I think it needs to be stressed here again. I think this is relevant no matter where you farm in the world.

Below are the conclusions from a long term study we have been conducting at the Manitoba Zero - Till Research Farm looking at the inclusion of forages and livestock into a 0-till farming system. Further details can be found at http://www.mbzerotill.com/page.aspx?page_id=270, this rotation study is the first one that comes up on the list of MZTRA projects. The study is not quite finished and the 2009 data is still being finalized, expect a final report in the next couple of months.

1. Alfalfa in a rotation as a short term stand can significantly reduce commercial nitrogen requirements for the annual crops grown following the stand termination. We will be producing a crop of oats in year 2 following the stand termination and have 130 and 107 lbs/acre residual nitrogen in the soil samples from fields 103 and 203 at the beginning of the season. The requirements for nitrogen for producing the winter wheat crop during the first year out of the rotation was reduced to 55% of the nitrogen required in a rotation producing only annual crops. Nitrogen was not the limiting factor in any yield losses during 2008.

2. There is some risk growing winter wheat following alfalfa. Alfalfa when grazed does not necessarily leave enough stubble to trap snow to protect winter wheat from exposure to cold. Alfalfa can also leave the top soil deficient in soil moisture therefore having potential to reduce the winter wheat crops viability in the event of a prolonged period of adverse weather. During the 2008 growing season we experienced these conditions and saw reduced plant populations in some regions of our winter wheat fields. These reduced populations were not limited to any particular landscape feature so the problem was more complex than normal over-wintering losses. The yield map from field 203 in 2008 clearly delineates the difference in yield between the grazed and hayed portions of the previous alfalfa crop. Yield differences were primarily due to plant population differences. All areas of the field had good germination, emergence and growth in the fall and had viable roots in the early spring but failed to successfully break dormancy.

3. Grazing cattle on a pure stand of alfalfa at the bud stage of growth of the alfalfa is high risk and requires good management skills. Alfasure if administered properly has excellent results and good control of frothy bloat. When employing the strategies that we have been employing in our grazing program there is little room for mistakes. During the 2008 grazing program we allowed the water to go without the alfasure injection on 2 separate occasions which resulted in 3 mortalities. The fourth mortality was caused by moving the calves late in the evening. All of these situations could have been prevented with better management.

4. Reduced input strategies can be an effective way to reduce inputs and input costs. The use of alfalfa in a rotation to provide an alternative is effective. The inclusion of alfalfa in a

rotation can also increase risk as the risk of producing alfalfa includes production risks, harvesting risks and market risks which are difficult to protect a farm operation from. Alfalfa can be a good strategy to use to improve soil quality and improve the water balance as it will draw down the water level in years of good production and allow more precipitation to infiltrate therefore providing more storage capability in the soil.

Scott Day
Box 816
Deloraine, MB.
R0M 0M0
204 747 2392

Contribution 25, from Stephen Kimani, Kilimo Trust, Uganda

-----Original Message-----
From: Stephen Kimani [mailto:SKimani@kilimo.co.ug]
Sent: 05 February 2010 07:26
To: Crop-Livestock; Crop-Livestock-L@mailserv.fao.org
Subject: Week 1 – Contribution from from Stephen Kimani, Kilimo Trust, Uganda

On Alley cropping…

There is certainly need to continue further exploration.

Depending on land sizes and climatic conditions, I see further work on fodder legumes such as Calliandra calothyrsus or other similar species which will contribute towards soil conservation when planted along contours, improve soil nitrogen via N2 fixation, and contribute as livestock fodder. This system fits well in intensive crop-livestock systems e.g. in East Africa, mainly humid and sub-humid zones. Rotations would fit more where land sizes allow, whether humid or sub-humid.

Alley cropping also fits well within nutrient cycling theme, in the sense that manure quality especially N content would improve as a result of feeding livestock with high nitrogenous leguminous materials.

Cheers,

Stephen Kimani
Kilimo Trust

Contribution 26, from Eric Vall, from CIRAD, France

-----Original Message-----
From: Eric Vall [mailto:eric.vall@cirad.fr]
Sent: 05 February 2010 08:54
To: Crop-Livestock
Subject: Week 1- Contribution from Eric Vall, from CIRAD, France

Je vous prie de trouver ci-après une contribution au forum à propos de nos travaux conduits au Burkina Faso (zones de savanes subhumides)

- What have we learned about integrated crop-livestock systems since the 1980's? Please describe innovative crop-livestock systems that you are familiar with (please remember to let your readers know the geographic/agroecological area that you are referencing).

Aujourd'hui, dans les zones de savanes subhumides de l'Afrique de l'ouest du Burkina Faso et du Mali sud la grande majorité des exploitations pratiquent en même temps l'agriculture (coton, maïs, sorgho, légumineuses...) et l'élevage (petits ruminants, bovins de trait, bovins d'élevage...) et ces deux activités sont plus ou moins intégrées (valorisation fourragère des résidus agricoles, production de fumures organiques, exploitation de l'énergie animale). Mais il existe une diversité de modalités de combinaisons de l'agriculture et de l'élevage selon les exploitations. Les très petites exploitation agricoles (5 ha de culture environ) sans traction animale existent encore et peuvent atteindre 10-20% des cas dans certaines régions.

Les exploitations dominées par l'agriculture (3ha à 20 ha de surface cultivée), où l'élevage se limite bien souvent à la traction animale, sont ultra-majoritaires (50 à 60%). Les exploitations où l'élevage de troupeaux de bovins (20 à 100 têtes) constituent l'activité dominante représentent de 5 à 20% des cas, l'agriculture se limite à une petite production vivrière de céréales. Enfin, un système agro-pastoral combinant l'agriculture sur des surface moyennes à grandes (10 à 50 ha) et ayant constitué un noyau d'élevage (10 à 100 têtes) a émergé ces 20 dernières années entre les 2 pôles précédents (10 à 20% des exploitations). Ces exploitations "d'agro-éleveurs" se caractérisent aussi par une assez bonne intégration de l'agriculture et de l'élevage (exploitation importante de l'énergie animale pour l'agriculture et le transport, modes de production diversifiés de fumure organique, stockage de résidus fourragers importants). Il me semble que l'on peut qualifier les systèmes des agro-éleveurs de systèmes innovants.

- What are the key benefits that arise from these systems? economically, environmentally, and socially? From a production standpoint, what are the gains in terms of functional biomass, multiple purpose production?

Le systeme agro-pastoral développé par les agro-éleveurs est innovant mais est-il durable pour autant? Des études plus fines nous ont montré que sur le plan économique la combinaison des 2 activités rend ces exploitations globalement plus perforantes que les autres (et plus résistantes aux chocs économiques et climatiques grâce à la combinaison des productions) avec une meilleure garantie en terme de sécurité alimentaire. Mais souvent, ces exploitations restent guidées par des logiques extensives. On cherche à accroitre le plus possible les surfaces cultivées et la taille des troupeaux. Ceci pose des problèmes multiples dans un environnement ou bien souvent on atteint un seuil de saturation eu égards aux ressources en terres agro-pastorales encore disponibles (ce qui conduit à une multiplication des conflits avec les autres exploitations, une trop forte pression d'exploitation sur les ressources naturelles). Donc les systèmes des agro-éleveurs sont innovants et sans doute durables tant qu'ils conservent une dimension raisonnable en terme de surface cultivées et en terme de taille des troupeaux.

- Do you believe that integrated crop-livestock systems are an answer for sustainable intensification? Do they have a place in our strategy for feeding 9 billion people in 2050?

Dans l'environnement de l'Afrique de l'ouest caractérisé par de multiples incertitudes en terme pluviométrique, de garanties de débouchés, avec peu/pas de filets de sécurité économiques, la combinaison des activités agricoles et pastorales dans les exploitations leur confère plus de flexibilité. Dans un espace en voir de saturation foncière, l'intégration de l'agriculture et de l'élevage permet de produire plus, à surface exploitée constante. D'important progrès restent à faire, mais les pratiques de productions de fumures organiques ont fortement progressées (production de fumier en fosse à la maison, en parc à bétail de compost au champ...) l'utilisation de l'énergie animale est une pratique courante pour l'agriculture et pour les

transports, les cultures fourragères ne sont plus limitées aux essais en station même si elles restent peu développées.

- How are these innovations being scaled up? What are the mechanisms for sharing knowledge (Farmer Field Schools, Farmer Cooperatives, Farmer interest groups or associations)?

Dans l'ouest du Burkina Faso nous travaillons depuis quelques années sur la conception des innovations avec les producteurs en suivant une démarche de recherche action en partenariat. La RAP naît de la rencontre entre une volonté de changement de la part des acteurs de terrain et une intention de recherche des scientifiques et poursuit un objectif dual : produire des connaissances, réussir un projet de changement délibéré. Elle se développe au sein d'un cadre éthique négocié et accepté par tous. Elle est pilotée par des cadres de concertation hybrides composés de scientifiques et d'acteurs de terrain. Elle est conduite en milieu réel, le plus souvent par des équipes interdisciplinaires, selon une approche systémique. Le travail est conduit simultanément selon 3 axes : i) l'analyse des situations complexes pour les rendre intelligibles, ii) la prévision des evolutions possibles des situations, iii) l'étude de la faisabilité des options de transformations, leur mise en œuvre et leur évaluation. L'analyse des pratiques et des systèmes de production, l'expérimentation en milieu paysan, la modélisation d'accompagnement, l'évaluation multicritères, sont des outils privilégiés par la RAP. Cette méthode est expérimentée dans un province du Burkina Faso (le Tuy) sur différents thèmes : production de fumure organique au champ (compost de tiges de coton), renforcement de la place des légumineuses dans les systèmes de culture sous différente forme (culture pure, associé, scv, agroforesterie), gestion concertée des resources agro-pastorales à l'échelle communale. Elle permet de conduire des expérimentations chez et avec les producteurs en grand nombre ce qui permet le traitement statistique des résultats, la prise en compte des contraintes de travail de l'exploitation, et de produire des connaissances originales sur les savoirs locaux. Mais elle induit des couts de transaction importants avec les expérimentateurs, et une simplification des dispositifs expérimentaux.

- What are the key constraints to implementing integrated crop-livestock systems? What about constraints to scaling up/out?

Dans cette région du monde on peut citer comme contrainte au développement des systèmes agro-pastoraux : le manque de main d'oeuvre disponible sur les exploitation, le manque d'accès au crédit (achat d'animaux, achats d'équipements de transport), l'abandon des cultures associées pour les cultures en lignes (difficultés à réintroduire les cultures associées dans des systèmes de cultures façonés par la mécanisation à traction animale), le manque de sécurité foncière (on hésite à investir dans des champs où l'on est simple locataire...)...

Bien cordialement
Eric Vall

Contribution 27, from Azage Tegene of ILRI, Addis Ababa, Ethiopia

-----Original Message-----
From: Tegegne, Azage (ILRI) [mailto:A.TEGEGNE@CGIAR.ORG]
Sent: 05 February 2010 10:26
To: Crop-Livestock-L@mailserv.fao.org
Subject: Week 1 - Contribution from Azage Tegene of ILRI, Addis Ababa, Ethiopia

Definition - Crop-Livestock systems

From discussions and comments in week 1, I realize that there is a clear difference in our perception and understanding of crop-livestock systems.

Appreciate if we can agree on a working definition of the key term and system we are all talking about.

Best regards,

Azage Tegegne (PhD)
Animal Scientist
International Livestock Research Institute (ILRI)
P.O. Box 5689, Addis Ababa, Ethiopia
Tele: Office: 251-1-646 3215 (ext 2406)
Mobile:251-911-24 64 42
Fax: 251-1-646 1252
Email: a.tegegne@cgiar.org
Web <http://www.ilri.org/> http://www.ilri.org
Where phone calls to the USA are cheaper than to Ethiopia use:
Phone +1-650-833-6696

Contribution 28, from Brian Sims, UK

-----Original Message-----
From: BrianGSims@aol.com [mailto:BrianGSims@aol.com]
Sent: 05 February 2010 10:42
To: Crop-Livestock-L@mailserv.fao.org
Subject: Week 1 - Contribution from Brian Sims, UK

Colleagues,

If the challenge is to feed 9 ´ 109 people by 2050, perhaps it would be sobering to realize that we are failing to feed our 6.8 ´ 109 population today. At least 1 billion people are severely undernourished and over 30% of sub-Saharan Africa's population is actually chronically hungry.

On top of this situation we have the growing deleterious impact of global climate change with increased desertification, drought incidence and severe weather events. All of which will conspire to weaken food production in vulnerable areas. If we then add the negative impact of the burgeoning bio-fuel production on world food production we can see that the outlook is, indeed, grim and that 'business as usual' is not a viable option to reach our goal.

What can be done to increase food production without unleashing devastation on our natural environment? One sure way is to stop ploughing and to keep our soils covered to conserve this most precious of resources. Conservation Agriculture (which includes direct planting and permanent soil cover with cover crops) provides an attractive means for achieving this. If we then add complementary Agroforestry practices (especially the incorporation of the fertilizer legume tree Faiherbia albida) then we have away to protect and fertilize our soils and, at the same time, provide forage and browse for livestock enterprises. This keeps soil safe from the depredations of grazing cattle after harvest and reduces the pressure on natural forests for browse and fuel wood.

These ideas are expanded in a presentation made at the II World Congress of Agroforestry in Nairobi in August 2009 and the conclusions are given below. The paper has also been summarized in the Tropical Agriculture Association's newsletter 8 for winter 2009. The remarks of particular relevance to the question of crop-livestock interactions are highlighted:

II World Congress of Agroforestry
23-28 August 2009, Nairobi, Kenya

Agroforestry and Conservation Agriculture: Complementary practices for sustainable development

Brian Sims, Theodor Friedrich, Amir Kassam, Josef Kienzle

Conclusions: Complementary CA and AF for broader synergistic impact

The exploration of the many facets of CA and AF in this paper has led us to the following conclusions on the highly desirable compatibility and complementarity that exists between the two connected paradigms:

Ø Both AF and CA seek to emulate natural recycling mechanisms and other ecosystem services (especially the elimination of soil erosion) found in forests.

Ø Both CA and AF promote soil health and biodiversity and so both will enhance soil fertility and hence its productive capacity.

Ø AF systems (especially versions of alley cropping or live fences with leguminous tree species) produce nutritious browse which can alleviate pressure on cover crops. Free grazing of cover crops after main crop harvest is one of the major constraints to CA adoption in SSA.

Ø AF systems neatly complement CA systems in the provision of soil cover, animal feed, nutrients, household fuel, hillside protection against soil erosion and wind erosion control through shelter belts.

Ø Carbon sequestration, a key weapon in the fight for climate change mitigation, is vastly enhanced both in the soil (through no-till) and biomass (principally in trees and shrubs).

Ø Adaptation to climate change is facilitated by the increased water infiltration and storage in soils under CA and AF systems. Improved soil structure as a result of no-till and increases micro-faunal activity improve infiltration whilst increased SOM improves holding capacity.

Ø Degraded land is best rehabilitated with AF systems in conjunction with CA (which is better designed to perform under good soil conditions). Soil protection and anchorage through the establishment of tree species whilst maintaining cover and eliminating tillage with CA is a logical solution to rehabilitation.

Ø Crop and enterprise diversification are encouraged by CA and AF. One of the key components of CA is the use of crop rotations (for both main and cover crops) to exploit different soil strata and so recycle more nutrients. More and different crops can facilitate growth into new enterprises, such as livestock production. AF has vast scope for diversifying into fruit and timber production as well as livestock to exploit the additional feed produced.

Ø Family livelihoods are improved through CA and AF as labour requirements for soil preparation and weeding are reduced, crop production is increased and so incomes can be

raised. Diversification of crops leads to better diets and a more constant supply of food crops throughout the year.

Ø The policy implications for developing country governments are clear: both CA and AF should be actively supported through incentive programmes (e.g. easier access to essential inputs), training programmes (for extension agents and farmers), and encouraging and nourishing the formation of farmer self-help groups (such as FFS). These ideas are encapsulated in the declaration following the IV World Congress on Conservation Agriculture held in New Delhi, India in February 2009.

Brian Sims

Contribution 29, from Paulo Salgado et al., from CIRAD, France

-----Original Message-----
From: Paulo Salgado [mailto:paulo.salgado@cirad.fr]
Sent: 05 February 2010 11:02
To: Crop-Livestock-L@mailserv.fao.org
Cc: Jonathan Vayssières; Eric Scopel; penot@cirad.fr; Emmanuel Tillard; Dusserre Julie; Stéphanie Alvarez; Michellon; eric.penot@cirad.fr; Vincent Porphyre; plecomte; Patrick DUGUE; Pierre-Yves Le Gal; 'SALGADO Paulo'
Subject: Week 1 – Contribution from Paulo Salgado et al., from CIRAD, France

February 5, 2010

Dear Moderators,

On behalf of my colleagues and myself, please find in this message the collective perspective of some researchers (Emmanuel Tillard, Philippe Lecomte, Eric Penot, Eric Scopel, Jonathan Vayssières, Julie Dusserre, Stéphanie Alvarez, Roger Michellon, Vincent Porphyre, Patrick Dugue, Pierre-Yves Le Gal … and myself) from CIRAD (French Agricultural Research Center for International Development) which are presently positioned (or closely connected) in the Indian Ocean sub-region (mainly Madagascar and Reunion Island).

Taking advantage of this interesting e-consultation, we are convinced that it would be useful in the near future to create a kind of inventory / database / network from existing references and activities on integrated crop-livestock systems in North and South, in temperate and tropical regions to be shared between Institutions or for future additional works. Environment diversity, and differentiated assets and constraints lead to a geographical diversity of crop-livestock systems which will be interesting to explore.

- Do you believe that integrated crop-livestock systems are an answer for sustainable intensification? Do they have a place in our strategy for feeding 9 billion people in 2050?

In the context of a sustainable intensification, the synergies and trades that could be optimized between crop and livestock systems generally addressed in separate fields, shown as an important factor in improving rural economies and agricultural environmental impact. For instance, the dynamics of concentration of livestock farming, in periurban situations produce nutrient surplus and latent pollution. Conversely in the cropping systems, especially in tropical conditions and with economically limited smallholders, fertility management on the long term is a key issue in order to maintain staple and commercial crops productivity. On the other hand, the disequilibrium introduced with deforestation to develop agricultural activities will contribute to natural land degradation processes such as erosion or quick soil organic matter (SOM) mineralization. The loss of carbon as well as problems of fragility and fertility

of tropical soils, where the demand for organic inputs is high, remains a major issue. In addition, the rising cost of fertilizers in relation to the volatility of energy prices and green house gases (GHG) emission costs for manufacturing and transportation, as well as the scarcity/competition around resources (e.g. phosphorus) raise questions on how to re-design an integrated soil fertility management and to do so, a closer integration between livestock and crops is crucial.

That integrated crop-livestock systems are probably an answer to boost some Conservation Agriculture (CA) systems. In fact these systems are based partly on the use of a "service crop", which generally can be a pasture crop or a cover crop used as a forage, and a pluriannual rotation where the local staple crop (rice, cassava or maize) is in rotation with some crops which can also be used as well to complement livestock feeding (i.e. maize, some leguminous, etc.). Therefore livestock is a natural output for some of the products and provide generally a better return that being sold as a sole crop. The example of dairy production is exemplary of such case. When there is effectively an increase in output value, there is therefore an incentive as well for intensification. The side products of livestock, organic manure, can be widely used in order to maintain, or even increase soil fertility, particularly in the case of CA, leaving the use of chemical fertilizers to what is only necessary to profit from the potential of improved varieties. Therefore, such combination of CA on one side, rationalized intensification for sustainability, and livestock and crop integration on the other side became extremely attractive for farmers.

Crop-livestock integration may (should) also be an answer for sustainable intensification in developed countries. For instance, in Reunion island (France), in high input dairy systems, closer crop-livestock integration (i.e. better use of manure to fertilize forage crops + better use of forages to feed animals) is a truly good opportunity to improve both environmental and economical farm performances (win-win option). Better use of on-farm produced resources is the opportunity to replace costly inputs. While farm efficiency is improved, nutrient surplus decreased and farmers' revenues improved by closer crop-livestock integration.

In the general questioning on the future of food productions, livestock systems are in a critical position. They have to face strong societal doubts. In view of the effects and wide diversity of practices for developing products, crop-livestock systems become the challenge of not only productivity but also increased efficiency on the technical, economic, environmental and social levels. Integrated crop-livestock systems will certainly have an important role in the future for the growing demand for food but are probably not the only solution. More efficient information technologies, better management strategies, precision agriculture (crop & livestock), etc. will also be needed to address this issue. However, animal health and fertility, plant protection still stay major concerns in several regions across the world.

- What have we learned about integrated crop-livestock systems since the 1980's? Please describe innovative crop-livestock systems that you are familiar with (please remember to let your readers know the geographic/agroecological area that you are referencing).

Several research units from CIRAD (French Agricultural Research Center for International Development), located in the Indian Ocean sub-region (mainly Madagascar and Reunion island), are currently carrying out R&D activities on integrated crop-livestock systems including: (1) impact of organic fertilizers (manure, compost) in forage yields and soil fertility; (2) characterization of variation factors of quality organic fertilizers in dairy herds; (3) valorization of sugar-cane byproducts by ruminants (feeding, bedding animals and composting) using the modeling approach; (4) integrated zero tillage crop–livestock systems based on Conservation Agriculture (CA) principles, (5) introduction of temperate grass species to increase winter forage production and to improve forage quality.

In Madagascar, and particularly in the Alaotra lake region (east-central part of the country), the adoption of CA systems, a real change of paradigm for local farmers, linked with livestock production ensure sustainability in agricultural production as well as economic stability (less or no more problem of economical balance, better valorization of farm products and organic manure production and use).

- What are the key benefits that arise from these systems? Economically, environmentally, and socially? From a production standpoint, what are the gains in terms of functional biomass, multiple purpose production?

Integrated crop–livestock systems decrease external inputs (improve farm economy), improve manure and byproducts management and so can reduce the negative impact of agriculture (crops & livestock) on the environment.

In the case of Conservation Agriculture (CA) integrated crop-livestock systems, cropping systems often incorporate multifunctional cover crops (soil protection, biomass production, water efficiency, nutrient recycling, SOM improvement, C sequestration, soil biology enhancement, soil porosity, etc.). Most of those plants are very productive forage that can be used in grazing activities and grazing intensification, mainly during dry season when other pastures are already consumed. On the other sense, cattle manures are one of the main sources of fertilizer to be used onto the field crops to improve or maintain productivity, especially for very poor farmers from the south (e.g. Madagascar). Once collected, they can be combined with green manure from some CA cover-crops, first of all legumes, and some chemical fertilizers whenever available, to develop efficient Integrated Soil Fertility Management (ISFM) strategies. Such efficient integration would avoid some classical environmental externalities both from agricultural or grazing intensification processes.

In Madagascar, CA provides a better biomass production and use, a better valorization in the long term of organic manure provided to the field leading to a better agronomic sustainability in agriculture production meanwhile livestock products increase economic sustainability, in particular dairy production.

In Reunion dairy systems, benefits are both environmental and economic. However, we found that closer crop-livestock integrating often means accrued labor demand. Concerning environmental concerns, closer crop-livestock integration leads to better whole farm nutrient and energy efficiencies. Consequently nutrient surplus, energy consumption and green house gas (GES) emissions are mitigated (these results are based on a whole-farm modeling approach).

Even if there are negatively connoted interactions linked to the prospect of a classical livestock intensification, unambiguously oriented toward market economies, regarding the "South", we have to back on the complexity and the multiplicity of the functions (food, capital, cash, traction for cultivation, fertilization, religion, gifts, ...) and the economic and social influence that hold the animal and the livestock activities in poor economies.

- How are these innovations being scaled up? What are the mechanisms for sharing knowledge (Farmer Field Schools, Farmer Cooperatives, Farmer interest groups or associations)?

In Madagascar, development projects (BVLac and BVPI-SE/HP funded by AFD, or French Development Agency) are implemented since 2003 with emphasis on CA technologies, land use improvement, land certification process, animal husbandry health improvement, compost, and manure producing facilities, and livestock crop integration. The main mechanisms used by these development projects for scaling-up and sharing knowledge include credit access,

technical assistance, exchanges of experiences between farmers, demonstration fields, scientific and technical documentation, trainings courses etc.

In Reunion, participatory modeling was tested as a mean to facilitate adoption of more integrated systems. Despite the limited number of involved farmers our project showed positive effect of participatory modeling on farmers' learning and adoption of more efficient practices. After the project the knowledge of farmers about biophysical processes played a role in crop-livestock integration (grass growth, N loss during manure handling and storage, etc.) was significantly improved.

Some experiences in Brazil and Madagascar show that the innovative CA systems are brought by institutions to farmers by technical support and facilities input access (mineral fertilization, weed killers, seeds, etc.). Many smallholders are really interested in these new agricultural systems due to the technical assistant and the advance of input (which they will have to buy after yield). In fact they accepted to participate on the project, try to make "what the scientists said", but the most often they deviate the use of the input to the system the most economical interesting for them. The smallholders have to answer daily to economical constraints. Then, if the selling milk has the most economical value the innovation can be deviated for this purpose. It always the interrogation about what will happen when the project will be gone. How much the innovation will be integrated in the agricultural system of the farms? Will they try to access by themselves to necessary inputs? Those are the difficulties of innovations diffusion.

- What are the key constraints to implementing integrated crop-livestock systems? What about constraints to scaling up/out?

In Madagascar, a better knowledge on farm mechanisms between livestock activities and crop production as well as farm strategies according to local contexts (erratic rainfall, climatic risks, outputs price volatility, etc.) is required to improve recommendations.

In Reunion, subsidies for main inputs (mineral fertilizers and concentrate feeds) make external input use very attractive and while labor cost is very high crop-livestock integration is forgotten.

Smallholders have to coordinate the key constraints which are daily needs (food, animal feed, cash, etc.) with climatic risks. It is difficult to make them integrate long-term concepts when the needs are daily. The implementation of integrated crop-livestock systems have to make sure that they will reduce the short and long –term (farm) risk.

- How best do we integrate these sustainable intensive production systems into a landscape scale approach?

It will depend if landscape use is already regulated by "local organization", with a specific form of negotiation, or any other collective space where the valorization of territorial and/or global resources is already planned. If there isn't any, local collective organization should be enhanced.

In Madagascar several CA systems are developed for each level of the landscape, in function of their bio-physical characteristics, but in function too of each type of farmer. Farmers will often choose to concentrate forage production (and also CA cropping systems involving forage cover-crops) in the hillside, in new lands. But every time more new systems are developed to introduce forage in the more fertile lowlands in rotation with rice or maize production.

In other contexts, the limited crop-livestock integration at farm scale can be compensated by an integration of these two activities at regional scale. The modeling approach considering at once the economic, biophysics and sociological interactions could allow a better analysis of the potential of these sustainable production systems. A regional optimization model is actually developed in La Reunion Island to represent possible complementarities between the sugar cane and the dairy sector mainly in term of biomass exchange (feeds for organic fertilizers). In this French Region the main constraints are environmental (mountainous island) and organizational (the two sectors do not communicate for historical reasons). The optimization regional model may be used to support discussions and explore future "closer sector integration" scenarios with both stakeholders.

Best regards,

Paulo Salgado
Pôle ELEVAGE
CIRAD REUNION
7, Chemin Irat - Ligne Paradis
97410 Saint-Pierre

Téléphone ++ 262 (0) 262 49 92 53
GSM ++ 262 (0) 692 76 76 04
Secrétariat ++ 262 (0) 262 49 92 02
Fax ++ 262 (0) 262 49 92 95

Contribution 30, from the Moderators

-----Original Message-----
From: Crop-Livestock
Sent: Fri 2/5/2010 12:06 PM
To: Crop-Livestock-L@mailserv.fao.org
Subject: Week 1 -- Contribution from the Moderators

Dear Colleagues,

The following is from the Moderators.

1. Some of the most interesting new approaches to the on-farm integration are the intensified systems emerging in Brazil where Conservation Agriculture (minimum soil disturbance with crop residues left on the soil surface, plus crop rotations) is being linked to livestock production systems as pastures are sown and incorporated as part of the rotation. The biology of what is being learned and applied in Brazil could be applied to smallholders in Africa and elsewhere, but there are issues of controlling the grazing of livestock in the smallholders systems. What solutions are being found to protect some of the crop residues? Is living fence a good option? Is applying alley cropping and/or using wire- or tree-fencing the perimeter an option? How can one optimize the management?

2. Under what conditions does moving livestock into cropping lands add to soil health? For example, we have heard a thoughtful contribution from Terry Wollen of Heiffer Foundation (Contribution 14) about hoof action to enhance water infiltration, for example. Does this help in general or only in highly degraded soils with serious surface compaction? Another point for clarification here is the benefit of manure as plant nutrients; if the manure comes from biomass grown on the same field where the manure is deposited, is there a net nutrient gain? a functional ecosystem gain?

Regards,

Moderators
Crop-Livestock-L
Crop-Livestock@fao.org

Contribution 31, from P. Parthasarathy Rao at ICRISAT, India

-----Original Message-----
From: ParthasarathyRao, P (ICRISAT-IN) [<mailto:P.PARTHA@CGIAR.ORG> mailto:P.PARTHA@CGIAR.ORG]
Sent: 05 February 2010 12:16
To: Crop-Livestock
Subject: Week 1 – Contribution from P. Parthasarathy Rao at ICRISAT, India

To the moderator,

- Do you believe that integrated crop-livestock systems are an answer for sustainable intensification? Do they have a place in our strategy for feeding 9 billion people in 2050?

I did not see many responses from South Asia except a few from Bangladesh. Bulk of the milk and meat production (except poultry meat) comes from mixed crop -livestock systems. In India, as also in most south Asian countries crop residues by far the most important feed resource particularly in the semi-arid, arid ecologies. For example, in India, 50 to 70% of total feed (on dry matter basis) is from crop residues of fine cereals, coarse cereals, and leguminous crops. In the summer months stored crop residues are the only source of feed. Thus crops and livestock are integrated on the same farms making full use of the available biomass throughout the year.

Farm sizes are small in south Asia and hence mixed crop livestock systems are more profitable compared to only crop production. For example in India 85% of the farms are below 2 hectares (more than 60% are marginal farms i.e., less than 1 hectare). A majority of the farmers marginal, small, and large have livestock (draft animals, milch animals, and small ruminants).

Given the above scenario the question is not if these systems can feed the growing population but how can we increase the productivity of these systems and make them sustainable since the lives of so many poor farmers is dependent on them. The alternative is only industrial systems which contribute to environmental pollution etc.

- What have we learned about integrated crop-livestock systems since the 1980's? Please describe innovative crop- livestock systems that you are familiar with (please remember to let your readers know the geographic/agroecological area that you are referencing).

Integration takes place outside the farm also, for example landless livestock keepers in a village link with crop producers (for their surplus fodder) while the crop producers link with livestock keepers for manure etc.

What are the key benefits that arise from these systems? economically, environmentally, and socially? From a production standpoint, what are the gains in terms of functional biomass, multiple purpose production?

All the biomass that is produced on the field is utilized effectively thus avoiding burning etc that causes pollution. Income from crop production is generated once or twice in a year while

income from livestock can be on a daily basis (particularly milk). Women play an important role in livestock rearing and have control on the income from livestock sector that is used for household health and nutrition.

- What are the key constraints to implementing integrated crop-livestock systems? What about constraints to scaling up/out?

Lack of appropriate infrastructure facilities linking mixed systems with demand centers located in urban areas, small scale production and small surplus making long distance marketing uneconomical, lack of information on improved crop and livestock technologies or their availability.

P.Parthasarathy Rao
Principal Scientist
Global theme on Institutions, Markets, Policy and IMPACTS
ICRISAT
Patancheru, India

Contribution 32, from Shirley Tarawali at ILRI, Nairobi, Kenya

-----Original Message-----
From: Tarawali, Shirley (ILRI) [mailto:S.TARAWALI@CGIAR.ORG]
Sent: 05 February 2010 12:44
To: Crop-Livestock-L@mailserv.fao.org
Subject: Week 1 - Contribution 32, from Shirley Tarawali at ILRI, Nairobi, Kenya

Dear Colleagues

Thank you for this great opportunity, and for the interesting discussions so far, here are a few thoughts on week 1 issues

Shirley

From your perspective:

- Do you believe that integrated crop-livestock systems are an answer for sustainable intensification? Do they have a place in our strategy for feeding 9 billion people in 2050?

If crop livestock systems are to play a role here its going to be important to recognize that these systems are heterogeneous – not all will have a trajectory of change that will directly benefit smallholders in an environmentally friendly way whilst being able to respond to the major demands for livestock products – there is no "one size fits all" approach. Furthermore, if real practicalities of systems transition are to be addressed, vastly different approaches for research and development will be required that bring together policy, institutional, social dimensions to enable smallholder market participation – most often before technology dimensions are addressed. The present "juggling acts" that many smallholders are undertaking to manage risk and eke out a living are vastly different from integrated, market linked smallholder crop livestock production systems, which may be increasingly focused on single commodities. There is a tremendous potential to address future food by developing some crop livestock systems in an environmentally, economically and socially sustainable way, but it will require some real innovation in all dimensions to manage the transition!

The contribution from New Zealand is interesting – it highlights the vast difference between smallholder crop livestock systems in developing versus developed countries. But perhaps

there are some dimensions that we can learn from? Such as….. input and output markets working; no single approach (on a farm, or landscape or temporal scale); availability of information that allows farmers to be responsive; integration across farms (providing fodder for the neighbor etc) – and perhaps a key bottom line that applies everywhere – farmer livelihood (which includes sustainability of the natural resource base) is an underpinning issue.

- What have we learned about integrated crop-livestock systems since the 1980's? Please describe innovative crop-livestock systems that you are familiar with (please remember to let your readers know the geographic/agroecological area that you are referencing).

A number of interventions at this forum have pointed out diverse potential benefits of improving or intensifying livestock or crop production. One aspect on the technology front that we (ILRI) have pursued with national and international partners in West and East Africa and South Asia crop-livestock systems is to investigate "multi dimensional crop improvement". This arose out of the recognition that for many farmers in these systems, choices of crop varieties are not only based on grain (or sometimes tuber) yields, but on the quantity and quality of crop residues that are used to feed animals. Bringing together animal nutritionists to look at the quality/quantity of residues with crop plant breeders had in the initial stages a couple of key dimensions:

- Identification of significant variation in key quality parameters that relate to animal productivity, but without compromising grain yield. This means there is something to breed for!

- Ability to develop NIRS (Near Infra Red Spectroscopy) equations for these parameters that enable significant numbers of samples to be quickly and simply analysed. Something again that facilitates the breeding and selection process (animal feeding trials with huge numbers of test varieties would be unfeasible!)

More recently, some other aspects that emphasise the non technical issues have come to the fore:

- We see increasingly that crop residues are traded and transported, and that prices are related to quality (as perceived visually and/or after feeding – eg in milk production). There may be major implications here in terms of nutrient movement with the challenge of spatial separation of livestock and crop production and what that means for soil fertility – which is a complex mix of non and technical issues…..

- Taking this work further requires participation of diverse actors involved in the seed sector, feed processing and local entrepreneurs

- Improved crop residues alone will can improve animal productivity, but will not raise such to the levels required to address future demand. Combining feeds (including crop residues, local by products, strategic supplementation) and processing feeds (chopping etc) can increase productivity further, but raises considerable challenges in terms of feed input delivery systems, information and the like.

See recent intervention from Lieven also on this topic, of crop residues and a few more references available at:

SLP research web page (for several issues that have been discussed so far) (http://www.vslp.org/vslp/front_content.php?idcat=21).

See also the 2003 Special Issue of Field Crop Research on Food-feed crops:

http://www.sciencedirect.com/science?_ob=PublicationURL
<http://www.sciencedirect.com/science?_ob=PublicationURL&_tockey=%23TOC%235034%232003%23999159998%23467286%23FLA%23&_cdi=5034&_pubType=J&view=c&_auth=y&_acct=C000001618&_version=1&_urlVersion=0&_userid=995675&md5=ef7d3e4adbcd67cd6ef69907fc43b593>
&_tockey=%23TOC%235034%232003%23999159998%23467286%23FLA%23&_cdi=5034&_pubType=J&view=c&_auth=y&_acct=C000001618&_version=1&_urlVersion=0&_userid=995675&md5=ef7d3e4adbcd67cd6ef69907fc43b593

- What are the key benefits that arise from these systems? economically, environmentally, and socially? From a production standpoint, what are the gains in terms of functional biomass, multiple purpose production?

Some of the comments about the need to manage biomass and understand trade offs in crop livestock systems are pertinent. The System-wide Livestock Programme (www.vslp.org) together with partners in four regions of developing country crop livestock systems has recently initiated a series of regional studies to investigate such issues in relation to crop livestock systems at various levels of intensification and in different market settings. See below a summary of this work.

"Mixed crop-livestock systems are very dynamic and are evolving rapidly in response to external drivers such as demographic pressure, development of urban markets and increased demand for crop and livestock products, climate variability and change. In addition, the recent interest for bio-fuel production exacerbates further the pressure on biomass in production systems.

The SLP study aims at better understanding the tradeoffs in crop residue uses in cereal based systems in four regions: millet, sorghum, maize based systems in West Africa; maize based systems in Eastern and Southern Africa; and wheat/rice based systems in South Asia. The major tradeoff in most systems is the short term benefits of using crop residues to feed livestock versus leaving the crop residues in the field to improve soil productivity (nutrient balance, erosion control, and soil health).

The study focuses on the decision making processes at the farm/household level and will capture the diversity/contrasts and recent changes in CR uses at various scales in order to better target technical, institutional and policy options to improve livelihood without compromising long term system sustainability."

- How are these innovations being scaled up? What are the mechanisms for sharing knowledge (Farmer Field Schools, Farmer Cooperatives, Farmer interest groups or associations)?

I think it's a much broader context (rather than single innovations) that addresses market demand and the opportunity for smallholder participation – which does not work for all systems in every place and will need to be nuanced depending on things like livestock commodity, economic stage of the country (GDP, whether agricultural, transforming or urban), agricultural potential…etc. One aspect that is key to the potential of smallholders to remain competitive is land and labour costs, especially at production level, meaning for example in some instances, smallholders often have an advantage over large scale enterprises for dairy, but not so for pigs and poultry.

See for example:

Baltenweck I., S. Staal and M.N.M. Ibrahim. Demand-driven crop-ruminant intensification: trans regional analysis (TRA) to understand patterns of change using village level data from three continents. http://bsas.org.uk/downloads/mexico/015.pdf

(Other links related to TRA: http://www.vslp.org/upload/pdf/trasnregionl.pdf and http://www.trajectories.org/issues.asp)

- What are the key constraints to implementing integrated crop-livestock systems? What about constraints to scaling up/out?

There needs to be some careful consideration of WHAT is to be scaled up. Single technology focused approaches (eg the alley farming discussion) are unlikely to work, but need to be approached in ways that allow for integrated market (input and output), institutional (at various levels from local to national and regional – including the participatory approaches and community engagement), policy dimensions with technology aspects (which also should not focus on just single interventions but – for example bringing together issues of crop varieties and management with livestock husbandry, feeding, improved breeds and veterinary care….etc. In many instances, crop livestock systems (as we have seen from the discussion so far) are already integrated, and the challenge includes how to build on such integration and evolve to address these multidimensional requirements that have been well highlighted.

Contribution 33, from Pedro Machado, Embrapa, Brazil

-----Original Message-----
From: Pedro L O A Machado [<mailto:pmachado@cnpaf.embrapa.br>
mailto:pmachado@cnpaf.embrapa.br]
Sent: 04 February 2010 23:59
To: Crop-Livestock; Crop-Livestock-L@mailserv.fao.org
Subject: Week 1 - Contribution from Pedro Machado, Embrapa, Brazil

Dear all,

Hope I am not late.

1. Do you believe that integrated crop-livestock systems are an answer for sustainable intensification? Do they have a place in our strategy for feeding 9 billion people in 2050?

A. Yes if ICLS leads to nutrient cycling (cover crops in rotation with cash crops help on K and N cycling) and weed suppression by plant residue covering the soil surface and keeping soil moisture during dry spells commonly observed on tropical climates (1500 mm rainfall with dry season for 5 months).

2. What have we learned about integrated crop-livestock systems since the 1980's? Please describe innovative crop-livestock systems that you are familiar with (please remember to let your readers know the geographic/agroecological area that you are referencing).

A. The Cerrado - neotropical savanah (see climate characteristics above) covers 25% of Brazil with clayey Ferralsols (50-60% clay) being predominant but significant portion of sandy soils also present. During the 1980s and still nowadays planted pasture abounds, mostly suffering from certain level of degradation (low meat production due to low forage to soil water erosion on the landscape). This covers 100 million ha approximately. Farms for grain production are characterized by soybean in the summer rainy season followed by fallow during the autumn/winter dry season. Maize may be planted at the end of the rainy season. Zero-till is being widely adopted, but precise area is hard to be found. Most information on

zero till area is anecdotal based on questionnaires to farmers or consultants and farm coops. However, by mid-1990s the recovery of degraded pasture was initiated by ranchers in collaboration with scientists and included intensive heavy-disc harrowing (tilling not deeper than 13 cm) of 200 to 500 ha areas at the beginning of the summer rainy season. Maize or upland rice mixed with African Brachiaria grass and mineral fertilizer. Maize showed better performance and the resulting yield enabled payment of the costs for pasture recovery. This works when maize prices are ok. Nowadays, maize prices hardly pay the costs for tillage and fertilizer.

Later, scientists and farmers (not ranchers) adopting zero-till for soybean followed by fallow identified the possibility of sowing maize mixed with brachiaria grass after soybean harvest taking advantage of the residual rainfall of the summer season. After the harvest of maize, brachiaria is left to grow during winter dry season, zebu oxen are brought to the area to gain weight for meat and after being sent to slaughter houses, brachiaria is desiccated with glyphosate and soybean is sown again in the area with a zero- till planter. Pasture may be prolongated for two years before soybean is planted again.

There are other ways of ICLS with goats, pasture grass and grape production.

Have to go now. Kids need me to have teeth brushed and to go to bed. More later...

Bye,
Pedro L O A Machado
Soil Scientist
Embrapa Rice and Beans
Brazil

Pedro L O de A Machado
Email:pmachado@cnpaf.embrapa.br
Pesquisador A - Dr. nat. techn. Solos
Embrapa Arroz e Feijao
Rodovia GO-462, km 12
35735-000 Santo Antonio de Goias, GO

Contribution 34, from Ramon Costa Alvarenga at Embrapa, Brazil

-----Original Message-----
From: Ramon Costa Alvarenga [<mailto:ramon@cnpms.embrapa.br>
mailto:ramon@cnpms.embrapa.br]
Sent: 05 February 2010 14:50
To: Crop-Livestock
Subject: Week 1 - Contribution from Ramon Costa Alvarenga at Embrapa, Brazil

Dear colleagues,

My contribution:

Yes. I believe that the integrated crop-livestock systems was the proposal for greater impact on food production for Brazil in the last two decades. Historically, most farmers produce cereals and cattle production in isolated systems. Add these two activities into a single system has generated breakthrough. Traditionally, almost all cattle production is grazing on soils naturally low and the pattern of production is low, something around 100 kg of live weight per hectare per year. By integrating these areas with the crop production, you can double or triple the cattle production in the short to medium term. The pasture also gives considerable

contribution to the fields: a straw of very good quality and quantity for the implementation of no-tillage. For the most areas in Brazil which typically has a hot and humid climate that favors rapid decomposition of crop residues promoting a poor management and soil and water conservation, the integrated crop-livestock system it is showing to be a very good management. With this new reality is being able to increase both the cattle and the plant production and this will undoubtedly help to feed a growing world population.

In the state of Minas Gerais, Brazil, some experiments show encouraging results (see in
<http://www.cnpms.embrapa.br/publicacoes/publica/2007/circular/Circ_93.pdf>
http://www.cnpms.embrapa.br/publicacoes/publica/2007/circular/Circ_93.pdf
and
<http://www.cnpms.embrapa.br/publicacoes/publica/2006/circular/Circ_80.pdf>
http://www.cnpms.embrapa.br/publicacoes/publica/2006/circular/Circ_80.pdf
and
<http://www.cnpms.embrapa.br/publicacoes/publica/2009/comunicado/Com_166.pdf>
http://www.cnpms.embrapa.br/publicacoes/publica/2009/comunicado/Com_166.pdf).

The intercropping of maize and grass, I believe, is the most prominent technology although other combinations of crops and fodder are also possible. One of the main advantages of this consortium is the economic exploitation of the soil throughout the year: spring / summer – crop + forage grass, fall / winter - grassland can still last for one or more years.

Environmentally, these systems allow the use and rational management of soil with gains in quality of soil and water. No-till is more easily made possible due to the initial conditioning of the soil and the increased supply of straw for pasture for soil mulch. Thus, soil erosion is reduced, soil degradation and sedimentaion of reservoirs and water courses is minimized. This system has been showing reducing of using of pesticides to control pests, diseases and weeds. In summary, the synergism between tillage and pasture strongly contributes to the sustainability of farming.

Economically, the increasing of the productivity with lowering cost production promotes a profitable system. In addition, increasing the availability and quality of products. Socially, the increase in revenues improve living conditions in the field, consequently increased labor supply by encouraging people to remain in the field. In Brazil there is an emptying of the countryside with people migrating to cities, swelling the slums, etc…

The interaction of research with the state technical assistance have allowed the farmers take these innovations. Courses, field days, lectures and other types of work "on farm" is going on. More than a thousand of extension agents have been trained, government programs encourage the replication of these technologies on farms throughout the state: more than one thousand units of observation and transfer technologies are set up. It is estimated that only in 2009 more than thirty thousand farmers had access to these technologies. Many colleges and universities already have in their curriculum the teaching of integrated crop-livestock systems even in graduate school.

In my opinion the best way to integrate these systems with the landscape is through the integrated crop-livestock-forest systems. The forestry component comes not only the restoration of forest around the watercourses and protection of slopes, but also the production of wood from planted forests for multiple uses contributes markedly to reduce the demand on natural forests which are thus preserved. In the system itself, no-tillage management is very useful.

Ramon Costa Alvarenga
Pesquisador Embrapa Milho e Sorgo
Manejo e Conservação do Solo e da Água

Coordenador PROTILP
C. Postal 151-35701-970 Sete Lagoas-MG
Tel: 31-3027.1251 Fax: 31-3027.1188

Contribution 35, from Michel Duru at INRA, France

-----Original Message-----
From: Michel Duru [<mailto:mduru@toulouse.inra.fr> mailto:mduru@toulouse.inra.fr]
Sent: 05 February 2010 15:11
To: Crop-Livestock
Subject: Week 1 - Contribution from Michel Duru at INRA, France

Dear Moderators,

As an agronomist working for INRA (French National Institute in Agronomy). I have a lot of experience about livestock systems in beef system (less favoured areas: mountains, hills) as well as intensive dairy systems, mainly in France.

- Do you believe that integrated crop-livestock systems are an answer for sustainable intensification? Do they have a place in our strategy for feeding 9 billion people in 2050?

Yes, I do believe they have such a place, although the current economical and environmental context is not yet favorable to such developments in Europe. However, I think that the expected changes, as global change or energy crisis would favour such evolution in the next decades.

- What have we learned about integrated crop-livestock systems since the 1980's? Please describe innovative crop-livestock systems that you are familiar with (please remember to let your readers know the geographic/agroecological area that you are referencing).

Several research units from INRA are involved in research programs relying on integrated crop-livestock systems (East and Centre of France). Both combined "system experiments" and participatory research through networks of farmers. The main problem is that economic drivers don't favor very much such a system in the current context.

- What are the key benefits that arise from these systems? Economically, environmentally, and socially? From a production standpoint, what are the gains in terms of functional biomass, multiple purpose production?

The key benefits of integrated crop–livestock systems are to decrease inputs (fertilizer, pesticides….), improving farm economy and reducing environmental impacts.

For social issues, crop-livestock systems can increase mental workload which can be discouraging farmers from adopting them; but they offer the opportunity to spread the labor all the year long, avoiding surplus of labor at some key periods of the year.

- How are these innovations being scaled up? What are the mechanisms for sharing knowledge (Farmer Field Schools, Farmer Cooperatives, Farmer interest groups or associations)?

- What are the key constraints to implementing integrated crop-livestock systems? What about constraints to scaling up/out?

The response to this question is not easy, taking into account of economical, environmental and social drivers in Europe.

Most often, Market favors crops in comparison to milk and meat, so that the most favored areas decreased animal production. In less favored areas, where it is difficult to grow cereals (wheat, corn), livestock is most often the alone agricultural activity than can occupy the land. These two reasons tended to specialize the landscape for crops or livestock even if the environmental benefice of integrated crop-livestock systems is now well known. However, global change, especially increasing extreme climatic events, should encourage the development of more robust farming system. Integrated crop-livestock systems can be more resilient that specialized agricultural systems. A strong increase in energy prices will certainly lead to the development of integrated crop-livestock systems producing the same quantity with less energy consumption (concentrates, fertilizer….).

- How best do we integrate these sustainable intensive production systems into a landscape scale approach?

In Europe, the landscape is very patchy (except in the great plains used for annual crops) in terms of farming system and environmental conditions (slope, aspect, soil characteristics) at different scales: farm, catchment…… A first approach would be to examine at what scale complementarities can be interesting: within and between farms.

Regards

Michel Duru
INRA
France

Contribution 36, from Jill Lenne, UK

-----Original Message-----
From: Jillian Lenne [mailto:jillian.lenne@btopenworld.com]
Sent: 05 February 2010 16:03
To: Crop-Livestock-L@mailserv.fao.org
Subject: Week 1 - Contribution from Jill Lenne, UK

Dear Contributors

I have greatly enjoyed reading the contributions from Week 1. The breadth of experience with crop-livestock systems globally is very impressive. Clearly there is a need to bring all of this valuable information together into an accessible knowledge base so that all practitioners working in crop-livestock systems can be informed of past and current successes. Perhaps a Global Crop-Livestock Initiative?

Five years ago, a colleague and I collated and analysed the relevant outputs from some of the DFID-UK funded Africa-based projects in crop-livestock systems with a view to identifying the key elements of successful initiatives which could be applied to future research in these systems. Very few of these projects were "crop-livestock" projects per se but were implemented in crop-livestock systems. I have attached the publication from this study.

Key characteristics of successful and productive projects were that they:

* fostered multidisciplinary research teams of crop, livestock and social scientists;
* worked with both crop and livestock R&D institutes;

* built on existing knowledge bases and integrated multiple knowledge bases;
* 're-worked' the stock of knowledge according to farmer and system needs;
*developed productive and sustainable partnerships; and
* sought opportunities for spill-overs to other locations and regions.

Many of the analysed projects were "crop" projects that potentially offered more than the implementing scientists realised at the time. However, the full realization of the benefits from this substantial research effort continues to be hampered by the historical and ongoing lack of cross-disciplinary linkages and cross-sectoral approaches. "Crop" and "livestock" scientists are located in different institutes. It is usually only through a project that they have a chance to work together. When the project finishes, it is very difficult to maintain the partnership. In most countries, agricultural institutes are organized on disciplines and there are barriers between the soil, plant and animal sciences. This situation precludes a holistic approach to complex system-based problems. Within animal sciences, pasture science and animal nutrition have often been separated from animal production (i.e. management). Such an organizational structure ignores the real problems faced by farmers and interactions in farming practice between the disciplines. If the benefits of successful initiatives are to be enjoyed by farmers in crop-livestock systems, crop and livestock research needs to be better integrated.

For me, the critical constraints to implementing successful crop-livestock research to need current and future populations are a) the lack of a global knowledge base and b) the general lack of cross-disciplinary linkages and cross-sectoral approaches in crop-livestock research.

Best wishes
Jill Lenne
Scotland, UK

Contribution 37, from Jorge Ribaski at Embrapa, Brazil

-----Original Message-----
From: Jorge Ribaski [mailto:ribaski@cnpf.embrapa.br]
Sent: 05 February 2010 17:04
To: Crop-Livestock
Subject: Week 1 - Contribution from Jorge Ribaski at Embrapa, Brazil

Dear colleagues,

My contribution:

Silvopastoral systems as a support for sustainable development in the southwest region of the State of Rio Grande do Sul, Brazil

The anthropic pressure in the natural ecosystem of the Southwest region of the State of Rio Grande do Sul (Pampa biome), Brazil, characterized by large sandy soils formations, has caused a significant reduction of its vegetation cover, facilitating the extensive erosion occurring in several regions. The natural limitations for agriculture and traditional extensive cattle raising added to the inappropriate land use have aggravated its natural erosion process, gradually amplifying the areas with scarce vegetation coverage and sandy fields. This process of environmental degradation has had negative impacts upon social and economic conditions, decreasing quality of life of country population.

Currently, there is great incentive to develop strategies capable to promote sustainable land usage. In this context, the development of integrated silvopastoral systems is seen as an alternative to mitigate the desertification and to aggregate value to the rural properties through

forestry and wood production. The use of integrated silvopastoral system is coherent with governmental developmental policies, which are aimed at actions capable to promote socioeconomic development without adverse effect in the environment.

The objective of this study is to develop sustainable silvopastoral systems according to economic, social and environmental points of view, aiming at improving welfare and quality of life of farmers, adding economic value to their farms through wood exploitation and natural resources conservation of this ecosystem.

Jorge Ribaski
Embrapa Florestas

Contribution 38, from Jagdish Timsina at the IRRI Bangladesh Office

-----Original Message-----
From: Timsina, Jagadish (IRRI) [mailto:J.Timsina@cgiar.org]
Sent: 05 February 2010 17:08
To: Crop-Livestock
Subject: Week 1 -- Contribution from Jagdish Timsina at the IRRI Bangladesh Office

I would like to add/emphasize the following points to this last day of discussion on Week 1 :

1. Conservation agriculture (CA), climate change, and crop-livestock integration are closely linked. CA emphasizes (a) reduced or minimum tillage (minimum soil disturbance) (b) partial or some level of residue retention (c) diversified, profitable and sustainable crop rotations. All these three assist in development and promotion of crop-livestock integration systems. Reduced tillage helps retain crop residues in the field and can be used for improving soil fertility and organic matter as well as can be used for feeding livestock. No doubt, reduced tillage will help mitigate greenhouse gas emissions as reduced tillage means reduced carbon emissions, and thus reduce the impact of climate change. Partial residue retention has been suggested in CA so that at least some residues are retained in soil for lowering soil temperature, conserving soil moisture, and building soil organic matter (all these processes help crop species adapt to climate change) while some residues are used for livestock. Diversified and sustainable crop rotations generally imply leguminous or nutrient adding food crops or fodder or cover cops to cropping systems. Such rotations provide nutritious fodder or feed for livestock.

2. When we attempt to develop or improve the productive and profitable crop-livestock systems, we must consider the effect of global climate change on such systems. Just like climate change will change the adaptability of crop species and cultivars, climate change will also affect the adaptability of the fodder and forage species as well as that of livestock. Likewise, how crop-livestock systems will contribute to mitigating or emitting the greenhouse gases must also be analyzed. For example, rice lands and ruminants contribute to methane emissions. How can we optimize the crop-livestock systems so as to mitigate the climate change?

3. As has also been indicated by different contributors, cereals provide crop residues as well as grain (feed) for the livestock. Of all cereals, maize is becoming quite popular in Asia. Maize hybrids (yellow color) are grown widely mainly because the grains are used as feed for livestock (mainly for poultry but also for cattle) while white maize is used as food for humans. Maize leaves and residues are also used widely in Asia. In case of wheat and rice, mostly residues are used and but less grain is used as feed. Hence, cereal (maize)-livestock integration is the best form of crop-livestock integration in Asia.

Thanks,

Jagadish Timsina
IRRI Bangladesh Office

Contribution 39, from José Campero Marañon in Bolivia

-----Original Message-----
From: José Campero Marañon [mailto:jrcampero@hotmail.com]
Sent: 05 February 2010 17:17
To: crop-livestock-l@mailserv.fao.org
Subject: Week 1 - Contribution from José Campero Marañon in Bolivia

Dear Moderators:

I have greatly enjoyed reading the contributions from Week 1. Perhaps it is necessary to have a Global Crop-Livestock Initiative in order to facilitate the development of sustainable intensification. On the order hand, my is English is very poor. But I think that the language is only one of the ways of communication.

Do you believe that integrated crop-livestock systems are an answer for sustainable intensification? Do they have a place in our strategy for feeding 9 billion people in 2050?

Yes. The utilization of by-products generated in a subsystem as input for another subsystem is important. In highlands of Bolivia, the integrated systems of production are being practiced from before the Spanish conquest of these lands. In these integrated Andean systems the surface of the principal crop depends on the capacity of the livestock component, composed principally by llamas, alpacas and sheep, to produce manure. Nevertheless, it is in the extensive systems of production of meat with bovine where the strategy of sustainable intensification is much more important. In Bolivia, these systems are very inefficient and the annual production per hectare is only 16 kg of corporal mass; productions that have a value of near 8 dollars. In these natural range it is urgent to include an agricultural component such as rice, maize or tolerant soybean to acid soils; close to the crop, it is necessary to include lime and fertilizers to the soil (lime and chemical fertilizers) in order to correct the pH and the deficiencies of the soil nutrients; and, finally jointly with the annual culture it is key to establish the permanent pasture, generally it is some species of generous of Brachiaria or Panicum. This practice of pasture establishment is very common in Tropical Chapare; this technology was improved and documented by EMBRAPA Brazil.

This strategy allows to establish and to correct the fertility of the soil at a zero cost; because the sale of the excess agricultural crop pays for the cost of the improvements to the soil and the establishment of the pasture. It is documented that this strategy for sustainable intensification allows productivities per hectare superior to 500 kg of corporal mass of bovines per hectare and year.

What have we learned about integrated crop-livestock systems since the 1980's? Please describe innovative crop-livestock systems that you are familiar with (please remember to let your readers know the geographic/agroecological area that you are referencing).

In Bolivia, several technologies were transferred in order to intensify native savanna production, such as: the partial or total substitution of the savanna native vegetation by improved pastures or leguminous, incorporation of leguminous arboreal into savanna native vegetation, and many others. Nevertheless, they failed in the massive application of these technologies, because of the low cost of the land, particularly certainly in the tropical

lowlands; and, because there existed little political interest from the neoliberal governments for democratizing the access to the land. Actually, the land must perform an economic and social function. In consequence, it becomes necessary to intensify the production in order to reach this function that the law demands from the land.

In the way of sustainable intensification of the extensive systems of livestock production, the principal strategy or the most promising technology, in my modest opinion, is: annual crop (rice, maize or soy bean) + improved the fertility of soils; and, + the culture of the improved pasture. Technology that was reported in the lines above.

What are the key benefits that arise from these systems? economically, environmentally, and socially? From a production standpoint, what are the gains in terms of functional biomass, multiple purpose production?

The sustainable intensification of extensive livestock systems will allow reaching economic, environmental and social benefits.

Economic. It is demonstrated that the intensification of extensive livestock systems will allow major economic income due to an increase of the current productivity from 16 to 500 kg of corporal mass of bovine per hectare. It means, the intensification will allow to increase the productivity for surface unit by more than 30 times in relation to the current levels

Environmental. Additionally, this process (intensification) will allow using minor surfaces of native savanna to produce meat and, in parallel, it is possible to transform the surfaces of savannas that are not used as natural forests or cultivated forests, helping to mitigate the effects of the climatic change by carbon sequestration in tropical grassland ecosystems.

Social. The way livestock intensification is possible is if there is more land allocated for crop production or integrated crop-livestock systems. Also, it is possible to minimize requirement of land allocated for livestock. The land not used for livestock purpose, will allow the creation of a land market, democratize the access to the land for people that at this moment do not have land for agricultural uses.

The main benefit is in terms of ecological resilience of the system.

The principal ecological benefit is that there will be reduced pressure on forest land. And, at a global level this will be increase forest capacities to sequestration of Carbon. It is possible that in the near future the technology allows the reduction of the CH4 emission from ruminants in grasslands.

How are these innovations being scaled up? What are the mechanisms for sharing knowledge (Farmer Field Schools, Farmer Cooperatives, Farmer interest groups or associations)?

Our experiences in Bolivia, the Estate will develop specific policies to improve these innovations. These policies will be in relations to development of differential incomes in order to improve the innovation associated with sustainable intensification. Other aspects are to bring to the producers credits and production inputs at low prices. The most important is that the Estate and Farmers association agree about the way for this process of sustainable intensification.

What are the key constraints to implementing integrated crop-livestock systems? What about constraints to scaling up/out?

The principal key constraints for the development of the integrated crop-livestock systems is the high demand of rangelands that are needed to offer to the agricultural system the sufficient

quantity of mature that demands the agricultural component. It is possible to resolve this issue with the use of chemical fertilizers. But this use, will be tested in terms benefits/water and soil contamination.

How best do we integrate these sustainable intensive production systems into a landscape scale approach?

In Lowlands of Bolivia, the support capacity of the native savanna has an average of 0.28 UA. And, with this capacity of support of native savanna there is 30 million of hectare under this management. This information shows us the necessity to develop a process of sustainable intensification. The best way, in our opinion is the technology known as "Barreirao" (BS) that was documented by Kluthcouski et al (1999).

In Bolivia, especially in the Chapare region, it is the form of establishment of B. decumbens or humidicola. The BS needs to know the fertility and acidity of the soil in order to correct it; and, the requirements in nutrient of the annual crop, the method of preparation of the soil and the epoch as well as the depths and epochs of soil preparation. The forage culture uses the residual fertilization to consolidate its establishment and to guarantee the temporary sustainability.

José R. Campero
DIRECTOR ALIANZA BOLIVIANA DE LA
SOCIEDAD CIVIL PARA EL DESARROLLO SOSTENIBLE

Contribution 40, from Alan Franzluebbers at USDA

-----Original Message-----
From: Franzluebbers, Alan [mailto:Alan.Franzluebbers@ARS.USDA.GOV]
Sent: 05 February 2010 18:48
To: Crop-Livestock-L@mailserv.fao.org
Subject: Week 1 - Contribution from Alan Franzluebbers at USDA

Dear Colleagues,

Contemporary research in the USA has not been particularly focused on integrated systems in general, but there have been some pockets of activities in various regions. These activities could serve as examples of the processes to achieve successful integrated crop-livestock system. I can relate a bit from our research in the southeastern USA (a warm, humid climate similar in characteristics to other parts of the world). For a review of the region and some of the research conducted in this regard, see the attached article (2007a_AF.pdf). Winter cover crops are a great strategy for the region to control soil erosion, recycle nutrients, and build belowground biodiversity. The high quality forage of many annual species makes them an excellent choice to integrate cropland with livestock (2007b_AF.pdf). At least in the medium term when stocking rates are balanced with available forage, the negative impacts of animal traffic can be minimized and lead to improved nutrient cycling at the soil surface as well (2008d_AF.pdf and 2008e_AF.pdf). Integration of crops and livestock does not necessarily have to be limited to within a farm, but also might be possible among farms in a community (2007c_AF.pdf).

Do you believe that integrated crop-livestock systems are an answer for sustainable intensification? Do they have a place in our strategy for feeding 9 billion people in 2050?

Yes, integrated crop-livestock systems can be a part of a package for many regions to achieve sustainable agricultural systems under the pressures of trying to increase production for the

expected food, feed, fiber, and fuel needs of society. Resource-efficient farming systems would dictate that resources be shared among components of a diversity of production systems.

What have we learned about integrated crop-livestock systems since the 1980's? Please describe innovative crop-livestock systems that you are familiar with (please remember to let your readers know the geographic/agroecological area that you are referencing).

In the southeastern USA, converting conventionally tilled cropland to cropland managed with conservation tillage (reduced, strip, no tillage) has been essential to stop erosion and build soil quality. Producers are also realizing that successful conservation tillage systems require continuously vigorous plant cover on the land. Utilizing cover crops for animal forage has been slowly attempted and has a place to increase nutrient cycling and still preserve vegetative cover through the winter period.

What are the key benefits that arise from these systems? economically, environmentally, and socially? From a production standpoint, what are the gains in terms of functional biomass, multiple purpose production?

Economic and environmental benefits have been realized in some cases, but the social acceptance of winter grazing of cover crops and pasture-crop rotations has been difficult to achieve at this point. Case studies are available to show that overall farm productivity increases with integrated systems.

How are these innovations being scaled up? What are the mechanisms for sharing knowledge (Farmer Field Schools, Farmer Cooperatives, Farmer interest groups or associations)?

Conservation production systems training conferences and field days are being developed more often and farmer-led conservation tillage associations are slowly recognizing the potential value of integrated crop-livestock systems.

What are the key constraints to implementing integrated crop-livestock systems? What about constraints to scaling up/out?

Extending knowledge from research experiments to farmers is still lacking with integrated systems in the USA. Region- and location-specific information is also lacking for a diversity of integrated approaches and this limits broad-scale adoption.

How best do we integrate these sustainable intensive production systems into a landscape scale approach?

Buy-in from key land management support groups is necessary. Vocal, innovative farmers must serve as examples to their fellow farming community to illustrate what the advantages and disadvantages might be.

Alan J. Franzluebbers
USDA - Agricultural Research Service
1420 Experiment Station Road
Watkinsville GA 30677
Tel: 706-769-5631 ext 223
alan.franzluebbers@ars.usda.gov

Contribution 41, from Paulo César de Faccio Carvalho at UFRGS, Brazil

-----Original Message-----
From: Paulo Cesar de Faccio Carvalho [mailto:paulocfc@ufrgs.br]
Sent: 05 February 2010 20:14
To: Crop-Livestock
Subject: Week 1 - Contribution from Paulo César de Faccio Carvalho at UFRGS, Brazil

Dear Moderator,

Please find below some comments on proposed topics. Please consider this contribution from myself and from Dr. Anibal de Moraes (Universidade Federal do Parana).

- Do you believe that integrated crop-livestock systems are an answer for sustainable intensification? Do they have a place in our strategy for feeding 9 billion people in 2050?

I am not sure ICLS are an answer to sustainable intensification in the way we usually refers to. I think we can consider ICLS certainly as a sustainable option to feed people, since almost no other system can mimic the natural nutrient fluxes in the way ICLS can potentially reach (obviously depending on systems characteristics). In Southern Brazil ICLS have been considered as a strategy to both smallholders and large cash crop oriented farms.

- What have we learned about integrated crop-livestock systems since the 1980's? Please describe innovative crop-livestock systems that you are familiar with (please remember to let your readers know the geographic/agroecological area that you are referencing).

I will refer to Southern Brazil (subtropical area). ICLS I this region are mainly based on cash crops (maize, soybean, and rice)/pasture (annual C3 and C4/perennial C4 grasses) rotations. Thus livestock comprehends mainly dairy and beef cattle operations. One comment merits reference in this topic. We have learnt the need of diversity as the basis of rotation in ICLS, and the benefits of grazing animals in enhancing this diversity and its positive consequences. Agricultural systems based only on cash/crop and no-till systems have been suffering from unsustainable intensification leading to loss of biodiversity, nutrient pollution and habitat fragmentation. Innovative crop-livestock systems are being considered in the concept of higher diversity in the rotations (C3, C4, annuals, perennials, mono, dico, trees, etc.), and the necessity of a grazed pasture phase to perform nutrient cycling in a way only crop rotations cannot perform.

- What are the key benefits that arise from these systems? Economically, environmentally, and socially? From a production standpoint, what are the gains in terms of functional biomass, multiple purpose production?

Some of the main key benefits we have been experiencing are: i) economically – diversification of incomes (in nature and in time); risk decrease, increasing crop and/or livestock yield; land, labor and machinery use efficiency; ii) environmentally – increasing organic matter and many soil quality attributes; recycling nutrients, increase diversity, decreasing gas emissions (being evaluated); decreasing pressure to open new agricultural areas (mainly natural pastures in the Southern Brazilian case); iii) socially - increasing profits decreases migration pressures from smallholders; ICLS are creating new specialists/specialties demand to work with (human resources, technologies, equipments, etc…);

- How are these innovations being scaled up? What are the mechanisms for sharing knowledge (Farmer Field Schools, Farmer Cooperatives, Farmer interest groups or associations)?

Two main references on this topic. Lessons learned show Southern Brazilian farmers are responsive for Cooperative educational systems, as well as field demonstrations. We have an excellent experience with MAPA/Brazil within the PISA project, which comprises 22 demonstration units in 31 municipalities and 3000 participants in Brazil. The basis is a participatory approach, knowledge being applied and adapted on farm by a local committee fostered by specialists. Field demonstrations allow for multiplication of the results. The originality remains on how the committee is structured and works, which is difficult to explain here.

- What are the key constraints to implementing integrated crop-livestock systems? What about constraints to scaling up/out?

A very complex question with very possible answers. One point to be mentioned is there is no organized public-oriented initiatives to foster ICLS. FAO can have a crucial role on that.

- How best do we integrate these sustainable intensive production systems into a landscape scale approach?

A landscape scale approach needs some kind of public intervention and clear economic benefits. Once more FAO can help in emerging oriented policies.

Regarding moderator comments below, just a few words...

1. Some of the most interesting new approaches to the on-farm integration are the intensified systems emerging in Brazil where Conservation Agriculture (minimum soil disturbance with crop residues left on the soil surface, plus crop rotations) is being linked to livestock production systems as pastures are sown and incorporated as part of the rotation. The biology of what is being learned and applied in Brazil could be applied to smallholders in Africa and elsewhere, but there are issues of controlling the grazing of livestock in the smallholders systems. What solutions are being found to protect some of the crop residues? Is living fence a good option? Is applying alley cropping and/or using wire- or tree-fencing the perimeter an option? How can one optimize the management?

A crucial issue is in which measure we can control grazing. Livestock systems in Africa are quite different from those in Brazil, but the key remains on grazing control (frequency, which considers animal movements, and intensity, which consider stocking rates and grazing intensities). Fencing, pastoralism, and other grazing controls… there are many "precision grazing" tools solutions that have been recently developed (GPS location control, virtual fencing, pedometers, etc..). Anyway, for management optimization there is need for some measure of grazing control.

2. Under what conditions does moving livestock into cropping lands add to soil health? For example, we have heard a thoughtful contribution from Terry Wollen of Heiffer Foundation (Contribution 14) about hoof action to enhance water infiltration, for example. Does this help in general or only in highly degraded soils with serious surface compaction? Another point for clarification here is the benefit of manure as plant nutrients; if the manure comes from biomass grown on the same field where the manure is deposited, is there a net nutrient gain? a functional ecosystem gain?

The main condition to allow soil health enhancement by moving livestock into is the use of moderate grazing. The way animal influence soil health can be positive or negative depending on grazing intensity. This experience have been observed in many soil/systems conditions. Concerning the second question, the ecosystem functionality by manure produced by biomass grown or not on the same field considers the absence of grazing in the system where manure

comes from outside? “Nutrient gain” refers to what exactly? We need these clarifications to go further.

I thank you all for this opportunity and congratulations for the organizers initiative.

Kind regards, Paulo

Paulo César de Faccio Carvalho
Departamento de Plantas Forrageiras e Agrometeorologia
Faculdade de Agronomia - UFRGS
Av. Bento Gonçalves 7712 Cx Postal 776
CEP 91501-970 Porto Alegre, RS, Brasil
+51 3308 7402 ; +51 9919 7196
Grupo de Pesquisa em Ecologia do Pastejo

Contribution 42, from Lindsay Coulthard, Manitoba, Canada

-----Original Message-----
From: mztra [mailto:mztra@mts.net]
Sent: Sat 2/6/2010 12:38 AM
To: Crop-Livestock-L@mailserv.fao.org
Subject: Week 1 - Contribution from Lindsay Coulthard, Manitoba, Canada

Dear Moderator:

I am passing along my comments on the week 1 consultation. I appreciate the opportunity to follow this process and to be able to read the observations from other parts of the globe on farming issues.

Lindsay Coulthard
Farm and Extension Manager
Manitoba Zero Tillage Research Association
Brandon, Manitoba, Canada

- Do you believe that integrated crop-livestock systems are an answer for sustainable intensification? Do they have a place in our strategy for feeding 9 billion people in 2050?

I do believe that an integrated crop-livestock system is part of the answer for sustainable intensification. In western Canada we have moved our production towards more specialized farming systems since the 1970's with less than successful results. Our crop production is done by one segment of the agricultural industry, livestock reproduction is another segment and livestock feeding and finishing is done mainly by large enclosed feedlot systems. There is limited integration between these systems.

Our production systems are continually under stress from high costs of production. We believe that one solution to those problems is to integrate livestock back into our cropping systems to achieve benefits from each of the systems working together. I believe this would be a key part of the strategy for feeding our expanding population.

- What have we learned about integrated crop-livestock systems since the 1980's? Please describe innovative crop-livestock systems that you are familiar with (please remember to let your readers know the geographic/agroecological area that you are referencing).

We have been addressing some of the energy related costs of production in our cropping systems and working to rely less on fossil fuel based energy sources. With this objective we are now working towards developing systems which will include cover crop production with legumes as at least part of the cover crop blend. In our temperate climate in western Canada we try to produce these cover crops as a whole season crop and need a financial return on this crop. We are using livestock to graze the cover crop to give us that economical return. The biomass from these cover crops is not entirely grazed and the nutrients are left for subsequent crops. Another important part of this equation is the rotational grazing system that we are using to harvest the cover crops. This system ensures that we are establishing a healthy plant during the production year which will improve the soil health as well as increase our nutrients stored as organic material in the soils. This also reduces the amount of time that the livestock are kept in an enclosed feeding area which will reduce the energy required in the total feed uptake in the feedlot. The biggest benefit from this system is the reduction in commercial nitrogen for crop production while maintaining yields that we are experiencing following the legume production.

- What are the key benefits that arise from these systems? economically, environmentally, and socially? From a production standpoint, what are the gains in terms of functional biomass, multiple purpose production?

The key benefits achieved from this system are:

1. Reduced need for commercial fertilizer (economic and environmental benefits)
2. Reduction in the time required to feed and finish the livestock in the feedlot system (economic, environmental and social benefits)
3. Animal waste remains in the field where it is beneficial to soils (economic, environmental and social benefits)
4. Reduced capital expenditures in farm equipment

- How are these innovations being scaled up? What are the mechanisms for sharing knowledge (Farmer Field Schools, Farmer Cooperatives, Farmer interest groups or associations)?

These innovations are being scaled up in a modest way by innovative farm producers who are interested in modifying their farm production management. There has been limited uptake from the farming public in western Canada as this technology is being extended at a time when the economic returns to a livestock enterprise are depressed.

This technology is being extended to farm producers in field schools, workshops and working with farm groups.

- What are the key constraints to implementing integrated crop-livestock systems? What about constraints to scaling up/out?

One of the key constraints to the adoption of new technology in western Canada is the support programs put in place to assist farm producers. These programs do a lot to support the status quo in our production systems. This results in less innovative thinking and a resistance to adopting new technology which may involve additional management and possibly additional risk.

Another constraint to implementing an integrated crop-livestock system in western Canada is high labour costs. These systems do involve additional labour and management. Western Canadian farms have increased in size and have felt the need to specialize to make use of limited management and labour.

- How best do we integrate these sustainable intensive production systems into a landscape scale approach?

What we require to expand the adoption of sustainable intensive production systems:

1. modify our farm economic support systems to reward innovation
2. Increase public emphasis on research, education and innovation
3. Additional research and extension of the benefits of this integration

a. Soil health benefits
b. Water quality benefits
c. Livestock health benefits

Lindsay Coulthard
Farm and Extension Manager,
Manitoba Zero Tillage Research Association
Brandon Office: 204-729-8838
Farm Office: 204-725-3939
Cellular: 204-825-7878
email: <mailto:mztra@mts.net> mztra@mts.net

Contribution 43, from Celso Ayala Vargas at INIAF, Bolivia

-----Original Message-----
From: Celso Ayala Vargas [mailto:celsoayalavargas@hotmail.com]
Sent: Sat 2/6/2010 4:10 AM
To: Crop-Livestock
Subject: Week 1 – Contribution de Celso Ayala Vargas INIAF Bolivia

Estimados colegas.

Con mucho respeto, pido disculpas por no poder traducir mis opinones al ingles, pero para mi es mas facil escribir en mi idioma.

En principio debo indicar que el termino de "intensificación de los sistemas", requiere de un analisis mucho mas profundo para su denominación, esto porque los sitemas productivos dependen del contexto en cual se quiera describir dentro del contexto mundial, en Bolivia existen sistemas productivos agricolas, sistemas productivos pecuarios, y sistemas productivos mixtos, esto depende mucho en que ecosistema en el cual nos ubiquemos, pero no solo exsiste la complejidad del cultivo o la producción ganadera, sino que en ella intervienen otros componenetes, como los biologicos (microorganismos), los componenetes, económicos, sociales y culturales. En la actualidad la producción intensiva es una derivación de estos sistemas y justamente su intensificación es denominada como producción moderna (monocultivos). Esta claro que es necesario incrementar la producción de alimentos para el 2050, pero no es necesario destruir los sistemas de producción, por eso antes de poder intervenir en ellos, se necesita realizar estudios minuciosos para cada uno de sus componentes y asi de esta manera pensar en un futuro su intensificación del conjunto de sus componentes.

En este momento en nuestro país temos el modelos de producción intesiva, como el cultivo de la soya, que por sus caracterisiticas esquilmantes, estan dejando grandes tierras erosionadas, y en producción la gandera, la intensificación significa el incremento de alimentos balanceados, donde muchos de sus ingredientes compiten con la alimentación humana y si continua creciendo el auge de los biocombustibles que tipo de intensificación llegaremos a tener?. Por eso es necesario hablar con mucho detenimiento sobre la intensificación de los sistemas

productivos. En la ganderia de los rumiantes son quienes se encargaran de convertir las praderas nativas en carne o leche, los mismos que son el sustento de millones de personas?. Si intensificacamos estos rubros requeriremos muchos alimentos para los animales,lo que tambien intensificara la producción agrícola, que es la consecuencia de la dependencia tecnologica actual, los sitemas productivos en la actualidad sobre todo se amantienen en los países en vias de desarrollo, y por que esto no han entrado en el ritmo de la producción intensiva?. Es justamente por que los pueblos originarios son quienes manejan ese concepto del equilibrio productivo con la naturaleza.

Son algunas de las cuestionantes que planteamos, antes de emprender con un terminologia, que a la larga puede afectar el concepto mismo de los sistemas de producción.

Un saludo cordial.
Atte.

Celso Ayala Vargas
INSTITUTO NACIONAL DE INNOVACIÓN
AGROPECUARIA Y FORESTAL - BOLIVIA

Contribution 44, from Andrew MacMillan, ex-FAO, Italy.

-----Original Message-----
From: Andrew MacMillan [mailto:andrew.macmillan@alice.it]
Sent: Sat 2/6/2010 9:06 AM
To: Crop-Livestock; Crop-Livestock-L@mailserv.fao.org
Subject: Week 1 – Contribution from Andrew MacMillan, ex-FAO, Italy.

Dear Moderator,

Some Reflections

What we seem to be seeing from many of this week's contributions is that, left to themselves, farmers in most parts of the world integrate livestock and crops in one way or another in their farming systems. They gain the benefits that come from recycling of nutrients (including the maintenance of a high level of organic matter in the soil, a source of fuel and even of building materials); the stability of income that comes from a diverse range of products, and, for subsistence farmers, a generally nutritious diet, and even a source of garments); and, in many cases, an important supply of power that greatly increases the performance of human labour.

Various pressures associated with "modernization" of agriculture have, instead of building on the advantages of intensifying crop-livestock integrated systems, undermined them. These include the separation of "agriculture" from "animal husbandry" in higher education, research and extension, and increasing moves towards specialization within each of these areas; the promotion of inorganic fertilizers as the principal source of nutrient replacement (to the neglect of not only manures but also biological nitrogen fixation); the replacement of animal traction by mechanized systems, adapted usually to a narrow range of cropping systems and benefiting from "scale"; a tendency for a concentration of farm land in ever larger units; and, perhaps, most of all, the relative managerial simplicity of "specialization", especially as the scale of operations increases. Subsidy policies, often related to a few products, have contributed to the "narrowing" of farming systems

At the root of many of the changes that have been taking place in the "modernization" of agriculture over the past 60 years has been the extent to which the direction of innovation in

farming has been driven so strongly by the potential commercial advantages that it offers to the corporate suppliers of inputs. There has been, as a consequence, gross under-investment in the improvement of farming systems in ways that minimize the use of purchased inputs - towards, for instance, raising soil organic matter content through mulches, manures, composts, intercropping and rotations; improving soil structure to allow for better water infiltration and retention; stimulating soil bacterial activity to increase nutrient availability; harnessing biological nitrogen fixation processes; integrated pest management processes; diversifying systems to increase resilience to climatic change processes and other shocks (including market shocks and pest related shocks); improving the efficiency of draft animal traction systems (and hand tools). For similar reasons, there has been gross under-investment in improving even fertilizer formulations to raise nutrient efficiency use, and innovations in spraying techniques that have led to better distribution of pesticide applications have been kept off the market. (Conservation Agriculture systems interestingly have gained strong corporate support, at least to the extent that they are herbicide-dependent).

At the same time, the adjustments in marketing arrangements that have come with the growth of super-markets throughout the world and direct contracting for delivery of large quantities highly standardised products, have increased pressures towards specialization.

What is particularly interesting is that so much innovation in crop-livestock system integration referred to in this week's discussion comes from inventive farmers (who have taken it upon themselves to spread the word) rather than formal research systems.

Hopefully a progressive rise in fossil fuel prices, the growing threats and uncertainties posed by climate change processes, including incentives to reduce greenhouse gas emissions, concerns over the degradation of scarce farmland and water resources through the use of non-sustainable farming practices, the widening gap between rich and poor, the presence of over a billion hungry people in the world, and another 2 billion malnourished, and so on, will begin to set new directions towards sustainable agricultural intensification on small and large-scale farms that will take full advantage of the many potential benefits that come from more integrated approaches to farming systems and ones that harness and reinforce many of the "ecological" processes that have been so seriously ignored in recent years. But this will require policies that create incentives for innovation that are "in the public good", rather than leave the direction of change in farming to be set largely by corporate interests - a point made very clearly by the International Assessment of Agricultural Knowledge, Science and technology Development http://www.agassessment.org/

Andrew MacMillan

Contribution 45, from Bob Boddey at Embrapa, Brazil

-----Original Message-----
From: bob [mailto:bob@cnpab.embrapa.br]
Sent: Sat 2/6/2010 6:08 PM
To: Crop-Livestock
Cc: Eduardo Campello; Segundo Urquiaga; Bruno; Claudia Pozzi Jantalia; Sérgio Miana de Faria; Alexander Resende
Subject: Week 1 - Contribution from Bob Boddey at Embrapa, Brazil

I have been traveling this week so I am rather late with my contribution. I hope the moderators will forgive and include this in their first week’s theme. I have only had time to glance at the other contributions

I think I need to divide my comments into two types of farming: The large mechanized operations and the resource-poor farmer.

In Brazil the Integration of Crop Livestock on medium to large size properties in the Cerrado region is advancing with great success. Typically farmer use 4 years of cropping followed by a similar period of planted pasture (mainly Brachiaria spp.). The tradition amongst cattle ranchers in most of Brazil has been to take advantage of nutrients in ash from burning off native vegetation (deforestation) or one or two years of cropping where fertilizers are added. BUT it is very unusual for ranchers to apply fertilizers to their pastures and this has resulted in huge areas (30 to 40 Mha perhaps) in the Cerrado of degraded pastures. However, Brachiaria is a pasture grass which is extremely productive with modest nutrient inputs and the residual nutrients from a few years of cropping can form very productive pastures. Continuous cropping in the Cerrado with good management under no till seems to maintain soil organic matter (SOM) levels close to the original levels, so from the point of view of the soil resource we can regard the system as sustainable. Some years ago the crops were managed principally with conventional tillage and loss of SOM was apparent but there is some data which suggests that in the 4 years cropping followed by 4 years pasture, the pasture phase allowed recovery of the SOM levels. However, today the system being increasingly adopted is cropping under no-till followed by pasture also implanted with direct drill (no till). These data on SOM levels come from the long term experiment at the Embrapa Cerrado Centre and managed by Lorival Vilela and his colleagues, who have already posted a few comments.

My preoccupation with SOM levels should not be regarded a great interest in carbon credits, but SOM is not being lost, and under good NT ICL systems, SOM levels will almost certainly increase for some years. The increase in SOM means that the soil resource is being used in a sustainable fashion. But these systems rely on chemical fertilization and skilled management. In the Cerrado there are many landowners who have access to the resources and knowledge base and it is almost inevitable if soybean, maize and beef prices remain favorable, that the area under these systems will increase. The impact is incredibly favorable compared to the present land use (misuse) of degraded pastures which are compacted, restrict water infiltration, and in advanced cases the soil is liable to wind or hydric erosion.

A very large proportion of small holders all over the tropics and sub-tropics already use integrated crop/livestock systems. But these systems are rarely sustainable. To preserve the soil resource the replenishment of nutrients removed must come from industrially produced fertilizers. There have been romantic ideas that one can use the dung and urine from cattle to fertilize crops. Of course this is possible, but you need many hectares (10 to 50 depending on the quality of the pasture) of pasture to produce animal wastes sufficient to provide one ha with, for example, sufficient nutrients for a reasonable maize crop.

But while fertilizer alone can help to maintain nutrient reserves, frequent tillage, be it with a hand hoe, or an animal- or a tractor-drawn plough will lead to the eventual reduction in SOM levels, loss of soil structure, lower crops yields etc., and eventually leading to erosion and soil loss. FAO has recognized this in their drive to promote no-till agriculture for small holders in the tropics. Apart from the plough, the great enemies of maintenance of SOM are fire (burning off of residues), or use of residues for fuel, and the consumption of crop residues by livestock. To adopt Conservation Agriculture as FAO defines it, requires the use of no-till and the maintenance of crop residues to protect the soil surface, apart from diversifying crop rotations. The use of fire to clear land for planting is almost universal. The best alternative is herbicide, but many small holders do not have access to this. Furthermore, the tradition is so strong, that a lot of farmer participation in successful trials will be needed for this change of practice. The other major constraint is the almost universal use of crop residues as fodder. Often the crop residues are of low forage value, but in the absence of other sources, they are the only feed available. It is here that one of our teams at Embrapa Agrobiologia has a

suggestion. We have a strong team here who work on using fast-growing legume trees to recover degraded areas. The use of these tree seedling which are inoculated with both selected rhizobium and endo mycorrhzal fungi allows there vigorous growth in totally degraded soils. Many smallholders will have areas (often sloping) which are useless for cropping or pasture as they are degraded or even eroded. These areas can be used to grow these trees. Many species provide forage, and also firewood and some species can be planted as live fence posts. I think this contributes towards an answer to the first question posted by the Moderators (Contribution 30).

"Some of the most interesting new approaches to the on-farm integration are the intensified systems emerging in Brazil where Conservation Agriculture (minimum soil disturbance with crop residues left on the soil surface, plus crop rotations) is being linked to livestock production systems as pastures are sown and incorporated as part of the rotation. The biology of what is being learned and applied in Brazil could be applied to smallholders in Africa and elsewhere, but there are issues of controlling the grazing of livestock in the smallholders systems. "What solutions are being found to protect some of the crop residues? Is living fence a good option? Is applying alley cropping and/or using wire- or tree-fencing the perimeter an option? How can one optimize the management?"

I think there is great potential for these trees to help provide solutions to the factors limiting adoption of CA by smallholders. It should be emphasized that we are not talking about any trees, they must be fast-growing legumes and they must be inoculated at least with rhizobium (the team has strains for over 20 species). However, a great deal of work is required in the field to look at the barriers to adoption and the acceptance by farmers of such a technology. I will be posting more information on these trees on our website http://www.cnpab.embrapa.br/pesquisas/cycling.html. There is already an article on the use of these trees to recover degraded areas:
http://www.cnpab.embrapa.br/pesquisas/fast-growing-legumes3.html

Bob Boddey, Nutrient Cycling group, Embrapa Agrobiologia,
(bob@cnpab.embrapa.br)
--
Robert M. Boddey,
Research Scientist,
Embrapa Agrobiologia,
Km 47, Caixa Postal 75.505,
Seropédica, 23890-000,
Rio de Janeiro,
Brazil.

Phone (Work) +55-21-3441-1568
Phone (Home) +55-21-2682-1427
Fax +55-21-2682-1230
Cell Phone: 21-8703-1411

Contribution 46, from Martin Entz in Manitoba, Canada

-----Original Message-----
From: Martin Entz [mailto:mentz@cc.umanitoba.ca]
Sent: Sat 2/6/2010 6:48 PM
To: Crop-Livestock
Subject: Week 1 - Contribution from Martin Entz in Manitoba, Canada

Dear Colleagues,

While I did not have the chance to provide input into the crop-livestock discussion, I very much appreciated reading what others had to say. This was an amazing opportunity to learn from others.

For me, one of the important themes was to not only have integrated production systems, but also integrated thinking - something that has suffered due to our hyperspecialization (in Canada anyway).

Best wishes and thank you

Martin Entz

Dr. Martin H. Entz
Professor of Agronomy and Cropping Systems
Department of Plant Science
University of Manitoba
Winnipeg Canada

visit my website: http://www.umanitoba.ca/outreach/naturalagriculture/

Contribution 47A, from Roberto Peiretti at APPRASID, Argentina

-----Original Message-----
From: Ing. Agr. Roberto A. Peiretti [mailto:sdrob@idi.com.ar]
Sent: Sat 2/6/2010 6:49 PM
To: Crop-Livestock
Cc: Crop-Livestock-L@mailserv.fao.org
Subject: Week 1 - Contribution from Roberto Peiretti at APPRASID, Argentina

Dear Amir:

Forestry and Crops-Cattle Grazing and cereal crops in commercial large scale agriculture

Just at the end of week 1 period, I am sending some pictures of good examples of agroecosystems parcelized allocation according to its production capacity (grazing on the bottom land and crops at the better soils).

Both activities are perfectly integrated and maximizing the efficiency of use of the available resources not only from the agroecological standpoint if not also from the economic standpoint. Crops are been developed under the No Till and MOSHPPA principles as well as pastures improved by No Tilling into the natural sod of the bottom lands.

Most of these pictures are from my friend and colleague Gabriel Carballal from AUSID Uruguay (Uruguayan No Till farmers association).

I will divide in three emails to avoid them to be electronically heavy. You can resend whichever of them you feel appropriate to illustrate the ideas and principles stated on my first contribution of this week.

This first are containing pictures of integration of forestry with cereals and grazing into the forestry area (cattle is not seen on this pictures but they are down there). Cereals and or

oilseed crops like soy in the best lands, improved pastures on the lowlands and forestry in the low agricultural quality lands. All of them for large scale commercial agriculture in this case.

The second mail will contain examples of small mostly subsistence farming operations of Northern Argentina and Paraguay

The third one will contain a short power point with examples of the advances of intercropping we are developing in Argentina in the central pampas area.

Regards

Roberto
AAPRESID
CAAPAS

Contribution 47B, from Roberto Peiretti at APPRASID, Argentina

-----Original Message-----
From: Ing. Agr. Roberto A. Peiretti [mailto:sdrob@idi.com.ar]
Sent: Sat 2/6/2010 6:55 PM
To: Crop-Livestock
Cc: Crop-Livestock-L@mailserv.fao.org
Subject: Week 1 - Contribution from Roberto Peiretti at APPRASID, Argentina

Dear Amir:

Small Farmers Examples of intercropping alley crops etc.

Here is the second mail.

Mandioca: This picture shows the No Tilled Cassava in Paraguay as an alley crop

Mucuna: This picture shows the intercropping of a legume into corn

Naranja poroto shows the alley crop of beans into orange plantation.

Regards

Roberto
AAPRESID
CAAPAS

Contribution 47C, from Roberto Peiretti at APPRESID, Argentina

-----Original Message-----
From: Ing. Agr. Roberto A. Peiretti [mailto:sdrob@idi.com.ar]
Sent: Sat 2/6/2010 7:12 PM
To: Crop-Livestock
Cc: Crop-Livestock-L@mailserv.fao.org
Subject: Week 1 - Contribution from Roberto Peiretti at APPRESID, Argentina

Dear Amir:

Intercropping in the Argentinean Humid Pampas

This is the last mail. It carries attached a short powerpoint showing the intercropping in ARGENTINA.

Regards

Roberto
AAPRESID
CAAPAS

Contribution 48, from Ricardo Ralisch at Londrina University, Brazil

-----Original Message-----
From: ricardo ralisch [mailto:ricardoralisch@gmail.com]
Sent: Sat 2/6/2010 9:24 PM
To: Crop-Livestock
Cc: Crop-Livestock-L@mailserv.fao.org
Subject: Week 1 - Contribution 48, from Ricardo Ralisch at Londrina University, Brazil

Hi Friends,

Through the contributions we have seen the importance of this subject: Crop-livestock integration

My contribution will explore some points:

1- In tropical conditions it is possible to make money from the crop-livestock integration (CLI) with cover crops or inter crops;

2- In several climatically hard conditions, mainly with a dry season or wet and hot season, the best alternative to have a permanent cover crop is with live plants, instead of straw which is a good alternative for mild climates.

3- Live plant cover means roots which increases SOM (see Bob Boddey contribution n. 45), recycles nutrients, recovers soil structure and feeds the soil biological life.

4- The CLI induces the diversification of roots (again), micro, meso and macro fauna and flora, crops and plants, agricultural activity and output (which would mean more profit).

5- The CLI is a real way to agricultural sustainability.

In our studies, we have seen that this kind of roots effects to "plow" the soils are much better than to do it with machines; and with a good root distribution (and with cover crops), which is a central feature of the Conservation Agriculture, it is possible to reduce the negative soil impacts on agriculture.

For this reasons in some climatic and weather conditions, the CLI is best known solution for sustainable intensification.

Congratulations to all.

Regards,

Ricardo Ralisch
Universidade Estadual de Londrina
Agricultural mechanization; Farm system impacts; No-Till
Londrina city, Brazil

Contribution 49, from Ken Giller at Wageningen University, The Netherlands

-----Original Message-----
From: Ken Giller [mailto:ken.giller@gmail.com]
Sent: Sun 2/7/2010 11:06 AM
To: Crop-Livestock
Subject: Week 1 - Contribution from Ken Giller at Wageningen University, The Netherlands

Dear All,

I'd also like to thank the Moderators for a very educative and insightful week of contributions. There is a rich contribution of new technical and ecological approaches, and I hope that someone will take the time to summarise and bring together the contributions. I was pleased that some of the recent contributions (Bob Boddey, Frank Place etc) have raised the issues of resource constraints among smallholders for whom there are several competing goals and uses for crop residues in mixed crop-livestock systems, and where trees and herbaceous forages can play an important role. The prioritization of crop residues for livestock feed was one of the main issues we raised in a recent review of the potential for conservation agriculture for smallholders in Africa (Giller et al., 2009) that raised considerable debate.

When we consider development pathways for smallholders, livestock can play a key role. My colleague Henk Udo in Wageningen and others refer to this as the 'livestock ladder' (see Udo et al, 2007) where incremental steps in a development pathway could be seen from chickens to small ruminants to cattle. We analyse a similar idea in the attached paper on smallholder crop-livestock systems in Western Kenya which I attach.

Thanks again for the stimulating debate and I look forward to the second week of interaction.

With best wishes to all,

Ken

Ken Giller
Professor - Plant Production Systems,
Wageningen University, P.O. Box 430
6700 AK Wageningen, The Netherlands
Street address: Building 107,
Droevendaalsesteeg 1,
6708 PB Wageningen
Tel: +31 317 485818
Fax: +31 317 484892
E-mail: ken.giller@wur.nl

Websites http://www.africanuances.nl/
http://www.seamless-ip.org/
http://www.competingclaims.nl/
http://www.pps.wur.nl/uk

Week 2 Contributions

Contributions in Week 2 of the crop-livestock e-consultation

From the Moderators

-----Original Message-----
From: Crop-Livestock
Sent: 07 February 2010 22:12
To: Crop-Livestock-L@mailserv.fao.org
Subject: Welcome to Week 2 (February 8-12) of the e-consultation on Integrated Crop-Livestock System for Development

February 8, 2010

Dear Colleagues,

Thank you to all of you who provided input to Week 1 of our e-consultation on Integrated Crop-Livestock Systems for Development - The Way Forward for Sustainable Production Intensification.

It is time now to turn our attention during Week 2 (February 8-12) to supply and value chain dynamics and the actors associated with promising crop-livestock systems.

In our background paper, we identified a focus on Input and output market linkage development for promising integrated crop-livestock systems and associated input and output supply chain processes and public-private service providers for different production systems and diverse markets (including constraints and opportunities in input supply chains covering production inputs of seeds, agro-chemicals, farm power, equipment and machinery, veterinary services, advisory and innovation systems on good farming practices, marketing infrastructure and organization forms etc; constraints and opportunities in output supply chains covering animals for meat, milk and other dairy products, hides and skins from cattle and small ruminants, and meat and eggs from poultry, and meat from pig; and opportunities for processing in integrated production systems etc).

During this week we need to highlight those opportunities and constraints along the input supply and output value chains from the various production inputs (for crop/livestock health and production) through the transport (distance/mode) and processing (infrastructure, food and worker safety, etc.) components en route to a variety of markets (local, national, international). Further, we need to better understand the role or potential role of different private sector, government and civil society actors that interact along the input supply and output value chains.

Needless to say, we are covering a lot of variables this week! That said, we would ask you to please ground your responses in a specific crop-livestock system and scale as you share your insights on the following questions.

- There are integrated crop-livestock systems across a range of types (on-farm or area-wide) and scales in different agroecologies. Are there system-dependent input supply chain constraints (e.g. seeds of certain legumes, equipment and machinery for minimum soil disturbance and direct seeding, herbicides, livestock feed for specialized systems, etc.) that need to be addressed? Which are these and how have they been or might they be overcome?

- Do integrated crop-livestock systems offer an advantage when it comes to incentives/rewards for good practice such as payment for environmental services or access to special markets? If so, what is your experience with these?

- Are there market (local, national, international) dependent value chain constraints (e.g. lack of local processing facilities, food quality/safety regulations, market access, etc.) that need to be addressed? Which are these and how have they been or might they be overcome?

- Who are the input supply chain and output value chain actors and how do they inter-relate? Who drives the chains (farmers, input providers, markets, government, etc)? How equitable are the benefits to different actors along the input supply chain and output value chain? Are there examples of input chain and output value chain actors working together to gain more competitiveness and sustainability or stability?

- Might we see a shift toward greater local/national sustainable markets in light of decreasing availability and increasing costs of transport fuel, climate change, food insecurity, etc.?

Please speak to any other issues or opportunities with which you have experience in terms of input supply and output value chains dynamics associated with integrated crop livestock systems.

Thank you for your attention to these questions. We look forward to learning together through this second week of the e-consultation.

Please do keep in mind the three overall objectives of the consultation (what do we know about integrated crop-livestock systems for development – what works and what does not; define next steps for key stakeholders; and guide and empower FAO to better support member countries to harness the development potential of integrated crop-livestock systems) towards which the discussions must aim at over the next four weeks. Also, each week's topic should be addressed in the context of two cross-cutting issues – the role of stakeholders, and capturing public goods and incentives for action.

For the technical background document and other related information, please visit the website: http://www.fao.org/agriculture/crops/core-themes/theme/spi/iclsd.

Week 1 summary will be posted on the website as well as a folder containing all the contributions during the week. The attachments that came with the contributions during Week 1 will also be available on the website in the documents section.

With that we thank you and welcome your responses.

Warm wishes,
The Moderation Team

Amir Kassam
Constance Neely
Theodor Friedrich
Eric Kueneman

E-mail: Crop-Livestock@fao.org

Contribution 1 from Max Shelton at the University of Queensland, Australia.

-----Original Message-----
From: Horne, Peter [mailto:horne@aciar.gov.au]
Sent: 07 February 2010 22:35

To: Crop-Livestock-L@mailserv.fao.org
Subject: Contribuiton from Max Shelton

1. We (Ross Gutteridge) at UQ were involved in alley cropping trials in the 80s and early 90s and published on the topic. The trials were never really taken onto farmers fields, except in an experimental context where the researcher was completely in charge. The work did not lead to any adoption that I am aware of, and I was not surprised that this work, and all of the work started by BT Kang in the 70s and 80s never led to serious farmer adoption due to a number of factors:
    - The scarcity of labour as mentioned was one issue, but more importantly, I doubt that farmers viewed the technology as a viable way to meet their needs. Using the tree legume mulch to lift soil organic matter and fertility was an indirect benefit not easily appreciated or recognised by farmers.
    - The actual responses of the alley crop to mulching were variable and difficult to easily demonstrate for a variety of reasons.
    - Add to this, the lack of commercial return from alley crops (often food crops), which made the extra work for variable or limited financial benefit hard to justify.
    - We always felt that there needed to be clear financial benefit to farmers (environmental benefit alone was not sufficient to motivate farmers) and that this might come from direct use of the foliage of the tree legumes for feeding animals which had more immediate commercial value. However, in the 70s and 80s the commercial value of livestock, though better than subsistence food crops, was still low and this was a disincentive to take on a labour intensive system.
    - The commercial value of livestock in smallholder systems has greatly increased in the past 10-15 years and this has changed the dynamics e.g. there is greatly increased interest in the use of forages that improve livestock production. Therefore interest in such systems has increased. If this is the case, then tree legume crop/livestock alley farming system may benefit from some reappraisal but there can be no certainty that it will succeed.
    - The crop improvement aspect of alley farming may still be a hard sell but the direct use of tree legumes for livestock is a different matter, especially if you do not prescribe that the tree legumes be planted in an alley cropping format. There are already large numbers of farmers around the world feeding tree legumes directly to livestock, but not always from an alley cropping style system.
    - There are examples of alley cropping working in practical farmer situations. In Australia, there has been some alley cropping of leucaena with forage crops rather than grain crops so livestock has been the main focus.

2. Whilst it is important to test new technologies on-farm, with full participation of farmers who need full opportunity and ownership to evaluate variants of the system, and farmer field schools might help, this alone will not lead to adoption if ultimately the concept does not meet a need of the farmer. Improved participatory approaches will not make the technology succeed if does not meet farmer needs.

Assoc. Prof. Max Shelton
Faculty of Natural Resources, Agriculture, and Veterinary Science,
The University of Queensland
Brisbane, Australia, 4072

Contribution 2, from Jorge Grijalva Olmedo, INIAP-Ecuador

-----Original Message-----
From: Jorge Grijalva Olmedo [mailto:jgrijalva55@hotmail.com]
Sent: 08 February 2010 02:41
To: Crop-Livestock
Subject: Week 2 contribution from Jorge Grijalva Olmedo, INIAP-Ecuador

saludos, aunque con retrazo involuntario, pongo a consideración un aporte del INIAP-Ecuador a la discusion de la primera semana.

Las pasturas para crianza de ganado, asociadas a sistemas integrados árboles - pasturas y/o pasturas-cultivos, constituyen la principal forma de uso de la tierra en la Amazonía ecuatoriana, cuya expansión en base de la utilización de prácticas no sostenibles, son a menudo consideradas entre los factores más importantes de deforestación y cambios climáticos globales. Desde otra perspectiva, esta actividad pionera ha acompañado al proceso de ocupación y transformación del espacio amazónico, y ha sido un contribuyente en la generación de empleo y evolución de varias cadenas de valor en la región. Sin embargo, varias preguntas aun merecen ser investigadas y contestadas: (i) La intensificación es realmente un camino seguro que puede contribuir a detener o al menos reducir la deforestación en la Amazonía?, De qué modo las sub-cadenas asociadas a cada componente del sistema integrado agricultura-ganadería, pueden contribuir a captar mano de obra?, La inversión en sistemas integrados puede efectivamente contribuir a reducir el impacto ambiental del efecto invernadero?

Trabajos realizados en varias comunidades de los Andes y Amazonia ecuatoriana sobre el valor de los sistemas silvopastoriles, muestran que la recuperación e intensificación de pasturas son las mejores estrategias para aumentar la unidad animal por hectárea, y por lo tanto, podrían contribuir a reducir el impacto ambiental. De hecho, en la región amazónica ecuatoriana sería posible liberar al menos un 25% del área con pasturas degradadas para dedicarlas potencialmente a la producción agroforestal (árboles-cultivos, árboles-pasturas). Por otra parte, tal como se evidencia en sitios o nichos particulares de la Amazonía donde se practica una agricultura intensiva basada en silvopasturas, el mejoramiento genético de los hatos así como el desarrollo de razas con mayor conversión alimenticia pueden contribuir a ese fin.

Por otra parte, de acuerdo con varios trabajos de investigación del INIAP en torno al establecimiento de pasturas asociadas en sistemas silvopastoriles, muestran algunas variables importantes que pueden afectar las decisiones y la difusión de tecnologías agroforestales, entre ellas se pueden citar a: las condiciones climáticas y las características del suelo, el crecimiento económico de los centros urbanos, la instalación de una agroindustria para dar valor agregado a los productos, la disponibilidad de mano de obra, la Disponibilidad de capital y acumulación previa, el Crédito para fomento agropecuario, la organización de productores, entre otros incentivos.

La intensificación que explica los altos niveles productivos en algunas propiedades del sector empresarial de varias cuencas importantes de la Amazonia, se debe a la introducción de innovaciones para conservar el suelo, otras prácticas de manejo y utilización de pasturas y de animales, la fertilización aún cuando podría potenciar el desarrollo de los pastos y cultivos, no es un elemento tecnológico discriminante sobre todo al sector marginal. Al respecto, cuando se analizan Pobreza, racionalidad económica y conservación, se cuestiona el supuesto del modelo convencionalmente conocido de pobreza-deforestación, al menos al nivel local ecuatoriano, precisamente porque los fragmentos boscosos en predios del sector de subsistencia y marginal, sugieren una *relación entre el nivel de pobreza, baja aptitud del suelo y conservación del bosque*. En este sentido, las familias más vulnerables, a pesar de que tienen mayor área boscosa, no lo aprovechan justamente porque no cuentan con la mano de obra suficiente y el capital para actuar en favor de la deforestación.

Dado el índice de pobreza que caracteriza a la población de la Amazonía, la estrategia de desarrollo debería buscar la conciliación entre los objetivos de desarrollo humano y la conservación de los recursos, explorando estrategias múltiples, que no sólo se orienten a la intensificación y al uso del bosque, sino también a promover la educación y generar empleo. La participación del Estado y la Cooperación Internacional es esencial para enfocarse a la intensificación y recuperación de áreas ganaderas que ya han sufrido un proceso de transformación, y por otro, poner énfasis en la gestión ambiental participativa de los bosques remanentes.

Se requiere intensificar las acciones para el desarrollo de mercados para los servicios ambientales que provienen del bosque. Las acciones estatales deben encaminarse a negociar la inclusión de alternativas "con sombra" (alternativas integradas agrícola-ganaderos) en los *acuerdos internacionales de implementación conjunta* de venta de carbono, solamente así, el pago por este servicio cumpliría un objetivo social.

Las prácticas tradicionales de producción agrícola-ganadero que se aplica en Amazonia, reflejan una racionalidad campesina aparentemente muy consistente con las características biofísicas y las condiciones socioeconómicas de los productores. En adición, la generación de tecnología enfocada al mejoramiento de las economías comerciales puede tener efectos negativos en el sector marginal, al provocar procesos de concentración de la tierra y, por otro lado, al liberar recursos, mano de obra y capital, pueden influir en la ampliación de la frontera. En consecuencia, la evaluación de sistemas alternativos agroforestales y silvopastoriles conducentes a incrementar la productividad en el largo plazo y retener mayor cantidad de mano de obra y generar ingresos, debe considerarse como una prioridad. En esa perspectiva, los sistemas agroforestales abren el camino correcto para el establecimiento de tecnologías sostenibles o eco-tecnologías, apoyadas en los principios de la agroecología y la agroforestería. Asimismo, deben examinarse *las reformas políticas necesarias para promover la agroforestería dentro de esta estrategia de desarrollo,* dándole atención preferencial al mejoramiento de la estructura institucional para el desarrollo de mercados de productos arbóreos y apoyo a la investigación, extensión y promoción campesina.

cordialmente
Jorge Grijalva Olmedo, Ing. Agr. Ph.D
Líder Programa Nacional de Forestería
INIAP, Estación Experimental Santa Catalina
Km 1 panamericana sur, Quito
telefax : 2 690 692
domicilio: 2 232 822
Portable: 09 79 53 184
Quito-Ecuador

Contribution 3, from from Kwaku Agyemang, FAO Sub-Regional Office for Southern Africa (SFS), Harare

-----Original Message-----
From: Agyemang, Kwaku (FAOSFS)
Sent: Mon 2/8/2010 10:47 AM
To: Crop-Livestock
Cc: Han, Gaoju (FAOSFS)
Subject: Week 2 contribution from Kwaku Agyemang, FAO Sub-Regional Office for Southern Africa (SFS), Harare

Dear Friends and Colleagues,

I would like to extend my congratulations to the Organizers of this discussion and to all of you who were able to contribute to the Week 1 discussion. Due to back to back Workshops here last week we were not able to contribute on the topics for Week 1. I was encouraged by the last Contribution on Week 1 (Contribution # 48) from Ken Giller who referred to earlier contributions that dealt with resource constraints. Perhaps the competing use of crop-residues at individual farm level and at community level raises the most tension in management. At the community level the tension often escalates into conflicts among users of crop-residues (e.g. for conservation agriculture practitioners and livestock keepers relying on community resources including crop-residues). These conflicts which in West Africa sometimes lead to loss of human and livestock lives was one of the motivation for Research and development groups at ILRI, IITA and NARES in several countries to focus efforts in research in the Inland Valley Systems (Lowlands) in the region. Pastoralists and sedentarized livestock grazers have often claimed these areas as their traditional grazing areas or migratory routes while participants in development projects focusing on horticultural crops (with little or no residues for livestock) frequently
claim the right to use these lands. These vast lands estimated to be over 240 million ha in Sub-Saharan Africa hold huge potentials for crop-livestock integration because of the residual moisture in the soils even during the dry season.

I am attaching two publications from this multi-institutional, multi- country study published in 2006 and 2007 because they address most of the questions raised in Week 2 but also give good examples requested in Week 1. Briefly, I supply some answers to some of the questions raised in Week 2, mostly based on the findings from the study referred to.

1. System-dependent input supply chain constraints: With regards to Inland Valley Systems (IVS) crop-livestock enterprises, there are a few constraints. The major reason for the support of the integration on-going in the IVS is the recognition that in West Africa the IVS perhaps provides the highest potential to increase food production using intensification methods because soil moisture is not a constraint. However, the soils tend to be heavy and usually require animal draught power to cultivate the valley system. The ultimate constraint is availability of draught power (oxen, bulls, horses,
etc) to IVS farmers in timely manner because they are either too few in the community or are being used on up-land plots. Individual farmers may not have draught power at all or may have only half of a pair and must rely on hiring or teaming up with another resource poor farmer in order to have a full complement of draught power. Thus, the clear supply chain constraint in this case is inadequate animal draught power.

2. Incentives/Rewards for good practices in crop-livestock farming: The use of IVS for crop-livestock farming should logically attract incentives and rewards because the use of the IVS reduce or prevent the rush to use marginal fragile uplands to increase food production. Secondly through the planting of "more acceptable" crops such as dual-purpose or multiple purpose crops (legumes, cereals. etc) in the IVS that leave crop-residues for livestock, the raging conflicts between crop and livestock farmers are known to reduce. The harmonious co-existence of these two groups of farmers should be rewarded by local and central government administrations. In the IVS areas of Nigeria and Southern Mali, these benefits are appreciated by local authorities, although I am not aware that this appreciation has translated into rewards yet.

3. +Input supply and Out value chain actors: Ideally most crop-livestock farmers in the IVS should have their own animal draught power for soil preparation and weeding, it is not so in practice and these farmers rely on a few well to do people who own oxen, bulls, horses, etc. The relationship between these input suppliers and output value chain actors can be simple or

complex depending on how many of the oxen/bulls are available at the beginning of the cropping season, how many farmers are cultivating the presumed higher priority up-lands, how large the up-lands areas to be cultivated are, etc. The timely use of oxen/bulls to cover cultivation in the IVS depend on many factors named above and also how smooth negotiations go on the transactions on the hiring and use of them. It is also known that farmers with half pair of oxen do pull their resources together with other farmers with incomplete pair to achieve complete pairs in order to facilitate optimal and timely use of draught power. This working together certainly bring sustainability or stability if not competitiveness.

4. Shift towards more sustainable markets in light of food insecurity: Historically, many of the large cities and towns in West Africa are situated near IVS. It is the demand from such large human populations atht are driving the intensified use of the inland valleys, for example in the production of high valued crops, milk production and small ruminant fattening. As urbanization increases and more people move into the the large towns and cities near IVS, the pressure to intensify will assume greater importance in attempts to reduce food insecurity among the less privileged but also better meeting the demands of the more sophisticated and rich consumers for products like meat and milk.

The attached papers deal with other aspects of crop-livestock integration in the IVS of West Africa but also give some production figures and trends observed from the studies. Should any of the colleagues be interested in this subject matter area they are welcome to contact me on kwaku.agyemang@fao.org

Thank you.

Kwaku Agyemang
FAO Sub-Regional Office for Southern Africa (SFS)
Harare
Zimbabwe

Contribution 4, from Roberto Díaz, INIA, URUGUAY

-----Original Message-----
From: Roberto Díaz [mailto:rdiaz@inia.org.uy]
Sent: Mon 2/8/2010 2:40 PM
To: Crop-Livestock-L@mailserv.fao.org
Subject: Week 2 contribution from Roberto Díaz, INIA, URUGUAY

Dear Moderator,

Please find below some comments on proposed topics. I was out of office and I hope the moderator forgive this rather late contribution.

Attached is a recent paper that discusses a successful experience on adoption of pasture rotation with grain crops in a temperate country (Uruguay) and the new challenges because soybean expansion under continuous cropping.

* Do you believe that integrated crop-livestock systems are an answer for sustainable intensification? Do they have a place in our strategy for feeding 9 billion people in 2050?

There is no other way for sustainable intensification than the diversification and integration through crop-livestock systems. The main challenges will come from feeding the growing

urban population. Most of that food will come from medium and large farms which are in continuous grain cropping systems where land degradation continues. The key role of pastures by fixing nitrogen (BNF) and recovering the soil carbon balance will be crucial when nitrogen fertilizers increase their prices because of petrol shortage.

* What have we learned about integrated crop-livestock systems since the 1980's? Please describe innovative crop-livestock systems that you are familiar with (please remember to let your readers know the geographic/agroecological area that you are referencing).

Livestock production has been traditionally dominant in the grassland ecosystem of Uruguay. The soils of the eastern pampas have traits that make them very susceptible to soil erosion; The direct consequence of the high erosion rates was a reduction of the soil productivity after a few years of conventional grain agriculture leading to a process in which land had to be discarded to recover under low productive native pastures. Some years later, those pastures were ploughed again to annual crops in a new cycle of agriculture that was shorter every time, because natural pastures were unable to completely recover soil productivity.

The opportunity to propose and evaluate ley-farming systems took place when technology to increase animal production, based on perennial pastures with temperate legumes started to be evaluated in the early sixties. Then local research was extremely successful to promote this rotation system based on a) the large productive and economic benefits demonstrated by long term experiments and b) the development of low cost technology based on under-sown pastures with winter cereals .

Some farmers began to adopt the rotation of perennial pastures with grain crops at the mid seventies, and by the nineties the entire grain production was based on a rotation of crops with cultivated legume pastures. It took only twenty years to change completely the integration of agriculture and livestock production in the new production systems

Survey reports in mid nineties indicated that almost a 90% of grain crops were planted in soils in which a legume pasture had been plowed in one of the four preceding years.

However some years ago, around to the turn of the century, started a vast intensification of field crop production based on soybean. Large farming companies began the practice of hiring agricultural land and establishing continuous soybean cropping systems. This process caused a disruption in the use of sustainable agriculture and livestock integrated production systems, regardless of raising meat prices. Previous considerations on productivity could be playing a mayor role on the change to intensive agriculture. However, medium and small producers who still manage their own farms stay on ley farming and still take advantage of their high livestock productivity.

* What are the key benefits that arise from these systems? economically, environmentally, and socially? From a production standpoint, what are the gains in terms of functional biomass, multiple purpose production?

The adoption of integrated crop livestock production under ley farming systems, proved to be a fast process, regardless of its complexity, when economic advantages are evident.

The contribution of organic matter by legume pasture mixtures in rotation with crops was able to maintain or recover SOC in the long term even under conventional tillage.

Biological nitrogen fixation by legumes could potentially satisfy the whole demand of the cropping phase, and this condition takes a higher economic relevance with increasing prices of N. Therefore, improving nitrogen fixation efficiency and use is a major research issue to be developed locally for each specific agroecosystem.

Land degradation by continuous agriculture cannot be overcome only by fertilizer application and other conventional practices. Yield potential is significantly higher when crops are rotated with pastures and the extent of that effect can only be evaluated in the long term.

Intensive livestock production requires much more labor per hectare than mechanized grain agriculture.

* What are the key constraints to implementing integrated crop-livestock systems? What about constraints to scaling up/out?

Small and medium size farms require achieving high livestock productivity in order to economically sustain the integration with crop production. When the incomes from animal production are low, farmers easily take the shortcut to permanent agriculture. Thus, the main challenge for experimental research in order to promote ley farming is to develop technology for high animal productivity under pastoral production.

The integration of crop and livestock production progressively requires two different farmers developing the system. One farmer taking care of animal production and another dedicated to the crop farming. A key issue for this contractual relationship is the long term commitment of both, taking advantage of mutual benefits of the integrated system.

Kind regards

Roberto Diaz
INIA
Uruguay

Contribution 5, from Suresh Tandon, ex-ICAR, India

-----Original Message-----
From: Suresh Tandon [mailto:skt4339@yahoo.com]
Sent: 09 February 2010 13:57
To: Crop-Livestock
Subject: Week 2 - Contribution from Suresh Tandon, ex-ICAR, India.

Dear Colleagues,

In India the farmers have been following integrated livestock farming since ages. Most of the farmers in India have a pair of milch animals to meet need of milk for the family as well as they also sell the milk to get addtional income. It is not something new. Yes, earlier the farmers had draught animals for doing various farm operations. In 1970 animal power contributed about 45 % to the total power availability on the farm but now it has reduced to 5%. Now tractor power contributes 45 % to the total power availaibility on the farm. We still have 64 milion draught animals. In hilly areas and in dryland areas animals are still being used for doing various farm operations.

Many farmers in India have started practcing integrated farming .They have started practicing aquaculture, poultry keeping and also have milch animlas. So the farmer is not dependent on grain crops only but earns extra income by folowing integrated farming. Under the National Agriucltural Inovation Project under livelihood security component of the Indian Council of Agriculutural Research (ICAR) about more than 35 projectshave been sanctioned on integraed farming in about more than 100 backward districts out of 153 districts identified by

GOI.This has enabled the farmers to earn additional income and has resulted in increaed livelihood security. .

Dr.S.K.Tandon,
Delhi
India
Email: skt4339@yahoo.com

Contribution 6, from Brian Sims, UK

-----Original Message-----
From: BrianGSims@aol.com [mailto:BrianGSims@aol.com]
Sent: 10 February 2010 12:10
To: Crop-Livestock
Cc: Crop-Livestock-L@mailserv.fao.org
Subject: Week 2 contribution from Brian Sims, UK

Dear Colleagues:

Some thoughts to contribute to the week 2 debate.

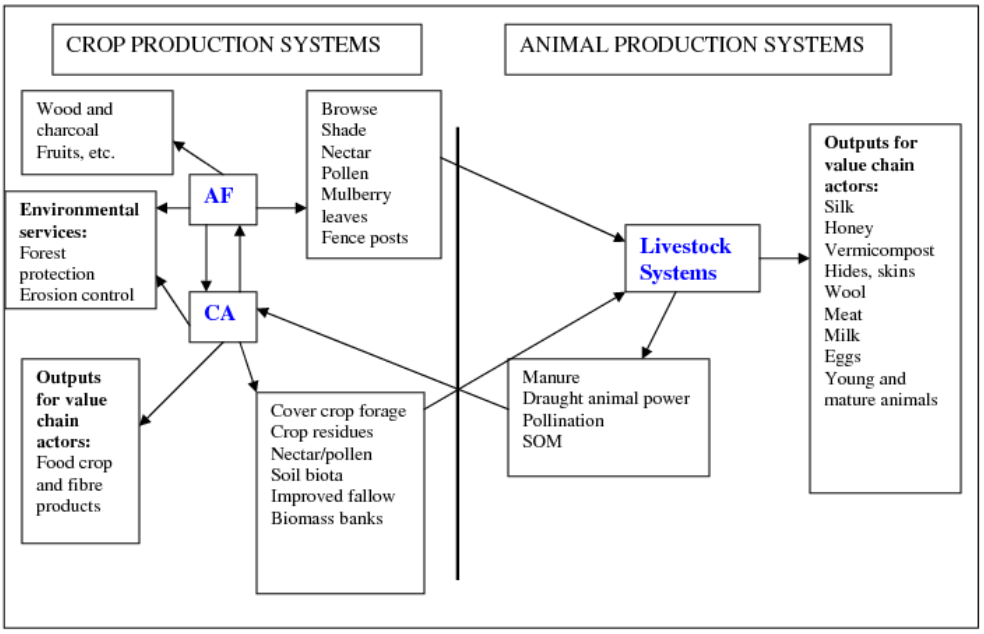
Brian Sims

Crop-Livestock e-conference. Week 2

Brian Sims (9/02/10)

I think that we are all agreed that to increase food production by >70% before 2050 in the face of climate change, desertification, bio-fuel production and population pressure means that we need to change radically our food production systems. That is why I emphasize the crucial potential of conservation agriculture (CA) and agroforestry (AF) integrated crop production systems.

Whilst pondering the supply chain question, I tried to visualize the range of interactions that there are between livestock and CA-AF cropping systems. The following sketch illustrates my first efforts (quite easily improved upon, for sure). And following the diagram I offer some further thoughts for consideration in this debate.



Some thoughts for debate:

- Firstly John Landers (Week 1, contribution 20) offered us a 'Fork for our thoughts' when citing Goodland's advice to convert all pasture to crops.
  Whilst it is true that meat production from grain is hugely inefficient (4kg grain to produce 1kg pork; 7kg grain to produce 1kg beef) livestock keeping is a much greater concept. It can include: bee-keeping; silkworm rearing; vermiculture; poultry production (chickens, ducks, geese, turkeys); guinea pigs; rabbits; etc., etc. Importantly we should also include improved soil biota (especially earthworms) as

Contribution 7, from P. Parthasarathy Rao at ICRISAT, India

-----Original Message-----
From: ParthasarathyRao, P (ICRISAT-IN) [mailto:P.PARTHA@CGIAR.ORG]
Sent: 10 February 2010 17:06
To: Crop-Livestock
Subject: Week 2 contribution from P. Parthasarathy Rao at ICRISAT, India

To the Moderator,

I am not addressing the specific questions given below in that order but cover some of them in my write up below on institutional arrangement to link small farmers to the demand centers.

Like in all developing countries the demand led livestock revolution is taking place in South Asian countries particularly India. Milk and meat production are growing faster than population growth rates leading to increase in per capita consumption levels albeit from low levels compared to global average consumption levels. The demand led livestock revolution will continue in the near future due to income growth, urbanization and change in tastes and preferences. The question often asked is, are the poor livestock keepers benefiting from the faster growth in livestock products given the constraints such as lack of access to inputs, technology, credit, services and product markets? Are the existing institutions/marketing arrangements ensuring the participation of the poor in this growing market?

For the small holders due to small marketed surplus selling in distant urban markets is uneconomical due to high transportation and marketing costs. It is found that marketing and transaction costs taking away 15-percent of the sale price in open markets. One notable example, in India is the milk marketing where small landholders participate in commercial dairying. This is because of the excellent net work of infrastructure developed under the Operation Flood Project under the leadership of NDDB. This implies that small landholders are capable of up scaling livestock activity provided they can overcome some of the production and mainly institutional and marketing constraints.

Institutions like growers' associations, cooperatives and contract farming can reduce marketing and transaction costs, provide assured markets and reduce price risk to the producer. Availability of an assured market also acts as an incentive to producers to use quality inputs, adopt improved technologies and scale up their production systems. In circumstances when farmers face problems in accessing inputs, technology, information and services, firms provide these as a part of contract and hence reduce uncertainty in their availability, quality and prices for the farmers. Studies in India by Birthal et al. (2005) observed contract farmers of milk realizing almost twice the profits compared to the non-contract farmers. In a study of dairy cooperatives, Gupta et al. (2006) found members of dairy cooperatives realizing 29 percent higher profits as compared to those of independent suppliers in the open market. In both the cases, higher profits were largely due to reduction in marketing and transaction costs.

For riskier ventures as poultry, contract farmers may not realize the same difference in the profits as do the dairy farmers. Nonetheless, contract farming in broilers performs important functions of banking and insurance besides reducing price risk for the small scale producers. In general, contracting firms provide day-old chicks and feed at no cost to the producers, which in a sense is interest-free credit for them. Firms, in turn, lift the entire output and pay

producers fixed growing charges that covers their contribution to cost (labour, water, electricity litter and rent for fixed assets). This insures producers against market risks. The coefficient of variation in the net revenue for contract producers was estimated 3.4 percent, as against 69.5 percent for non-contract producers.

Two other institutional aspects that have a direct bearing on the scale and productivity of livestock are credit and insurance. Lack of capital and higher production risks are important barriers to the expansion of smallholder livestock production. At present, credit and insurance support to livestock production is meager. Policy interventions are thus needed to improve credit flow to the livestock sector and strengthen insurance support, especially to poor smallholders.

Thanks

P.Parthasarathy Rao
ICRISAT

Contribution 8, from Murat Karabayev, CIMMYT-Kazakhstan

-----Original Message-----

From: Murat Karabayev <m.karabayev@cgiar.org>
Date: Tue, Dec 8, 2009 at 4:16 PM
Subject: Week 2 Contribution from Murat Karabayev, CIMMYT-Kazakhstan

Dear Moderator,

For the period 2004-2008 CIMMYT-Kazakhstan in cooperation with NARS and farmers implemented the component of the World Bank “Dryland Management Project” in Central Kazakhstan. The main objective of this component was "Validation and Demonstration of New Technologies for Restoration of Degraded Lands and Forage Crop Production". Below is a brief conclusion of the project component realization.

The main objective of the Project component implemented by CIMMYT is to show different methods of grassland establishment by sowing perennial and annual crops with low costs resulting in sustainable and profitable production, to convert the abandoned dry lands of Central Kazakhstan into pastures to contribute to carbon sequestration. Specific tasks to implement in 2004-2008 seasons to achieve the objectives were as follows:

- demonstration of different methods of abandoned dry land restoration for sowing perennial forages;

- demonstration of perennial crops and forage mixes;

- sowing forage under cover crops;

- to extend forage provision period.

Based on the results of demonstration experiments the following conclusions can be drawn:

· The best method of abandoned land restoration is chemical fallow followed by direct sowing of perennial forages. This method controlled weeds best.

· Perennial forages and its mixtures which produce the highest yield in dry conditions of Central Kazakhstan were identified. The results of trials have demonstrated that sowing perennial forages directly in the undisturbed stubble in the early spring ensured good germinating rate. Weeds were cut two or three times during summer. This technology was found to be labour saving. The highest hay yield was produced by a crested wheatgrass and sainfoin mixture.

· The wheatgrass is known to be the major forage in the dry steppes of the Central Kazakhstan. However, the data on the possibilities of significant improvement of forage hay yield by sowing wheatgrass with legume grasses are rather new. Replacement of natural hayfields with sown cereal forages has doubled productivity, whereas establishment of legumes and legume and cereal mixtures increased the hay yield four-fold. It is of especial significance that there has been convincing four-years' data obtained which demonstrated high productivity of legume forages such as sainfoin and alfalfa. Their productivity was much better than that of cereal forages which was not observed in previous studies in the region. Sainfoin demonstrated higher yields than alfalfa, but alfalfa can also be recommended. Thus, the yield of legume and cereal mixtures increased largely due to the legume component which is very important for improvement of the nutritional value of a pasture. In the conditions of the dry steppe of Canada, sowing legume and cereal mixtures is the widely adopted technology for pasture establishment. In the Northern Kazakhstan, the attempts to create legume/cereal pastures failed, and basically only cereal forages (Crested wheatgrass and Russian wildrye) remained in the dry steppe of southern chernozem. In Canada, sainfoin is not widely spread; alfalfa is more popular there. It is possible that the data showing that legume and cereal grass mixtures are a good option are related to the climate warming.

· Sowing perennial grasses under the cover of winter grains is not feasible, as in the dry years the grass shoots cannot compete with weeds and are suppressed by the winter grain crops.

· Sowing annual forages instead of fallow allows obtaining additional produce such as green forage, hay and grain. This conclusion is also new; at present the most widely used method to turn abandoned lands to forage production is fallowing.

· A 'green conveyor' concept was developed for the region which envisages production of annual forages as well as perennial ones. This approach greatly prolongs the period of forage availability and enhances the range of forages.

With the best wishes

Sincerely Yours

Professor Murat Karabayev,
Representative in Kazakhstan,
CIMMYT (International Maize and Wheat Improvement Center, Mexico).
http://www.cimmyt.org CIMMYT is a Future Harvest Center of the CGIAR P.O.Box 1446, Astana, 010000, Kazakhstan
Tel./fax: +7(3172)-343713
E-mail: m.karabayev@cgiar.org
-Seeding innovation… Nourishing hope

Contribution 9, from Hassan Mohammed Nur, Sudan

-----Original Message-----

From: hassan nur [mailto:hassanurnur@hotmail.com]
Sent: 11 February 2010 09:25
To: crop-livestock-l@mailserv.fao.org
Subject: Week 2 contribution from Hassan Mohammed Nur, Sudan

Dear All,

In the Sudan three animal raising systems can be identified: migratory, semi-migratory and agro-sedentary herding. Livestock on their movement often trespass on crop fields causing great damage that leads to tension/dispute between farmers and herders. A common maxim is often quoted in these communities 'crops and horns never co-exisits'.

However, the growing domestic and export market for live sheep and sheep meat has encouraged many crop farmers to enter in the business of sheep raising in an integrated manner. Crop residues are often used to feed small ruminants which in turn are sold to finance crop farming. Hence livestock is the biggest financier in a situation where formal credit is not accessible for it needs collaterals that vast majority of small farmers lack.

In places where rainfall variation is the trend, drought is frequent leading to a mounting fragile farming system. Livestock in such a case make a cushion against crop failures and consequently a better food security chances.

Hassan Mohammed Nur
Project Coordinator
Improving Livestock Production and Marketing Project
Federal Ministry of Animal Resources and Fisheries
Khartoum
Sudan

Cell:+249-122128146791
Land:+249-183-568753

Contribution 10, from A K Misra , DRWA, Bhubaneswar, India

-----Original Message-----
From: Arun Mishra [mailto:mishraak17@yahoo.com]
Sent: 11 February 2010 12:14
To: Crop-Livestock
Subject: Subject: Week 2 contribution from A K Misra , DRWA, Bhubaneswar, India

The Moderator,

Please find below some of experiences on institutional arrangements for scaling up/promotion of crop-livestock interventions in India.

A good scope exists for liaison with Panchayti Raj Institutions (PRIs) for harmony and to enable transparent utilization of common resources for the benefit of community. Poor farmers need to be linked with institutions like market, insurance, banks etc. to reduce the vulnerability. Sustainable development in developing countries can only be achieved through optimum utilization of their natural resources. There is tremendous scope for increasing the livestock production and productivity of indigenous breeds by improving nutrient availability from locally available feed and fodder resources. The availability of key inputs and veterinary services needs to be strengthened and improved to equip the farmers for livestock development. A favourable policy environment in terms of access to micro-credit and assured

markets will need to be provided and socioeconomic and technical constraints need to be addressed.

At Central Research Institute on Dryland Agriculture (CRIDA), we have implemented a DFID funded project in selected rainfed districts of South India (Anantpur, Mahbubnagar and Tumkur) with an institutional innovation for enhancing the livelihood of poor people through NRM interventions. The project has come up with formation of Salaha Samathi (SS) at cluster level (group of villages), which is an advisory group of villagers, formed by members who are acceptable to the community and willing to work for common cause. It is an informal and inclusive body in which existing Panchayti Raj Institutions (PRIs) and Self Help Groups (SHGs) are represented, besides representatives from women and weaker section of society (SC, ST). The SS has helped in smooth implementation of the project activities with assured people's participation in all the project interventions and in establishing linkages with the line departments (Animal Husbandry, Agriculture, Market, Insurance and Input Supply Agents). We have shown that SS successfully manage the project interventions. After working over two years, this cluster level institution has gained enough confidence for sustaining the project interventions even in the absence of donors funding.

In the same way, we have initiated action researches on crop-livestock-fish integration to assess implications of technologies in women perspective at **Directorate of Research on Women in Agriculture**. Among many resources, water bodies are an important resources base available in the coastal villages of Orissa in India. But unfortunately such resources remained unutilized for years. We federated the women SHGs to take water bodies and common lands from Panchayt on lease and adopt good practices of integrated farming. The required technical support including crucial inputs and trainings was provided by DRWA. As a result integrated crop-livestock –fish system enabled the farmers/women to earn additional income and has resulted in increaed livelihood security.

An action research has clearly demonstrated that available water bodies/village common resources can be productively utilized by wo/men groups for their socio-economic development provided appropriate technologies are blended with viable institutional mechanism. The DRWA model involving research, panchayatiraj institutions and women self help groups is an example worth replicating in similar situations.
Thanks

Dr A K Misra
Principal Scientist
Livestock Production & Management
Directorate of Research on Women in Agriculture
Baramunda P.O., Bhubnaeswar 751 003, Orissa, India

Contribution 11, from Mark Powell, USDA-ARS Madison, Wisconsin

-----Original Message-----
From: Powell, Mark [mailto:Mark.Powell@ARS.USDA.GOV]
Sent: 11 February 2010 13:31
To: Crop-Livestock-L@mailserv.fao.org
Subject: Week 2 contribution from Mark Powell, USDA-ARS Madison, Wisconsin

I must apologize in advance for some of these general observations.
It would have been better to cite particular contributions from last week, and add examples from the '80s.

So much was tried and learned during the 80's when funding for tropical crop-livestock research and development was at an all-time high. Although much has change in many tropical and subtropical environments, one can contend that much remains relatively unchanged. I refer to great changes in socio-economic conditions, yet most biophysical conditions and their associated challenges/opportunities remain relatively unchanged. There may well be 'on the shelf', well researched technologies that are still adaptable to specific biophysical conditions, but were not successful during the '80s due to prevailing socio-economic circumstances (e.g., policies, markets, gender roles). These practices may be more amenable to current societal conditions. What we cannot ignore is the great wealth of information gathered (much of it published) during the '80s. I attended an international symposium October 2009 that featured a presentation on research needs for soils of West Africa (where I spent 15 years in the 70's, '80s and early 90.). I came away quite dismayed. These 'ideas' were at the core of much research and development efforts 25 to 30 years ago. There was no recognition of the wealth of information from times past, what has been learned and how best to move forward. Is it a question of making this information more available? It seems as if good literature reviews are needed as first steps to mapping out new directions. What have we learned, are there technologies that should be revisited (what criteria should we use to evaluate and select technologies that should be revisited)?

One major oversight last week was livestock manure. Ruminant livestock convert a general range of only 15-30% of their feed into meat and milk (poultry and swine are better). In many crop-livestock systems manure is a precious 'by-product' that may actually exceed the value of what we usually perceive as 'products'. I recognize that this occurs mostly in subsistence farming systems, but there livestock play multiple roles including provision of traction, capital storage, food security and poverty alleviation.

As crop-livestock systems intensify towards a goal of enhanced productivity more feed is imported and manure becomes a problem. There are many creative things going on with manure collection, processing and use to mitigate pollution potential, including exchanges between specialized crop and livestock production systems.

Crops and livestock do not have to be operationally integrated (within the same management unit) to have functional integration (e.g., feed-manure). Henning Steinfeld et. al. depicted this 'area-wide integration' eloquently in some of his publications of the late 1990's (I do not have any electronic copies, but one reference is in the attached document: Crop-Livestock Integration in West Africa).

Carrying capacity and input use efficiency need to be considered when promoting expanded crop-livestock systems. For example, if livestock growth is to be promoted in a particular region, what is the capacity of the land base to provide forage and other essential feeds? When production goals are set, we need to know the capacity of the soil, water, air to capture and recycle the imported feed nutrients (often necessary for intensification) that end up in the manure. Feed concentrates, minerals, and other compliments to local feeds will be important inputs towards goals of enhanced livestock production. Assessments need to be made of imported feed impacts not only on livestock production but on manure chemistry and environmental outcomes. In some cases pollution may be a concern, but in nutrient poor environments s improvements in livestock productivity may enhance manure quality and therefore its positive impact on crops and pastures. Such tradeoffs in input use and their outcomes need to be assessed.

Regards,
Mark
****
J. Mark Powell

Research Soil Scientist-Agroecology
USDA-ARS US Dairy Forage Research Center
1925 Linden Drive West
University of Wisconsin
Madison, WI 53706

ph: (608) 890-0070
fax: (608) 890-0048
mark.powell@ars.usda.gov
http://www.ars.usda.gov/pandp/people/people.htm?personid=21056
http://www.soils.wisc.edu/soils/people/faculty/powell.php

Contribution 12, from Mario Herrero, CGIAR Systemwide Livestock Programme

-----Original Message-----
From: Herrero, Mario (ILRI) [mailto:M.HERRERO@CGIAR.ORG]
Sent: 12 February 2010 06:14
To: Crop-Livestock
Subject: Week 2 contribution from Mario Herrero, CGIAR Systemwide Livestock Programme

Dear Eric et al,

Please post this paper that just came out in Science. It is from a CG-wide effort on the future of crop-livestock systems. It covers some of the material discussed plus some aspects about the role C-L systems are likely to play in sustaining food security in the future

Kind regards

Mario Herrero

ILRI lead/SLP funded study published today in Science Special Issue on Food Security

Bruno Gerard | February 12, 2010 at 5:11 am | Categories: Crop-Livestock, Food security, Global, Intensification, News, climate change | URL: http://wp.me/pIHn6-73

Smart Investments in Sustainable Food Production: Revisiting Mixed Crop-Livestock Systems

M. Herrero P. K. Thornton, A. M. Notenbaert, S. Wood, S. Msangi, H. A. Freeman, D. Bossio, J. Dixon, M. Peters, J. van de Steeg, J. Lynam, P. Parthasarathy Rao, S. Macmillan, B. Gerard, J. McDermott, C. Seré, M. Rosegrant

Farmers in mixed crop-livestock systems produce about half of the world's food. In small holdings around the world, livestock are reared mostly on grass, browse, and nonfood biomass from maize, millet, rice, and sorghum crops and in their turn supply manure and traction for future crops. Animals act as insurance against hard times and supply farmers with a source of regular income from sales of milk, eggs, and other products. Thus, faced with population growth and climate change, small-holder farmers should be the first target for policies to intensify production by carefully managed inputs of fertilizer, water, and feed to

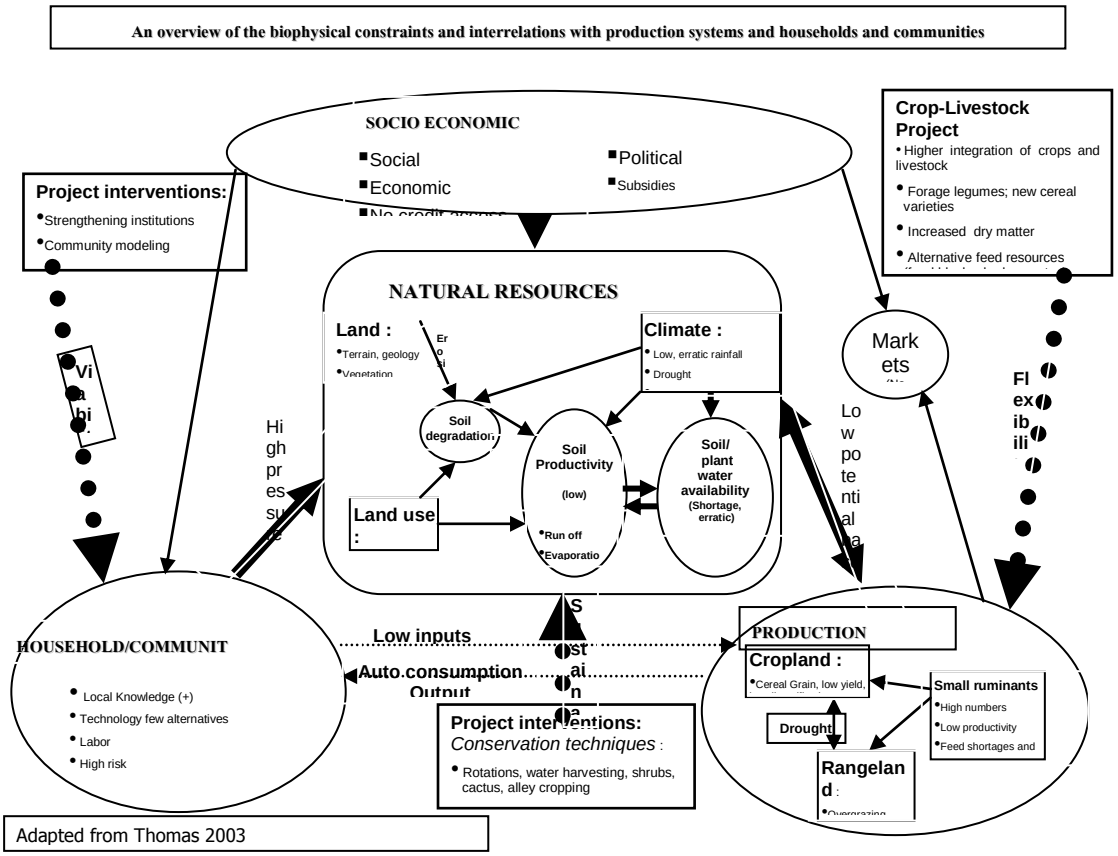
minimize waste and environmental impact, supported by improved access to markets, new varieties, and technologies.

Contribution 13, from Stephhen Twomlow at UNEP, Nairobi

-----Original Message-----
From: Stephen Twomlow [mailto:Stephen.Twomlow@unep.org]
Sent: 12 February 2010 13:51
To: Crop-Livestock
Cc: Crop-Livestock-L@mailserv.fao.org
Subject: Week 2 Contribution from Stephhen Twomlow at UNEP, Nairobi

Dear All,

A possible alternative schematic to Brians - but maybe too complicated



Stephen Twomlow PhD
Senior Program Officer Biodiversity and Land Degradation
Division of GEF Coordination
United Nations Environmental Program (UNEP)
PO Box 30552 (00100)
Nairobi
Kenya

Direct line: +254 20 7

625076
Work Cell Phone: +254 728604550 (International Roaming)
Private Cell phone: +254 726593285 (Kenya only)
skype: steve.twomlow
e-mail: stephen.twomlow@unep.org
web site: www.unep.org

Contribution 14, from Bruno Gerard, CGIAR Systemwide Livestock Programme, ILRI

-----Original Message-----
From: Gerard, Bruno (ILRI) [mailto:B.Gerard@CGIAR.ORG]
Sent: 12 February 2010 15:53
To: Crop-Livestock
Subject: Week 2 Constribution from Bruno Gerard, CGIAR Systemwide Livestock Programme, ILRI

Dear colleagues,

It seems that contributions somehow slowed down this week. Not being an economist I will not develop much but rather point to few publications/pieces I found interesting (not much docs so far for this week).

It is clear that markets play a large role in driving the intensification/specialization of crop-livestock systems and that the actual situation is very diverse across and within regions (see table below). With the increasing overall demand for livestock products and urbanization, niches/hotspots of intensification/specialization at diverse scales are quickly emerging and in those rapidly changing environments productivity, sustainability, equity, conflict resolution over resource uses, sometimes land deals and environmental issues certainly require attention/support.

Have a nice WE,

Bruno

	Intensification gradient		
	Extensive	**Intermediate**	**Intensive**
Crop nutrients	Fallow	Manure	Chemical fertilizer
Livestock feed	Rangeland	Crop residues	Feed crops, concentrates
Power	Manual	Animal traction	Motorized
Finance	Natural assets/stocks	Informal credit/loan	Formal credit/loan
Market orientation	Subsistence, barter exchange	Semi-commercial	Commercial, monetized market
Crop + livestock system evolution	Parallelization	Integration	Specialization
Nominal cost gradients:			
- Capital	High		Low
- Labour	Low		High
- Land	Low		High
Induced innovation	Capital saving		Land and/or labour saving

Table 2.1: Conceptualization of crop-livestock systems along an intensification gradient (Source: Erenstein and Thorpe, 2009)

Livestock Market Dynamics and Local Vulnerabilities in the **Sahel**. Matthew D. Turner, Timothy O. Williams
http://dx.doi.org/10.1016/S0305-750X(01)00133-4

Improving livestock marketing and intra-regional trade **in West Africa**. Williams, Spycher, Okike
http://books.google.be/books/download/Improving_livestock_marketing_and_intra_.pdf?id=7_0jK1Io7ZEC&hl=fr&output=pdf&sig=ACfU3U2wLL6skAsQFUzur9gY-zXHvyXWmQ

Feed marketing in **Ethiopia**. Berhanu Gebremedhin Adane Hirpa and Kahsay Berhe
http://www.vslp.org/cgslp/cms/upload/pdf/Feed%20marketing%20in%20Ethiopia-Working%20paper%2015.pdf

Pro-poor livestock Policy Initiative (ppli) working papers (47) at
http://www.fao.org/AG/AGAINFO/programmes/en/pplpi/workingpapers.html

---

Contribution 15, from Sérgio José Alves and Ademir Calegari - IAPAR, Brazil

-----Original Message-----
From: Sergio Jose Alves [mailto:sja@iapar.br]
Sent: Fri 2/12/2010 8:35 PM
To: Crop-Livestock
Subject: Week 2 Contribution, from Sérgio José Alves and Ademir Calegari - IAPAR, Brazil

Please find below some comments .

Integrated animal and grain crop systems have enabled the production of high quality milk and meat at highly competitive costs. A combination of perennial and annual forage species, management tactics, pasture fertilization, and animals with high genetic potential has enabled the production of high quality animal products with high market value. In stocker operations, the system has made it possible for animals to be ready for slaughter with less than 20 months of age, finished on pasture and having high a quality carcass, meeting the requirements of demanding markets. In dairy enterprises, work has been conducted on pasture production with and without supplementation, resulting in milk yields ranging from 15 to 20 liters animal-1 day-1, at low cost of production, demonstrating that high profitability is possible in this system.

In South Brazil, Nort West of Parana State, in a Tropical and subtropical region, three Farm Cooperatives, developped together with Iapar (Research Institute) a R & D Program,and during the last 10 years increased from around 200-300 ha and now achieved more than 350-400 thousand hectares of the Crop (no-till corn and soybean) Livestock Integration System. So, the soil and water protection and profitability of the system has encouraged the farmers to follow this way. Also some forage/cover crops species such as, black oat, ryegras, Pearl Millet, Finger millet, Brachiarias, Panicum sp., Cynodon sp., has been studied and used by farmers in different agroecological zones. Some farmers has increased the profitability from 20-45% their Annual farm Net Income,and diminishing their risks.

Regards,

Dr. Sérgio José Alves
Dr. Ademir Calegari
Crop-Livestock Systems
Soil researcher - IAPAR
IAPAR - Instituto Agronômico do Paraná
calegari@iapar.br
sja@iapar.br - (43) 33762387
CEP 86001 - Londrina – Pr

Contribution 16A, from Alan Franzluebbers at USDA - ARS in Georgia

-----Original Message-----
From: Franzluebbers, Alan [mailto:Alan.Franzluebbers@ARS.USDA.GOV]
Sent: Fri 2/12/2010 10:55 PM
To: Crop-Livestock-L@mailserv.fao.org
Subject: Week 2 contribution from Alan Franzluebbers at USDA - ARS in Georgia

Dear Colleagues,

Some brief thoughts on system constraints for crop-livestock systems in the southeastern USA:

1. Large volume of information needed for sophisticated production systems (with specialization, farmers have focused on limited aspects of farming compared to more complex systems)

2. Lack of field infrastructure (fencing, water sources) and supply and delivery linkages

3. Lack of information on how chemical usage could affect crop, animal, and human health, as well as food safety

4. Need to balance year-round forage supplies and labor for crop and livestock requirements

5. Need to develop a market for alternative meat production (e.g. consumer preference for grain-fed vs. pasture-fed beef).

Alan

Alan J. Franzluebbers
USDA - Agricultural Research Service
1420 Experiment Station Road
Watkinsville GA 30677
Tel: 706-769-5631 ext 223
alan.franzluebbers@ars.usda.gov

Contribution 16B, from Jagadish Timsina, IRRI- Bangladesh Office

-----Original Message-----
From: Jagadish Timsina [mailto:j.timsina@irri.org]
Sent: Sat 2/13/2010 2:42 AM
To: Crop-Livestock
Subject: Week 2 -- Contribution from Jagadish Timsina, IRRI- Bangladesh Office

Dear Colleagues,

I agree with Mark Powell that much has been done on crop-livestock integration (CLI) during 80s and early 90s and that a good literature review should be the starting point before formulating any new research and development activities. This is true in Asia too. At IRRI, we had first Asian cropping system network/program in 70s and then Asian rice farming system network/program in 80s and early 90s. Crop-livestock integration was one of the strong components/activities of ARFSN. The network had established good linkages and partnerships amongst several Asian countries and had done substantial bio-physical and socio-economic studies. Gender issues/analysis and women's role in farming systems (including crop-livestock systems) was one of the important activities of the network. Several donors had supported the ARFSN and CLI activities. I was quite a bit involved in the network. There was one international workshop on CLI organized by IRRI and held in Dhaka in 1990. There are no electronic copies of the papers but hard copies should be available at IRRI, Philippines. Likewise, CIMMYT did a lot of diagnostic surveys in Asia during 80s and 90s and came up with various reports for different sites for various Asian countries much of which contain valuable information on CLI, including markets, institutions, and value chain analysis. Hence, literature reviews and identifying "on-the-shelf" technologies for dissemination/delivery are must.

In addition, in my recent work on exploring the current status and future potential of rice-maize systems (yet unpublished), I summarised following that I would like to share with you as it is related to Week 2 discussion.

"The demand for meat and milk in several Asian countries has resulted in a dramatic increase in livestock population, especially poultry, resulting in ‘livestock revolution’ (Delgado et al., 1999). Consumption of beef is increasing very rapidly in China whereas in India and the Philippines there is only a small increase in beef consumption. Consumption of pork has increased dramatically in China, Philippines, and Vietnam. Consumption of poultry, however, has increased rapidly in China, Indonesia, and the Philippines but at slower rates in Indonesia and Thailand. The countries where livestock population has remained stable or decreased are importing meat and milk products from neighboring countries or from developed countries such as Australia, European Union, New Zealand, and USA.

FAO and UN data for population projections indicate faster rate of population growth from 2000 to 2030 compared to 2030 to 2050. The food and other needs of the growing population underpin the strong demand for cereals. The demand for wheat, based on production and stock changes, is expected to increase from 621 Mt during 2004-06 to 760 Mt in 2020 (Rosegrant et al., 2001), around 813 Mt in 2030, and greater than 900 Mt in 2050 (FAO, 2006, 2007; Rosegrant et al., 2007). This implies growth rates of 1.6% during 2005-20, 1.2% during 2005-30, and 0.9% over 2005-50. For rice, it is 500 Mt in 2030 and 520 Mt in 2050. Projections suggest that demand for maize will be faster than for wheat, particularly because of its strong demand for livestock and poultry feed, and also because of its increasing demand for food and bio-fuel. Rapid population growth in Asia, persistent poverty in areas where maize is an important staple for the poor (especially parts of South Asia, Indonesia, and the Philippines), and rising prices of main staples such as rice and wheat will continue to exert an upward pressure on food and feed maize demand. The latter is expected to be a main driver toward shift in food consumption pattern, especially in poverty-stricken areas since

international and farm-gate prices of maize are comparatively lower than those of rice and wheat. Demand for maize will increase by 50%, or 140 Mt, from 558 Mt in 1995 to 837 Mt in 2020. The increase in maize demand will be acute in Asia - an 87% rise from 162 Mt in 1995 to 303 Mt, or an increase of 141 Mt, in 2020 (IFPRI, 2000). Rising incomes, population growth, urbanization, and changes in diet preferences will be responsible for much of the shift from rice and wheat to maize. *Most of the extra 141 Mt of maize that will be produced in Asia between 1995 and 2020 will be fed to livestock.* Delgado et al. (1999) report that developing countries of Asia are in the midst of a demand-driven "livestock revolution". *Livestock production and consumption of both meat and milk products are expected to grow about four times faster in developing countries than in developed countries up to 2020. By 2020, developing countries will produce 60% of the world's meat products, and Asia, led by China, will account for 43% (51 Mt) of additional meat demand worldwide between 1997 and 2020 (Delgado et al.,1999).

Thanks,

Jagadish Timsina
IRRI Bangladesh Office

Contribution 17, from Adrian Catrileo, INIA, Chile

----Original Message-----
From: acatrile@inia.cl [mailto:acatrile@inia.cl]
Sent: Sat 2/13/2010 3:23 AM
To: Crop-Livestock-L@mailserv.fao.org
Subject: Week 2 contribution from Adrian Catrileo, INIA, Chile

Dear All,

Many of the contributions have pointed out the possibilities of the productive response that may be obtained from the crop-livestock systems. I also sent to the forum a modest contribution for Week 1 looking at the experience we have had in southern Chile in the 80's. I will try to add some other elements which in my opinion may play an important role in the definitive system to implement or its sustainability.

Global economy has strongly influenced the presence of crop-livestock systems. For instance, in Chile, where there are nearly 3.8 million cattle, 50% of them are in hand of Small-farmers (<50 ha). Export to the EU was promoted in the recent years by accomplishing a specific certification. Many farmers, especially those involved in the final step to export finished cattle and Small-farmers, who produce mainly calves, were prepared to export and adapted their crop-livestock systems for this target. However, because of an imposed limited quota, many farmers were out of the contract, so the certification for the EU was rejected by the Small-farmers and in general, cattle business became less interesting. At the end, the whole system was affected.

The situation described above shows that not only innovative systems (breed, traceability, animal welfare, etc., for a specific market) are needed to estimulate livestock production, but also, government and political support must be associated with the innovation of crop-livestock systems in order to be improved.

Another point to be analyzed is that farmer capacitation should be done by motivated and well paid profesionals. In general, people who go to work in rural, marginal areas, where characteristic crop-livestock systems are complex and drove for Small-farmers, are young non-experienced professionals, who are looking to get away from that reality as soon as they

find a better salary and good personal development chances. In this sense, capacitation programs should consider special conditions for people who are interested in being involved in the reality of these systems.

By the way, I found very interesting the paper of Herrero et al. (2010) and the systems constraints mentioned by A. Franzluebbers which can be applied worldwide.

Regards,

Adrian Catrileo PhD
Instituto de Investigaciones Agropecuarias (INIA) - The Agricultural Research Institute - CHILE.

Phone 56-45-215706 (272)
Fax 56-45-216112
acatrile@inia.cl

Contribution 18, from Ridcardo Ralisch at the Universidade Estadual de Londrina, Brazil

-----Original Message-----
From: ricardo ralisch [mailto:ricardoralisch@gmail.com]
Sent: Sun 2/14/2010 2:21 AM
To: Crop-Livestock
Cc: Crop-Livestock-L@mailserv.fao.org
Subject: Week 2 contribution from Ricard Ralisch at the Universidade Estadual de Londrina, Brazil

Dear Colleagues,

What does agricultural intensification mean?

- I believe that we have a lot of possible and reasonable answers for this question, but we also need to consider the term in relation to the effects of the intensification and it's costs.

There are a lot of examples around the world showing wrong way to intensify agriculture. Most of these wrong initiatives were mainly based on the economical approach, with very short term horizon and with high environmental and social losses. The agricultural intensification based on technology introduction and specialization was a very useful way to concentrate the means of production, inputs and also the market. In this, many farmers are working for the big enterprises and corporations. It became a way to concentrate money and perhaps to promote hunger.

- More than 'increase' the productivity, the agriculture intensification should 'protect' the productivity.

It is much better to obtain optimum yields that can prolong the good yields, prolong the good yields, reduce the yield variability, reduce production costs, increase food security, to equate food and energy production etc. For this, we need absolutely to respect the natural capability of the environment to produce.

- To prolong the good yields around the world we also need to respect the cultural differences and protect the different ways of practicing optimum agriculture. It is impossible to ignore and override the agricultural techniques and institutions of a community-based social

organization. We have to adapt the successful techniques and practices to the environment and to the habits and social organizations of the population in creating change.

- That means Conservation Agriculture (CA)!
The intensification of CA needs to integrate crop with livestock to preserve and strengthen the diversification!

- Seems difficult? Nobody said it would be easy!

Ricardo Ralisch
Ag Mechanization and Farm system impacts
Universidade Estadual de Londrina
Brazil

Contribution 19, from José Guillermo Velásquez Penagos at Corpoica in Colombia

-----Original Message-----
From: José Guillermo Velásquez Penagos
[mailto:joseguillermovelasquezpenagos@gmail.com]
Sent: Sun 2/14/2010 11:56 AM
To: Crop-Livestock
Subject: Week 2 -- Contribution from José Guillermo Velásquez Penagos at Corpoica in Colombia

Dear Colleagues,

Attached please find a presentation that illustrates some experiences of integrated crop-livestock systems in Colombia

José Guillermo Velásquez Penagos, PhD
Corpoica colombia

Contribution 20, from Kevin Gallagher at FAO in Sierra Leone

-----Original Message-----
From: Gallagher, Kevin (FAOSL)
Sent: Sun 2/14/2010 8:13 PM
To: Crop-Livestock
Subject: Week 2 contribution from Kevin Gallagher at FAO in Sierra Leone

In Sierra Leone, we are looking at various constraints but the primary issues across poultry, goats, sheep, rabbits, grass cutters and cattle are:

1. Lack of knowledge on proper housing, nutrition and health care by most farmers (including lack of access to knowledgeable persons as there are few experts in the country)

2. Lack of vaccines and persons that can vaccinate.

3. Lack of feed either as fodder (especially tree sources of fodder) or as intensive feed (e.g. blended mixes).

We are attempting to handle these issues with Farmer Field School training and training for farmer animal technicians although we still have a lot of work today on all 3 points.

From the international community, there is a need for better packaged information for farmers and extension staff - lots of pictures!

We also are working on honey bees and see them as important kind of livestock. For this we have good support from Ghana's Prof Kwame Aidoo who has practical business experience in addition to his professional knowledge of pollinators. We need to be able to identify more people like him that know the situation here and can assist.

Finally, I would like to remind that in Asia, there is a very good use of ducks integrated into rice cultivation for weeding. The International Association for Rice-Duck Cultivation is active in Japan, Korea, Philippines and Vietnam. It shows clearly how crop-livestock systems can be a clear win-win under sustainable crop intensification.

Kevin Gallagher
FAO Sierra Leone

Week 3 Contributions

Contributions in Week 3 of the crop-livestock e-consultation

From the Moderators

-----Original Message-----
From: Crop-Livestock
Sent: Mon 2/15/2010 12:50 AM
To: Crop-Livestock-L@mailserv.fao.org
Subject: Welcome to Week 3 (February 15-19) of the e-consultation on Integrated Crop-Livestock System for Development

February 15, 2010

Dear Colleagues,

Thank you to all of you who provided input to Week 2 of our e-consultation on Integrated Crop-Livestock Systems for Development - The Way Forward for Sustainable Production Intensification.

In our first week of discussions, participants spoke to the importance of integrated crop-livestock systems and drew upon many examples of integrated crop-livestock systems that are being implemented at different scales around the world. Last week we delved into aspects of the input and output chains, the roles of different actors, and potential for some financial and technical incentives to promote these systems. We greatly appreciate the thoughtful responses that we have received to date.

This week (February 15-19) we want to focus the discussion on those policies and institutional supports that must be in place to enable the adoption and spreading of innovations and practices associated with promising crop-livestock systems for food and nutritional security. We have – within previous interventions - touched on some of these but let's devote this week to digging deeper to articulate the institutional and policy constraints that need to be overcome and how to go about it. We also want to highlight those institutions and/or policies that enable integrated crop-livestock systems and what makes them work. As noted in the background paper, these
constraints or enablers might be associated with sector-oriented policies, goals and strategies; strategic planning; infrastructure, credit, marketing (including agricultural market structures and market policies), insurance, land tenure etc; tactics for action, incentives, regulations (including those related to environment and pollution), and strategic directions for change in extensive and intensive crop-pasture-livestock systems, etc. If the commercial private sector has a substantial role in the production and/or marketing, what policy and regulatory measures are needed, and what processes work to ensure an effective and balance dialogue among stakeholders? Who can do what to make a difference?

Let's get started.

- From your perspective and in the context in which you are working, what are the top one-two (1-2) institutional and/or political constraints that undermine the uptake, implementation or spread of integrated crop-livestock systems?

- What can/might be done to address these constraints and who (or who together) can make that happen?

- If you had 5 minutes with a/your Minister of Agriculture (or Livestock, Finance, etc), what message would you want to deliver? What about 5 minutes with the head of national or international farmers' organizations? Any thoughts to share with a relevant private sector representative (inputs, processors, buyers, etc.)?

- What policy or institutional support or changes have you witnessed or read about that led to demonstrated success in the uptake, implementation or spread of integrated crop-livestock systems? Are there successes in other fields that might be applied in this situation?

- Please share any other thoughts on this topic that readers that will inform the discussion.

Please do keep in mind the three overall objectives of the consultation (what do we know about integrated crop-livestock systems for development – what works and what does not; define next steps for key stakeholders; and guide and empower FAO to better support member countries to harness the development potential of integrated crop-livestock systems) towards which the discussions must aim at over the next four weeks. Also, each week's topic should be addressed in the context of two cross-cutting issues – the role of stakeholders, and capturing public goods and incentives for action.

For the technical background document and other related information, please visit the website:
http://www.fao.org/agriculture/crops/core-themes/theme/spi/iclsd.

Week 2 summary will be posted on the website as well as a folder containing all the Week 2 contributions. The documents that came with the contributions during Week 2 will also be available on the website in the documents section.

Thank you again and we look forward to reading from you this week.

Best wishes,

The Moderators

Amir Kassam
Constance Neely
Theodor Friedrich
Eric Kueneman

E-mail: Crop-Livestock@fao.org

Contribution 1 from Lindsay Coulthard of the Manitoba Zero Tillage Research Association, Canada.

-----Original Message-----
From: mztra [mailto:mztra@mts.net]
Sent: Mon 2/15/2010 2:22 AM
To: Crop-Livestock
Subject: Week 3 - Contributions from Lindsay Coulthard of the Manitoba Zero Tillage Research Association, Canada

Dear All,

In western Canada we are fortunate to have access to most if not all of the system requirements to integrate crop/livestock production. We are able to access most seed types, herbicides, feed and equipment inputs. The technology is not complicated and is available to all farmers in western Canada.

I have attached a research publication assessing the economics of inclusion of alfalfa in a cropping rotation. This alfalfa production was used either as a dry hay production to be fed to livestock or as a grazed production with yearling cattle. There is increased risk with the alfalfa production system however there are also notable decreases in cost of production for grain crops produced in this system. There are also significant reductions in the requirement of fossil fuel based crop inputs when alfalfa is included
in a rotation.

Having read the submissions from other parts of the world I now recognize that there are huge disparities between the farming systems we employ and those employed in a large part of the world. The research that we are doing in western Canada does demonstrate that a crop-livestock integrated production system is a practical and beneficial tool in most areas of our "modern" agricultural production.

There are not at this time significant incentives in Canada to encourage farmers to adopt crop-livestock integration. There are several proposals which would reward farmers for providing ecological goods and services which would apply when we use farming technologies which would leave the landscape in a more natural state and to keep the livestock out on the landscape for a higher percentage of their productive lives. There are also some innovative farmers who are developing markets for livestock produced on a forage fed diet but this is a limited market at this time.

The majority of the meat processing in Canada is done at large processing plants. A number of large enclosed livestock finishing units have been located within short distance of these processing plants and several of these are vertically integrated with the processing plants. This situation in Canada does provide a disincentive to adopt a new technology as the large packers do feel they need some control of the livestock coming to their plants to maintain their productivity and margins. We are beginning to see some innovative farmers and small packers working together to fit niche markets in Western Canada but this is still a relatively small part of the total industry.

Farmers in Canada have over the past 35 years increasingly followed the lead of the input providers in making a lot of the farm management decisions. We have been provided with off the shelf inputs to solve the production problems within modern agriculture and have come to rely on these off the shelf solutions. With the increase in size of the farming operations we see fewer cultural solutions being utilized in favor of the commercial chemical and fertilizer solutions. We are seeing an increased interest mainly from the smaller livestock producers in more natural production techniques which may provide them with improved production without the additional costs. We are also seeing more influence from researchers and government extension
encouraging farmers to adopt alternative production systems.

Increased energy costs should bring about a shift towards more local food production systems. We in Western Canada have always been an exporting area and have prided ourselves on our ability to supply the world with food. With the adoption of new food production techniques in other parts of the world and an increase in production levels in some nations which were net importers of food in the past we are going to have to assess the production systems that we have adopted to service these markets. The transportation costs will continue to reduce the profit margins for producers in Western Canada who continue to produce a low value unprocessed food product for
export.

Lindsay Coulthard
Farm and Extension Manager,
Manitoba Zero Tillage Research Association

Brandon Office: 204-729-8838
Farm Office: 204-725-3939
Cellular: 204-825-7878
email: mztra@mts.net

Contribution 2, from J. Franzluebbers at USDA-ARS, Georgia, USA

-----Original Message-----
From: Franzluebbers, Alan [mailto:Alan.Franzluebbers@ARS.USDA.GOV]
Sent: 16 February 2010 16:15
To: Crop-Livestock
Subject: Week 3 - Contribution from Alan J. Franzluebbers at USDA-ARS, Georgia, USA

Dear Colleagues,

Thanks for the opportunity to share these thoughts with you from my perspective in the southeastern USA [a warm (15-20 °C mean annual temperature), moist (50-150 mm per month) environment with acidic, nutrient-poor soils (Ultisols)]

From your perspective and in the context in which you are working, what are the top one-two (1-2) institutional and/or political constraints that undermine the uptake, implementation or spread of integrated crop-livestock systems?

From a cropping perspective, a major constraint to widespread adoption of integrated crop-livestock systems (ICLS) is the institutional view that any problem encountered with a specialized approach can be overcome with a chemical or quick-fix approach. Lack of information, social support networks, physical resources, and financial credit limit a producer's ability to change the system without undergoing enormous financial ramifications. Some producers may want to change from a specialized to a more integrated system, but there is little support structure to enable this. Some producers simply are bolder than others and make the changes, oftentimes when circumstances indicate that farm survival cannot occur without such a change. From a livestock perspective, a major constraint for ICLS adoption is finding suitable alternative markets available in a reasonable distance from the farm to make a switch. Physical resources of proper equipment and suitable land can limit their choices as well.

What can/might be done to address these constraints and who (or who together) can make that happen?

Strong farmer-led organizations with educational support networks (e.g. extension and research teams working towards similar goals) could provide a great deal of technical and social support to encourage change to more resource-efficient and environmentally friendly farming systems. In our area, conservation-tillage farmer alliances have recognized the need for further development by integrating grazing animals. The Conservation Production Systems Training Conference sponsored by the University of Georgia has been helping to develop this approach.

If you had 5 minutes with a/your Minister of Agriculture (or Livestock, Finance, etc), what message would you want to deliver? What about 5 minutes with the head of national or international farmers' organizations? Any thoughts to share with a relevant private sector representative (inputs, processors, buyers, etc.)?

(1) Policies can affect the balance between production and environmental quality. Strategies should be considered that emphasize the long-term sustainability of a region by balancing

production and environmental quality, not just focusing on the short-term needs of a selected portion of the population. (2) Farmer organizations could work together so that the agricultural systems of a region are diverse and vibrant, rather than manipulated by a dominant few at the expense of others. (3) Private agricultural industries could offer a suitable suite of alternative technologies to meet the diversity of needs within a region.

What policy or institutional support or changes have you witnessed or read about that led to demonstrated success in the uptake, implementation or spread of integrated crop-livestock systems? Are there successes in other fields that might be applied in this situation?

Successful adoption of ICLS has occurred from the personal desires of individuals to reduce ecological stresses by adopting more resource-efficient agricultural systems that work for the unique conditions of the farm, its local and regional environment, and for the economic benefit of neighbors who can establish associated businesses (suppliers, retailers, tourism, etc.) to make the rural community thrive in a balanced, sustainable manner.

Alan

Alan J. Franzluebbers
USDA - Agricultural Research Service
1420 Experiment Station Road
Watkinsville GA 30677
Tel: 706-769-5631 ext 223
alan.franzluebbers@ars.usda.gov

Contribution 3, from Ahmed Alhasan Oshake, Federal Ministry of Animal Resources and Fisheries Khartoum, Sudan.

-----Original Message-----
From: Ahmed Alhasan Oshake [mailto:aeoshaik@yahoo.com]
Sent: 16 February 2010 22:43
To: Crop-Livestock
Subject: Week 3 - Contribution from Ahmed Alhassan Oshake, Federal Ministry of Animal Resources and Fisheries, Khartoum, Sudan.

Dear Colleagues

Thank you for the opportunities to share and discuss ideas and views on crop-livestock integration systems.

This is a very important issue as well in Sudan. Sudan lies in the north east of Africa and neighbours 8 countries, from the north and clockwise, Egypt, then Saudi Arabia eastwards across red sea, Eritrea, Ethiopia, Kenya, Uganda, Central African Republic, Chad and last Libya in the north west. The climate ranges from desert, semi-desert, poor and rich savannahs to humid equatorial climate in the south. Sudan generally is an open grassland separated by Nile River in the middle. My country is categorised as one of the countries expected to play a positive role in responding to increased demand for food.

Please find attached what I decided to say to my minister in the five minutes. (It is also pasted below).

Best regards.....

Oshaik

Ahmed Alhassan Oshaik
General Directorate of Extension, Technology Transfer and Pastoral Development
Federal Ministry of Animal Resources and Fisheries
Khartoum
Sudan

Contribution 4, from Adrian Catrileo at INIA, Chile

-----Original Message-----
From: acatrile@inia.cl [mailto:acatrile@inia.cl]
Sent: Wed 2/17/2010 11:05 PM
To: Crop-Livestock-L@mailserv.fao.org
Subject: Week 3 - Contribution from Adrian Catrileo at INIA, Chile

Dear All,

I am writing from southern Chile (38ºSL 72º WL). Here there is a mixed agriculture where crops and livestock usually are present in an integrated way with different intensity of the crop rotation.

In general, farmers have access to every agricultural input they need (seeds, pesticides, credits, etc) and for commercial farmers the decision about what they are going to grow the next season relies on the market conditions. On the other hand, small-farmers do more integrated crop-livestock systems (ICLS) where they produce the amount of food they need and the excess of production is sold.

Question 1.

Institutionally, the banks not always facilitate enough credit to farmers. They usually claim lack of credit to overcome with their ICLS especially in the long term. Fruit projects with better economic perspective in the long term are preferred by the bank, limiting the presence of crops and livestock, in fact, many cow-calf systems which were a traditional activity have decreased dramatically in the last five years. The second constraint refers to a very weak association between the different components of the added value chain. In general, larger industries buy agricultural products without necessarily having a contract with the farmers which at the end disincentive any plan of ICLS.

Question 2.

A better communication, transparency and confidence are necessary between the producers and processors. Besides, market conditions like credit (amount and opportunity), production contract, economic incentives for quality, good agricultural practices, animal welfare, soil health, are also required. So, farmer's organizations and an appropriate political environment are key elements.

Question 3.

To the Minister: What is your planed strategy to maintain farmers on their landscape while increasing productivity in quality and quantity, without deteriorating the environment?

To the head of farmer's organization: In your opinion, what are the minimal conditions required to implement an ICLS? And secondly, which are the bottle necks you visualize on the system?

Question 4.

Universities, research institutions and agricultural government supporters should be sympathetic with the System Approach and its practical, economic and sustainable benefits. This topic should be taught and learned throughout the university studies.

In the last few years, in some areas where soils are very infertile, the inclusion of a legume crop (lupine) which is used early in the year as green manure in order to increase the organic matter of that paddock/soil has been promoted in the crop sequence. This has been supported economically in part by the Minister of Agriculture and in part by the farmers, stimulating in some way to maintain also the ICLS.

Best Regards,

Adrian Catrileo PhD
Instituto de Investigaciones Agropecuarias (INIA) - the National
Agricultural and Livestock Research. CHILE
Phone: 56-45-215706 (272)
Fax : 56-45-216112
acatrile@inia.cl

Contribution 5, from Parthasarathy Rao at ICRISAT, India

-----Original Message-----
From: ParthasarathyRao, P (ICRISAT-IN) [mailto:P.PARTHA@CGIAR.ORG]
Sent: 18 February 2010 10:56
To: Crop-Livestock
Subject: Week 3 - Contribution from Parthasarathy Rao at ICRISAT, India

To the Moderators

My brief answers to the questions raised are shown below in blue.

-From your perspective and in the context in which you are working, what are the top one-two (1-2) institutional and/or political constraints that undermine the uptake, implementation or spread of integrated crop-livestock systems?

The compartmentalization of crop and livestock activities into separate entities by Government Departments, Extension Agencies, Researchers, is a major hurdle in integrating the system and bringing them under the ambit of new technologies that promote both sub-sectors.

A lack of understanding of the heterogeneity of crop livestock systems and the need for differential interventions in terms of technology delivery and development initiatives.

-What can/might be done to address these constraints and who (or who together) can make that happen?

Bringing on one platform all the service providers related to crops and livestock on a single platform so there is appreciation of the system as a whole rather than looking at each sub-sector independently.

Constructing a typology of crop-livestock systems for each country for better targeting of technology and development initiatives.

Better coordination among researchers working on crops and livestock. Interaction between crop and animal scientists.

- If you had 5 minutes with a/your Minister of Agriculture (or Livestock, Finance, etc), what message would you want to deliver? What about 5 minutes with the head of national or international farmers' organizations?
Any thoughts to share with a relevant private sector representative (inputs, processors, buyers, etc.)?

Put an environment / pollution tax on industrial systems and provide incentives for mixed systems in peri-urban or hinterlands. Use the tax for building infrastructure to link hinterland producers with urban /demand centres.

Bulk supply of inputs to farmers through farmer association would save on cost of inputs. Bulk purchase of produce by processing industry again through farmers association would save on marketing and transaction costs.

-What policy or institutional support or changes have you witnessed or read about that led to demonstrated success in the uptake, implementation or spread of integrated crop-livestock systems? Are there successes in other fields that might be applied in this situation?

A coalition approach where in all the potential stakeholders (players /actors) are brought on a common platform has a demonstrated effect on the uptake of new technology or program. The coalition would include both research and non-research stakeholders, public and private sector stakeholders, farmers, NGO's, bankers, market intermediaries, and industry.

A good example of this was the use of sorghum for poultry feed in Asia promoted through an institutional innovation / coalition approach. This coalition included crop scientists, poultry nutritionists, feed industry, credit agencies, input dealers (including seed), farmers, farmers' federation, poultry producers, poultry federation.

Under this approach each stakeholder / institution/organization would meet his sub-goal while meeting the overall common goal.

Regards

Parthasarathy Rao
ICRISAT
India

Contribution 6, from Alan Duncan at ILRI Addis Ababa

-----Original Message-----
From: Duncan, Alan (ILRI) [mailto:A.Duncan@cgiar.org]
Sent: 18 February 2010 14:20

To: Crop-Livestock
Subject: Week 3 - Contribution from Alan Duncan at ILRI Addis Ababa

Dear Moderators – here is my contribution for Week 3:

The first thing to say is that the lack of contributions to this e-forum during week 3 is significant. Compare the lack of activity we have seen in week 3 on policies and institutions with flurry of responses during weeks 1 and 2. Does this reflect the composition of the consultee group or is it that while we know a lot about the technical solutions, we know much less about how to turn these into reality on the ground – a big challenge. Now a few reflections in response to the questions posed.

- *From your perspective and in the context in which you are working, what are the top one-two (1-2) institutional and/or political constraints that undermine the uptake, implementation or spread of integrated crop-livestock systems?*

I work in Ethiopia and am mainly interested in uptake of improved feeding systems for livestock but many issues related to change in practice at farm level are generic. In Ethiopia, one of the constraints to integration crops and livestock is the strong policy emphasis on improved cereal production with little policy attention given to livestock. A further constraint is the disjointed nature of the system of actors working in the rural setting. We are experimenting with the use of "innovation platforms" to bring the necessary actors together in the hope that it will accelerate changes at farm level - we have some promising results and some disappointments but I think there is a need to focus less on pushing technologies and more on addressing institutional barriers to change at farm level. Off the top of my head a few of the institutional barriers to change are: 1. lack of participatory approaches among extension staff 2. compartmentalization of local govt actors (crops, livestock, NRM) 3. poor linkages between research and extension 4. research mandates that are not examining things at the system level 5. Insufficient attention to linking farmers to market and coupling technologies with income-generating commodities.

- *What can/might be done to address these constraints and who (or who together) can make that happen?*

We are using innovation platforms to bring diverse actors together for joint action. We have been struck by the limited extent to which key players in the livestock sector communicate and just getting them in the same room on a regular basis can lead to positive outcomes in terms of change at grass roots level - we need more of this kind of thing. There is a lot more on the whole "innovation system" perspective on the website of the Fodder Innovation Project (http://www.fodderinnovation.org/) and the project I lead, the Fodder Adoption Project recently started a blog (http://fodderadoption.wordpress.com/) where we will be posting on our experiences – subscribe if you want to be kept in touch.

- *If you had 5 minutes with a/your Minister of Agriculture (or Livestock, Finance, etc), what message would you want to deliver? What about 5 minutes with the head of national or international farmers' organizations? Any thoughts to share with a relevant private sector representative (inputs, processors, buyers, etc.)?*

I'd suggest that extension officers need more than technical skills - they are well placed to act as facilitators of innovation by bringing in private sector players, market actors etc to stimulate innovation - but they need to be capacitated and mandated in this direction.

-Please share any other thoughts on this topic that readers that will inform the discussion.

In summary, I suggest that changes in practice at farmer level are a lot about getting the right actors together, providing forums for them to develop joint actions, building capacity among local actors to think at system level and to move beyond technical interventions to organization and institutional innovations.

Alan Duncan
ILRI
Addis Ababa
Ethiopia

Contribution 7, from Bruno Gerard at ILRI, Addis Ababa, Ethiopia

-----Original Message-----
From: Gerard, Bruno (ILRI) [mailto:B.Gerard@CGIAR.ORG]
Sent: 18 February 2010 16:22
To: Crop-Livestock
Subject: Week 3 - Contribution from Bruno Gerard at ILRI, Addis Ababa, Ethiopia

Dear colleagues,

Publication on Innovation

Following Alan Duncan's contribution find attached a publication related to a 'Fodder Innovation Project' implemented in India and Nigeria, pleading for changes in the way we work and proposing a framework to bring stakeholders together in agricultural development.

Bruno

Reframing Technical Change: Livestock Fodder Scarcity Revisited as Innovation Capacity Scarcity - A Conceptual Framework

by A. Hall, R. Sulaiman, and P. Bezkorowajnyj

Abstract

This document, divided into three sections, develops a conceptual framework for a project on livestock fodder innovation – the Fodder Innovation Project (FIP). Livestock is important to the livelihoods of poor people in many regions of the developing world. A generic problem found across this diverse range of production and marketing contexts is the shortage of fodder. This paper argues that to address this problem it is necessary to frame the question of fodder shortage not from the perspective of information and technological scarcity, but from the perspective of capacity scarcity in relation to fodder innovation. To support this position the first section presents case studies of experience, from an earlier fodder innovation project, that suggest that while fodder technology is important, it is not enough. There is a large institutional dimension to bringing about innovation, particularly with respect to the effectiveness of networks and alliances needed to put technology into use. The second section begins by reviewing the evolving paradigms of agricultural research and innovation over the last 30 years or so and explains the emergence and relevance of the innovation systems concept to agricultural development. It then presents a framework for exploring fodder innovation capacity, with particular emphasis on the patterns of interaction needed for innovation and the policy and institutional settings needed to enable these processes. The third section reviews the wide range of existing tools available to investigate institutional

change. It then recommends that an eclectic approach of mixing and matching tools to the emerging circumstances of the research is the best way forward.

Contribution 8, from Tilahun Amede at ILRI Addis Ababa

-----Original Message-----

From: Amede, Tilahun (ILRI-IWMI) [mailto:T.Amede@CGIAR.ORG]
Sent: 18 February 2010 17:00
To: Crop-Livestock
Subject: Week 3 - Contribution from Tilahun Amede at ILRI Addis Ababa

Dear Moderators,

I would like to add few bullets on how institutions and policies affect uptake of interventions in CLS.

Technology flow and adoption cannot easily be predicted by studying the individual behaviour of agents, or the efficacy of some single innovation; and that long-term prediction of how interventions emerge will be subject to considerable uncertainty. It is also possible that farm level CLS will be patterned rather than random, and that these patterns will have arisen out of the interactions of local sets of practices, capacity, agents, strategies and artefacts in response to their environments. It is our contention that as innovation occurs, emergent behaviours arise, and these represent changes to social institutions. You may wish to share the model below (paper attached), emerged from our work on Livestock-water-land productivity in CLS in East Africa.

Thank you,

Tilahun

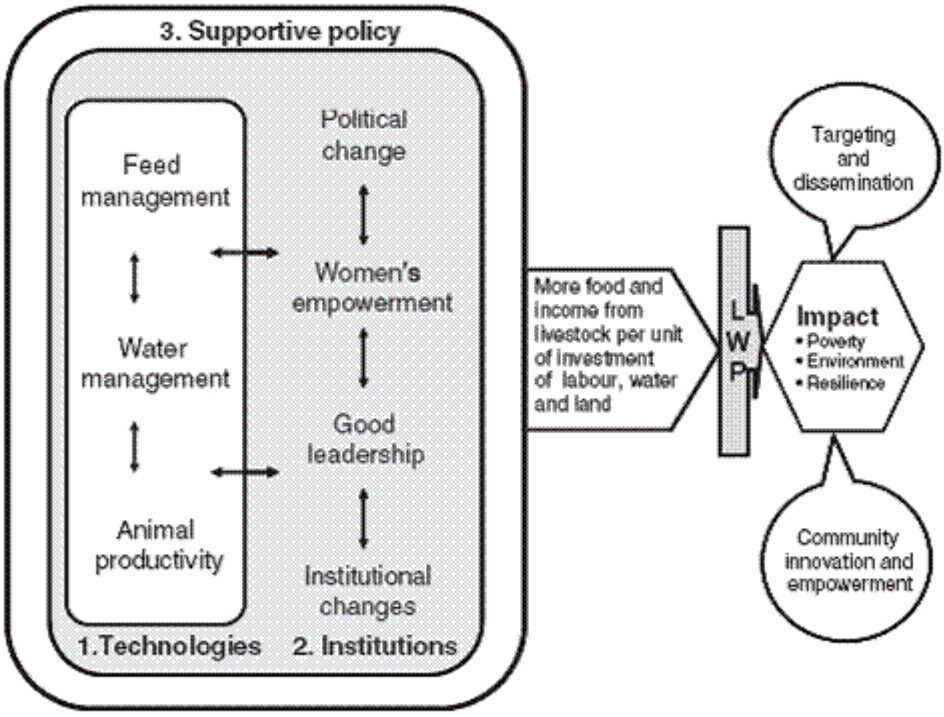


Fig. 1. Components of innovation systems to address poverty, environmental degradation and resilience through improved livestock–water productivity interventions.

==========

Tilahun Amede, PhD
Scientist, Livestock water and nutrient productivity
International Livestock Research Institute (ILRI) / International Water Management Institute (IWMI), P.O.Box 5689, Addis Ababa, Ethiopia
Bus: +251 116463215
Mobile: +251 911 230135
Bus Fax: +251 116461252
E-mail: T.Amede@CGIAR.ORG
Web Page: http://www.iwmi.org/ http://www.ilri.org

Contribution 9, from Jill Lenne, Scotland, UK

-----Original Message-----
From: Jillian Lenne [mailto:jillian.lenne@btopenworld.com]
Sent: 18 February 2010 18:15
To: Crop-Livestock
Subject: Week 3-- Contribution from Jill Lenne, Scotland, UK

Dear Contributors

Key issues raised

I strongly agree with today's contributions by Parthasarathy Rao and Alan Duncan (copied below) to the e-consultation on crop-livestock systems. My general contribution in Week 1 (paper on crop-livestock integration in SSA) also highlights both issues.

Best wishes
Jill Lenne

From Parthasarathy Rao: The compartmentalization of crop and livestock activities into separate entities by Government Departments, Extension Agencies, Researchers, is a major hurdle in integrating the system and bringing them under the ambit of new technologies that promote both sub-sectors.

A coalition approach where in all the potential stakeholders (players/actors) are brought on a common platform has a demonstrated effect on the uptake of new technology or program. The coalition would include both research and non-research stakeholders, public and private sector stakeholders, farmers, NGO's, bankers, market intermediaries, and industry. A good example of this was the use of sorghum for poultry feed in Asia promoted through an institutional innovation / coalition approach. This coalition included crop scientists, poultry nutritionists, feed industry, credit agencies, input dealers (including seed), farmers, farmers' federation, poultry producers, poultry federation.

From Alan Duncan: A further constraint is the disjointed nature of the system of actors working in the rural setting. We are experimenting with the use of "innovation platforms" to bring the necessary actors together in the hope that it will accelerate changes at farm level - we have some promising results and some disappointments but I think there is a need to focus less on pushing technologies and more on addressing institutional barriers to change at farm level. Off the top of my head a few of the institutional barriers to change are: 1. lack of participatory approaches among extension staff 2. compartmentalization of local govt actors (crops, livestock, NRM) 3. poor linkages between research and extension 4. research mandates that are not examining things at the system level 5. Insufficient attention to linking farmers to market and coupling technologies with income-generating commodities.

Contribution 10, from Eric Vall at CIRAD

-----Original Message-----
From: Eric Vall [mailto:eric.vall@cirad.fr]
Sent: 19 February 2010 11:04
To: Crop-Livestock
Subject: Week 3 - Contribution from Eric Vall at CIRAD.

Bonjour,

Je vous prie de trouver ci-après une contribution portant sur les systèmes agro-sylvo-pastoraux très répandus en Afrique de l'Ouest dans les zones cotonnières et en particulier au Burkina Faso en zone sub-humide.

1) From your perspective and in the context in which you are working, what are the top one-

two (1-2) institutional and/or political constraints that undermine the uptake, implementation or spread of integrated crop-livestock systems?

Une première contrainte me parait être liée à la séparation des Ministères de l'Agriculture et de l'Elevage, situation très courante en Afrique subsaharienne. Au Burkina Faso, dans la zone de savanes subhumide, les activités agricoles et pastorales sont conduites sur les mêmes espaces et au sein des mêmes exploitations. Toute mesure appliquée sur une activité a un impact sur l'autre. Sur le terrain les agents des 2 ministères travaillent souvent ensemble, néanmoins les logiques sectorielles l'emportent parfois sur celles de l'intégration de l'agriculture et de l'élevage. Une seconde contrainte concernent la faiblesse des organisations d'éleveurs par rapport aux organisation d'agriculteurs (comme les OP coton bien structurées et bien soutenues par les bailleurs de fonds) toujours dans les mêmes zones. Dans les actions de dvpt local, conduites par exemple par les communes rurales, cela conduit à une faible prise en compte de l'élevage

2) What can/might be done to address these constraints and who (or who together) can make that happen?

Au niveau local (village, commune), des cadres de concertation regroupant les représentants des OP d'agriculteurs et des OP d'éleveurs permettent d'activer les échanges entre agriculteurs et éleveurs. Souvent ces cadres de concertation manquent, ce qui fait qu'il n'y a pas de lieux où parler ensemble des problèmes générés par les activités réciproques et pour rechercher des solutions. Parfois des cadres de concertation existent et sont prévus dans les politiques de décentralisation mais sont insuffisamment actifs. Les méthodes de recherche action, qu'y s'appuient, sur des forums hybrides réunissant praticiens et scientifiques, permettent de redynamiser les échanges au sein de communautés agropastorales. Lorsque le dialogue s'établit entre agriculteurs, éleveurs, acteurs de terrains et scientifiques, un travail d'analyse des pbs et de recherche de solution se met en place et on constate un apaisement des tensions.

Au niveau national, on pourrait suggérer la mise en place de plateformes nationales d'échanges sur la question du dévpt agro-sylvo-pastoral à l'image de ce qui peut être fait au niveau local.

3) If you had 5 minutes with a/your Minister of Agriculture (or Livestock, Finance, etc), what message would you want to deliver? What about 5 minutes with the head of national or international farmers' organizations? Any thoughts to share with a relevant private sector representative (inputs, processors, buyers, etc.)?

Dans les zones de savanes subhumides de l'Afrique de l'Ouest, on aurait tout à gagner en renforçant encore plus l'intégration de l'agriculture et de l'élevage. L'agriculture bénéficie de la présence de l'élevage à travers la traction animale, la fumure organique, l'épargne/trésorerie sur pieds et l'élevage bénéficie de l'agriculture à travers les résidus de cultures (ressource fourragère de saison sèche), le recul de certaines maladies comme la trypanosomose....

Cordialement,
Eric Vall
Cirad

Contribution 11, from Natali KOSSOUMNA LIBA'A at the Université de Maroua, Cameroun

-----Original Message-----
From: Kossoumna Libaa Natali [mailto:kolibaa@yahoo.fr]

Sent: 19 February 2010 11:17
To: crop-livestock-L@mailserv.fao.org
Subject: Week 3 - Contribution from Natali KOSSOUMNA LIBA'A at the Université de Maroua, Cameroun

Dear colleagues,

Conditions for a good organization and management of rural area between breeding and agriculture

As geographer, my intervention relates to the problems involved in the organization and management of rural areas between breeding and agriculture. Recent observations show the exacerbation of the constraints which weigh on the traditional model of management and organization of pastorals activities in the North of Cameroon. With land insecurity which means safeguarding the spaces of pasture and tracking for cattle and supporting a mining or extensive agriculture, physical insecurity with the taking of hostage and the payment of strong ransoms by stockbreeders have come to be added. The latter try to implement new practices in order to adapt or at least attenuate such constraints. Geographical and sociological analyses of these problems were carried out between 2005 and 2008 within the framework of a thesis of doctorate in geography.

I will give my contribution by following the guidelines questions:

- From your perspective and in the context in which you are working, what are the top one-two (1-2) institutional and/or political constraints that undermine the uptake, implementation or spread of integrated crop-livestock systems?

The recent analysis enabled us to consider breeding and agriculture which are registered on the various territories occupied and exploited by the stockbreeders (base territory and territory of activity) as a whole and in their interrelationships. The various shapes of organization of these territories were characterized (cultures, spaces of pasture, tracks with cattle and of service road, dwellings...). This enabled us to understand and brainstorm on the various organizations, exploitations and territorial managements, to identify the structures of these territories, spaces of membership, the principal dynamics. This characterization also made it possible to specify the functional relations between the various actors (contracts, exchanges and complementarities...), the stakes and the concrete methods of territorial integration by matching organization and operation (rights, rules and access modes, authorities of management, conflicts, arrangements...). Thus, the interferences between the various activities (breeding and agriculture) in and beyond these territories, the new practices of the stockbreeders, the new individual and collective levels of organization around the herd and of the cultures were defined. The combination of these territorial transformations made it possible to clarify the needs expressed by the stockbreeders for the exercise for their activities and their survival. This led us at the end of the thesis to conceive and to organize proposals for an action to answer the territorial stakes for a good safeguarding of the environment (conditions of maintenance of mobility, complementarities agriculture and breeding), a social peace (avoidance of conflict situations, securing goods and people) and a sustainable economic development (safeguarding the incomes of the stockbreeders to avoid their impoverishment and to feed a growing population).

In spite of many exchanges between the communities of stockbreeders and farmers (work, material, etc), the improvement of productivity and management of the delimited courses of small surface and large courses were not successful. This lack of collaboration is partly explained by the unequal weight that breeding has within the two communities. The farmers initially seek to increase their cultivable surface without for example planning to develop the surplus of animal manure produced by animals of the stockbreeders at the time of parking on

the space of pasture. On the other hand the stockbreeders want to preserve a vast space of course, able at least to accommodate all the year part of the herd for milk production. The boards of management set up by the projects of development for the maintenance of the protected courses do not seem a device of stable management, effective and confirmed in the medium and long term. This shows that the pastoral situation cannot improve with subsidiary rules created by development projects in spite of their engagement and their effectiveness apart from the legislative framework. Considering the weakness of the surfaces of the secured courses in question and the technical and social difficulties to improve the productivity of it, transhumance appears indispensable for the stockbreeders of this area and more particularly of the two territories under study.

- What can/might be done to address these constraints and who (or who together) can make that happen?

We are actually in front of the settlement and integration of the stockbreeder's transhumant in the dominating socio-economic system. The results show that the settlement of the systems of bovine breeding of Mbororo and thus the abandonment of the transhumance, recommended by the authorities in order to reduce tensions between the farmers and the stockbreeders could be viable only if the following three major conditions are fulfilled:
- (i) delimitation of great spaces, (much larger than those currently limited) near the villages of stockbreeders
- (ii) A good and concerted management of available pastoral resources and, if possible in a complementary way;
- (iii) A fodder revolution in the base territory which the technicians and the stockbreeders have of the evil to design and to implement. In addition this fodder revolution containing crop plants (herbaceous and raised) should use to much space order not to compromise the food safety of the populations of this area which remains fragile.

Today the conditions necessary for a total settlement of the activities of breeding are not effective. As result of this, the practice of transhumance must be preserved and integrated in the regional diagrams of development.

- If you had 5 minutes with a/your Minister of Agriculture (or Livestock, Finance, etc), what message would you want to deliver? What about 5 minutes with the head of national or international farmers' organizations? Any thoughts to share with a relevant private sector representative (inputs, processors, buyers, etc.)?

The prospects for the evolution of the systems of breeding in the North of Cameroon must be considered through certain elements which constitute the determinants of them:

1. The requirement for the maintenance of the mobility of the animals

Faced with the pressure on space and with the number of animals involved, transhumance seems to be a guarantee for (i) the sustainability of the agro-pastoral systems of the Mbororo stockbreeders and thus (ii) the supply of livestock products to urban consumers, whose needs increases each year. This mobility makes it possible to develop in the course of years a diversity of the agro-climatic situations and natural courses. In order to be sustainable, however, these systems based on mobility must be better managed.

Resorting to paid shepherds further complicates this management; for example, the latter feels concerned only by the control of the herds and very little by the management of the consumable vegetation by the cattle. But, the major stake today for the stockbreeders is the maintenance of the large courses dispersed in various zones of the North Cameroon region and which are essential to the maintenance of transhumance. These courses are indeed threatened by the extension of the cultures and the neglect of the authorities in charge of their

control (official services, traditional authorities).

Sustainability based on the maintenance of transhumance relates today to the resolution of the problem of insecurity of goods and people on the one hand and that of the capacity of the stockbreeders to organize themselves collectively in order to be given sufficient spaces by ensuring the pastoral natural stock management on the other hand. The issue of sustainable development was tackled here from the point of view of the stockbreeders, thus on their territory and scale of the unit of production which they mobilize. The same question should also apply to the scale of the soudano-sahelian zone. This requires different methodological choices and the installation of multi-field teams in the definition of indicators of agro-ecological, economic and social performances being able to lead to adequate political choices. It requires decision makers, especially the State, to become aware of the place of mobility in animal feeding and the protection of the environment by taking strong decisions aiming at maintaining the state of spaces of usual courses and tracks for cattle. For the moment, in the absence of a collective reflexion for the organization and the space management, the practices implemented tend to constitute a heterogeneous mosaic of territories on the scale of each group of actors and even of each individual (stockbreeders and farmers) and whose results are undergone by each one. It is imperative to ensure the practice of agriculture and the preservation of pastoral spaces in territories where land pressure of agricultural and extra-agricultural origin (drives out, tourism...) is strong.

The disappearance of the stockbreeders or the reduction in the breeding will have a consequence on the milk and meat consumption in the area. It is also imperative to maintain the activity of breeding and the maintenance of pastoral spaces. In view of this, all the actors should mobilize their capacities of comprehension of the stakes in progress and define rules in a participative way, and adapt their rights and duties. This supposes a responsabilization of the State and a strong implication of the public services in the installation of a policy of viable and equitable territorial governance for space management.

2. Citizens living together on the same territory: a challenge for the State

Citizens, whatever their activities, their origin, their level of education occupy the same territory. The constitution of the various countries stipulates that all the citizens must have access to the same rights, conferred by the fact that they reside on the same territory. So the concept of citizenship can be linked to that of territorial governance seen as the greatest participation of citizens in the management of the territory. As a result of this, we conceive that all the citizens, whosoever, and whatever the activity which they practice and the portion of the territory that they occupy must all have the means to take an active part in the construction of this territory, to contribute to define and to carry out the project by which all can live together on the territory. However, the report is clear: exclusion and hatred which stockbreeders and their principal activity are victims of started in the past. The claims raised by the territorial governance causes in relation to the place of the space of pasture and the safeguarding of the way of life of the stockbreeders remain topical. Indeed, coordination between the various types of actors (the farmers, the stockbreeders, managers of the zones of interest hunting and hunting, communes, traditional authorities) and the various activities (Agriculture - cotton and corn-, breeding, activity of hunting and tourist...) can be developed only if the State, which has the means of enforcing the law is ready to play its role, i.e., to monitor, defend the contradictory interests and to arrange the territory. It thus poses the problem of the territorial governance in the centre of which the State, democracy and the citizenship are. The State must thus work out, apply, respect and enforce the law, and ensure the land safety for stockbreeders and their equitable access to the natural resources. The practice of pastoralism as a socio-economic activity and way of life must be guaranteed. This passes through the sensitization and the popularization of the laws and regulations for the determination of the status of spaces of pasture and the tracks of cattle and the promotion of a policy of regional planning. Stockbreeders must take part in decision-making relating to land.

- What policy or institutional support or changes have you witnessed or read about that led to demonstrated success in the uptake, implementation or spread of integrated crop-livestock systems? Are there successes in other fields that might be applied in this situation?

In Northern Cameroon, human population growth leads to increased competition for the same natural resources between nomadic livestock breeders (pastoralists) and crop farmers. While decision-makers would prefer pastoralists to settle and give up nomadism and transhumance, what is observed is a partial settling process with permanent dwellings and crop fields but with the persistence of seasonal practices of transhumance for a large part of the animals. The main reason behind this semi-settlement process is of both a social and economic nature: Pastoralists villages are given an official status by the authorities, thus engendering requests for public infrastructures such as schools and boreholes as well as claims for tenure rights. Seasonal transhumance for part of the herds renders possible sustainable temporal and spatial use of fodder resources and solves land availability problems. Individual strategies by breeders to gain access to diminishing grazing land have become the rule. A decrease in collective decisions can consequently be expected in the near future. Simultaneously, breeders have started to employ paid shepherds because of changes in seasonal grazing strategies brought by the new cropping practices.

From the economic point of view, this situation opens market opportunities for pastoralists. Cereal and milk yields are good and the access to local markets contributes to the good performance of those semi-settled production systems. The main reasons behind this semi-settling of Mbororo farmers are thus mainly economic but also have an important social component: breeders villages are officially registered by local authorities and social infrastructures such as schools and wells can be obtained.

Transhumance is a key factor in their sustainability and is conditioned by the availability of grazing lands beyond settling areas. Consequently, seasonal mobility is the only way to manage fodder resources in a sustainable manner. The perpetuation of this semi-transhumant way of life also depends on security measures against crime being implemented along remote routes utilized by herds and shepherds. A strong Government involvement in terms of policy is a prerequisite for that.

- Please share any other thoughts on this topic that readers that will inform the discussion.

Stockbreeders holding their future

In the same way, stockbreeders have to invent new forms of social and professional organization in order to have the capacity to defend their interests, to communicate with the authorities, the better organized communities of farmers and organizations working for development. For the moment, the stockbreeders are seen as "weak actors" insofar as they have few assets in the negotiations. By strongly getting involved in the local political life, stockbreeders could thus take part in the implementation of the legislative, regulatory choices and in the policies of regional planning relating to the concerns of sustainable development and to better assert their rights.

The adaptation of the stockbreeders and their activities of breeding to the new needs generated by the settlement pass through the diversification of the functions of the breeding. What may matter for the stockbreeders is implementing models of production based on the fattening (bovine, ovine) and in the dairy production. For that, a strategy of access to the crop waste products, the cotton oil cakes, corn chaff and fodder trees... in particular through various relations between city dwellers and farmers of neighbouring villages, appears essential. There is also a need for Cultural Revolution because the food used for the fattening and the dairy production can neither be entirely provided by the current pastoral resources nor

can they partly be bought given their cost and the low rate of offer on the markets. The stockbreeder will thus have to ensure the production of part of the food of these systems of intensified breeding. Trying to buy all is risky and expensive, especially as there is a risk on the access to the oil cake, more so when fall of the production of cotton is confirmed.

Natali KOSSOUMNA LIBA'A, PHD
Département de Géographie
Université de Maroua
B.P 55 Maroua - Cameroun
Tel: +237 77 84 48 22
Email: kolibaa@yahoo.fr

Contribution 12, from A K Misra , DRWA, Bhubaneswar, India

-----Original Message-----
From: Arun Mishra [mailto:mishraak17@yahoo.com]
Sent: 19 February 2010 11:42
To: Crop-Livestock
Subject: Week 3 - Contribution from A K Misra , DRWA, Bhubaneswar, India

Dear Sir

Please find below the replies to the questions raised for discussions.

Q - 1: From your perspective and in the context in which you are working, what are the top one-two (1-2) institutional and/or political constraints that undermine the uptake, implementation or spread of integrated crop-livestock systems?

Lack of system perspective/approach in research and development.
Lack of political will/support from top leaders may be due to lack of awareness and understanding of importance of integrated crop-livestock systems in enhancing the livelihood of resource poor farmers.
Lack of credit, insurance and marketing support to the poor farmers in adoption of CLS innovations.

Q - 2: What can/might be done to address these constraints and who (or who together) can make that happen?

Need to work in consortium mode and sensitize all the stakeholders involved in up scaling of crop-livestock innovations (Policy Makers, Scientists and Extension Agent's including NGOs, Panchayati Raj Institutions (PRIS), State Development and Extension Departments and Financial Institutions) about the importance of system approach.

Partnerships need to be built among the stakeholders for that better coordination and communication is prerequisite. Good, honest and visionary leadership can bring this change to happen.

Q - 3: If you had 5 minutes with a/your Minister of Agriculture (or Livestock, Finance, etc), what message would you want to deliver? What about 5 minutes with the head of national or international farmers' organizations? Any thoughts to share with a relevant private sector representative (inputs, processors, buyers, etc.)?

Assured market for small and marginal farmers, Credit Card for taking loan from banks for purchase of inputs required for integrated crop-livestock innovations to landless and poor people. Promote agro-processing and input delivery at cluster level through SHGs/CBOs.

Link integrated crop-livestock system with Food for Work programme.

Q - 4: -What policy or institutional support or changes have you witnessed or read about that led to demonstrated success in the uptake, implementation or spread of integrated crop-livestock systems? Are there successes in other fields that might be applied in this situation?

Indian Council of Agricultural Research (ICAR) is experimenting institutional innovations under National Agricultural Innovation Project (NATP) for enhancing the livelihood security of rural poor so that it (ICAR) becomes a dynamic innovation system capable of responding to the present as well as the future needs of agriculture research and development.

Major emphasis of the project is on Improving and developing the most suitable integrated farming system models in the less favourable environments and regions and groups through action research so that the livelihood of the rural poor improves through assured food, nutrition, employment and income.

Several technologies refined under Institute Village linkage programme of NATP (such as backyard poultry rearing, integrated farming systems, strategic feed supplementation, etc) are up scaled at sate level through Agricultural Technology Management Agency (ATMA) far wider and faster impact.

With regards

Dr A K Misra
Principal Scientist
Livestock Production & Management
Directorate of Research on Women in Agriculture
Baramunda P.O., Bhubnaeswar 751 003, Orissa, India

Contribution 13, from Antonio Rota at IFAD in Rome

-----Original Message-----
From: Rota, Antonio [mailto:a.rota@ifad.org]
Sent: 19 February 2010 13:14
To: Crop-Livestock
Cc: Mathur, Shantanu; Cleveringa, Rudolph; Sperandini, Silvia; Calvosa, Chiara
Subject: Week 3- Contribution from Antonio Rota at IFAD in Rome

Dear Moderator,

I would like to share the attached document "Integration of crop and livestock production in conservation agriculture: guidelines for project design" with the participants to this interesting e-consultation.

This Thematic Paper is an attempt to draw some lessons from key subject documents and develop some principles to guide project design. Aspects, which are particularly important for an institutions like the International Fund for Agriculture Development (IFAD) which finance

an average of 35 investment projects per year on agriculture development for a total value of more than USD600 million (2008 figures for loans and grants).

We are looking for contributions to this "live/on progress" document. Each contributor will be acknowledged and the final version will be posted on the Community of Practice for Pro-poor Development as public good for mutual knowledge and learning (CoP-PPLD at www.cop-ppld.net).

Best regards

Antonio Rota
IFAD, Senior Technical Adviser
Livestock and Farming Systems
Technical Advisory Division - PT
Via Paolo di Dono 44
00142 Rome, Italy
Tel. +39 06 5459 2680
Fax + 39 06 5459 3680

Contribution 14, from Sara Scherr at Ecoagriculture Partners, Washington DC

-----Original Message-----
From: Sara Scherr [mailto:sscherr@ecoagriculture.org]
Sent: 19 February 2010 14:58
To: Crop-Livestock
Cc: 'Louise Buck';'Constance Neely'
Subject: Week 3 - Contribution from Sara Scherr at Ecoagriculture Partners, Washington DC

Dear Colleagues,

This e-conference has been very rich. I would just like to add my voice to those who have emphasized the landscape/territorial governance issues among multiple stakeholders. There are still many technical challenges, but the biggest constraint now is institutional and policy silos between producers (different groups), conservation organizations, agricultural NGO, private sector investors, district and national government agencies, etc. In particular, there appear to be great opportunities to raise political support and financing for integrated crop-livestock strategies where these also contribute to resolving larger ecosystem-level challenges and opportunities, like watershed restoration, habitat restoration for threatened biodiversity, and carbon sequestration.

Now would be an opportune time for a systematic review of the various models that are being experimented with for multi-stakeholder innovation and action platforms, and lessons learned about their development and management (and financing). Through the Landscape Measures Initiative (www.landscapemeasures.org), Ecoagriculture Partners and numerous partners have begun compiling and further developing tools and methods for analyzing, planning, design and monitoring of such participatory landscape initiatives. Perhaps an outcome of this e-conference could be to pull together the methods being used in crop-livestock integration programs at landscape scale, and make them more widely available through diverse platforms, including the Landscape Measures Resource Centre.

Best wishes,

Sara J. Scherr, President

Contribution 15, from Luiz Carlos BALBINO and Paulo GALERANI at Embrapa, Brazil

-----Original Message-----
From: Luiz Balbino [mailto:luizcarlos.balbino@embrapa.br]
Sent: Fri 2/19/2010 7:43 PM
To: Crop-Livestock
Subject: Week 3 - Contribution from Luiz Carlos BALBINO and Paulo GALERANI at Embrapa, Brazil

Dear Colleagues,

Under the topic of the third week of discussions on crop-livestock integration, we would like to share the information on the program being developed by EMBRAPA and partners called CLFIS – Crop-Livestock and Forest Integrated Systems.

First, it is important to define the conceptual background involving the system. The CLFIS is a strategy of sustainable agricultural production which integrates crop, livestock and forest activities on a same area, applying agricultural techniques such as crop rotation, succession, double cropping, and intercropping, searching for synergistic effects among the components of the agroecosystems, contemplating environment aspects, human value, and economical viability.

The projects allow the combination of four categories of systems which have been tested in different agroecological zones in Brazil. The systems are:

1 - Crop-livestock Integration – this system integrates the components of crop and livestock exploration such as intercropping, double cropping, rotation, in the same area, and in the same season. A livestock operation may use rotation between grain and pasture to improve grass quality or even recuperate degraded pasture. On the other hand, a grain producer may use this system to improve grain yield.

Pasture and grain crops in rotation are very efficient for residue production, which is essential for success of the no-tillage management.

2 - Crop-livestock-forest integration – this combination integrates crop, livestock and forest explorations planted in rotation, or intercropped and or in succession, in the same area.

3 - Livestock-forest integration – in this system, pasture is intercropped on forest. Production of timber and other forest products are the objective besides animal production in the same area.

4 - Crop-forest integration – it combines crops and forest activities, intercropping crops with tree species (annual or perennial).

CLFIS may be considered the next step on development conservation agriculture. It will improve practices such as no-tillage, crop rotation and cover crops. Soil and crop management as well as pasture, forest and animal management are also expected to reach high performance, resulting in more stable agricultural production and advances on the environmental aspects.

The economical viability of the system is connected with the optimization of land and machinery use. Stable economical return is linked also with the synergy among the vegetable, forest and animal production and with the diversification of income (grain, meat, milk, biofuel, fiber and timber). In the same line, the lower requirement of fertilizer and better use of farm infra structure are expected as the system is adopted.

The CLFIS however, is not a panacea. It allows the harmonization of the system allowing synergy among the biotic and abiotic components. These systems do not replace possible different alternatives of farming practices and are not the solutions of all the problems in the agricultural property. It permits, however, the utilization of the available resources on the entire farm system.

The system has to be planned before adoption, considering the socio-economic and environmental aspects. Many other agricultural aspects related with the entire production chain of the crops, livestock and forest involved on the system should be considered beforehand. The adoption of the system is dependent, therefore, on the objectives and infrastructure available for each producer. It is worthy to say, also, that the system may be adapted to any size of farm operation.

There are two types of projects on CLFIS under coordination of Embrapa and with participation of partners (universities, official and private extension services, research institutes, farmers' cooperatives). The project "TECHNOLOGY TRANSFER FOR CROP LIVESTOCK AND FOREST INTEGRATION SYSTEMS" deals mainly with the process of technology transfer including training of extension agents, farmers and other actors. The project includes the establishment of TRU – Technological Reference Units which are field demonstrations and observations planted in different agroecological zones, to absorb the peculiarities of each biome.

Brazil has five different biomes, with large differences on rain fall distribution, chemical and physical soil characteristics, topography, among other agricultural aspects. As far as rain fall is concerned, it may vary from around 2500-3500 mm in the Amazon region, down to an average of 500 mm in the semi arid zones. In the Brazilian savannah, the Cerrado biome, the rain fall is around 1500mm per year. With a so diverse reality, the TRU are used also to test the performance of the agricultural practices of CLFIS to be adapted to each location.

The other project "CROP–LIVESTOCK INTEGRATION: A PROPOSAL FOR SUSTAINABLE PRODUCTION IN THE CERRADO REGION AND INTERRELATED AREAS" has also the characteristics of partners' involvement and focus more on the research aspects related with CLFIS. The research involving integrated systems such as CLFIS requires evaluation of the interrelationship among its components. It may need development of new varieties, and specific recommendations for those systems such as fertilizer and lime, plant population, row spacing, tree species, nutrient cycling, irrigation, IPM (integrated pest management, including weeds, insects and diseases), animal management among others. The energetic balance and emission of green house effects gases and carbon sequestration are also parameters being evaluated.

In conclusion, the CLFIS under study in Brazil is expected to contribute with the maintenance and reconstitution of forests, with promotion and generation of jobs and income, with good agricultural practices, and may contribute with restoration of physical, chemical and biological aspects of degraded agricultural areas. As the degraded areas are recovered, it is expected that the pressure for opening new areas for agricultural purposes in the Amazon and Cerrado (Brazilian Savanna) biomes will decrease. It is estimated that 67.8 million ha are available for CLFIS in the different biomes in Brazil, which are suitable for adoption of the system without expansion on to new areas. Actually, a different degree of adaptation of

CLFIS has been adopted in about 1.6 million ha in Brazil. The increasing acceptance of the system by farmers on the last five years is evidence that this strategy of CLFIS will result in development of the agricultural sector and environmental preservation in the country.

Best regards,

Luiz Carlos BALBINO and Paulo R. GALERANI

Luiz Carlos BALBINO
Líder do Projeto TT-iLPF
Gerência de Planejamento e Negócios
Embrapa Transferência de Tecnologia
PqEB - Av. W3 Norte (final)
Caixa postal 040315
70.770-901 Brasília, DF
Fone: (00) (55) 61 3448 4570
Fax : (00) (55) 61 3347-9668 / 3273 6136
Skype: snt.gpn.ilpf

Contribution 16, from Anibal de Moraes and Paulo César de Faccio Carvalho in Brazil

-----Original Message-----
From: Paulo Cesar de Faccio Carvalho [mailto:paulocfc@ufrgs.br]
Sent: Fri 2/19/2010 8:02 PM
To: Crop-Livestock
Cc: 'Anibal de Moraes'
Subject: Week 3 - Contribution from Anibal de Moraes and Paulo César de Faccio Carvalho in Brazil

Dear Moderator,

Here below some comments on proposed topics for this third week. Please consider this contribution once again from Dr. Anibal de Moraes (Universidade Federal do Parana) and myself.

_ From your perspective and in the context in which you are working, what are the top one/two (1-2) institutional and/or political constraints that undermine the uptake, implementation or spread of integrated crop-livestock systems?

From our point of view there are no public initiatives to foster technical expertise aiming to assist integrated systems. In Brazil there is more than 150 Faculties of Agronomy, and in only 4-5 this “discipline” exists at curriculum level (and 3-4 at post-graduation level). Thus, the majority of technical expertise actually working in Brazil comes from agricultural or livestock specialists, but not “system specialists”, contributing to bad experiences which constrains ILCS spreading.

A second important point is the lack of easy access to financial resources, which is necessary to implement the required infrastructure to ICLS. Whilst those resources exist in Brazil, stakeholders have no effective access to it. Bank managers have “doubts” about ILCS, since proposed performance in projects are much higher than conventional systems (particularly livestock performance). The financial agents have no knowledge about ICLS potentialities, both in economical and environmental context.

_ What can/might be done to address these constraints and who (or who together) can make that happen?

We need a curricular change to face the lack of professional expertise and thus enhance the knowledge necessary to spread ICLS. This educational basis could reach technical supporters who work to bank managers.

_ If you had 5 minutes with a/your Minister of Agriculture (or Livestock, Finance, etc), what message would you want to deliver? What about 5 minutes with the head of national or international farmers' organizations? Any thoughts to share with a relevant private sector representative (inputs, processors, buyers, etc.)?

Considering the Brazilian situation, the message would be the economical and environmental benefits of ICLS (with examples and case studies including those with political benefits…), and tell them dissemination depends on long-term investments in technical knowledge/assistance and financial access/stimulus.

_ What policy or institutional support or changes have you witnessed or read about that led to demonstrated success in the uptake, implementation or spread of integrated crop livestock systems? Are there successes in other fields that might be applied in this situation?

At regional level we consider the COAMO's experience (Cooperativa Agropecuária Mourãoense Ltda – Campo Mourão – Paraná) where in 5 years have reached an adoption level of 1980 stakeholders working with ICLS. Its success was based on field demonstrations and knowledge spread by 200 agronomists, trained by a partnership with Universidade Federal do Paraná (UFPR) and IAPAR (Instituto Agronômico do Paraná), and supported by private enterprises as well.

Another outstanding success in the implementation of ICLS initiatives to be mentioned is a project called PISA (Produção Integrada de Sistemas Agropecuários em Microbacias Hidrográficas). It aims to promote sustainable agricultural development having ICLS as one of its main pillars. The "Microbacia Hidrográfica" is the focused level to reach proposed transformations from conventional productive process to technological, sustainable, traceable and certificated processes. The project has the political Coordination of MAPA (Ministério da Agricultura, Pecuária e Abastecimento) and technical Coordination of UFPR, funds being provided by government (MAPA) and managed by Conselho Nacional de Desenvolvimento Científico e Tecnológico–CNPq. In each region a local Managerial Committee - MC, represented by the main community sectors, manages one or more "Comparative Units-CU" in which a pilot system is built. The majority of CU is built at farm level to serve as reference to technical dissemination at local, regional and national levels. The participation at PISA project is volunteer at all levels. As mentioned earlier, ICLS is the main pillar of the proposed initiative, but no-till, organic agriculture, good farm practices, and animal welfare are also tools of desired processes encompassed by PISA, aiming to land sustainability and diversification. In its third year PISA has experienced the participation of more than 3000 stakeholders and 340 public and private partnerships with 14 MC involving 22 municipalities and 7 states in Brazil.

Paulo César de Faccio Carvalho
Departamento de Plantas Forrageiras e Agrometeorologia
Faculdade de Agronomia - UFRGS
Av. Bento Gonçalves 7712 Cx Postal 776
CEP 91501-970 Porto Alegre, RS, Brasil
+51 3308 7402 ; +51 9919 7196

Contribution 17, from José Campero in Bolivia

-----Original Message-----
From: José Campero Marañon [mailto:jrcampero@hotmail.com]
Sent: Fri 2/19/2010 9:02 PM
To: Crop-Livestock
Subject: Week 3 - Contribution from José Campero in Bolivia

Dear Colleagues:

This is my contribution:

- From your perspective and in the context in which you are working, what are the top one-two (1-2) institutional and/or political constraints that undermine the uptake, implementation or spread of integrated crop-livestock systems?

In Bolivia, the principal political constraint for the development of integrated sustainable systems is the existence of big large agricultural lands. In these large scale and unproductive agricultural lands there are realized extensive livestock activities. In the year 2000, 87 % of the lands agriculturalist (28 million hectares) belonged to 7 % of owners of agricultural lands; the rural people had only 4 millions of hectares (13 %), of which they were cultivating 1.1 million hectares.

In the Andean zone of Bolivia, the situation of land tenure is hallmarked by the effects of the Agrarian reform of 1953 (the redistribution of property) and the subsequent perpetual fragmentation of the land (through inheritance). This condition carrying out that the smallholding has been sharpened coming to an average of 16,000 new smallholdings per year, aggravating the situation of poverty in the rural area. Parallel, in the last 25 years there was consolidated the unproductive big large agricultural lands (more than 81 % of the lands is without working). These owners of large big unproductive agricultural lands prosecute speculative purposes, and, the agricultural lands is them sell to foreign businessmen when the State benefits this lands with ways and productive infrastructure.

In this context, both principal limitations for the development of agricultural integrated sustainable systems are:

a) The policies of lands that allowed the development and the consolidation of big large unproductive agricultural lands, base of the extensive livestock systems in low lands of Bolivia.
b) The lack of capacity of the State to regulate the processes of increasing of the agricultural border. Condition that determines the expansion of the extensive activities of production and consolidation of the large agricultural lands.

What can/might be done to address these constraints and who (or who together) can make that happen?

From the perspective of the sustainable national development, the reversion of the big large and unproductive agricultural lands is the most important strategy to reduce the poverty and to guaranty the environmental sustainability. This strategy will allow the intensification of the land use and, in the medium term the development of crop-livestock integrated systems of production.

1. The New lands Politics establishes the elimination of traditional big large unproductive agricultural lands (where practices are reproduced servidumbrales forms of work) and modern (based on the concentration of big large and unproductive lands of lands and forests). The land must fulfil an Economic and Social Function (FES). If the FES is not present in the land management, the recovery of lands for the nation have established by way of expropriation. But, noting is easy, because the Bolivian Estate in low lands do not have the capacity for implement the law.

2. The Political Constitution of the State prohibits the big large and unproductive agricultural lands. Because this situation is opposite to the collective interest and reduces and limits the rural development. The maximum surface that the low permit is 5.000 hectares.

3. The excessive fragmentation of the agricultural property is principally the result of the transfer for hereditary succession. There are not many analyses on which they might be the possible routes of solution for the smallholding. A possible solution to the smallholding might be the promotion of the integrated systems crop – livestock to increase the productivity and the income of the producers; though the efficiency of this policy is high, but its costs also are high, and risks of market exist.

- If you had 5 minutes with a/your Minister of Agriculture (or Livestock, Finance, etc), what message would you want to deliver? What about 5 minutes with the head of national or international farmers' organizations? Any thoughts to share with a relevant private sector representative (inputs, processors, buyers, etc.)?

a) Minister of Agriculture

In Bolivia, the incentives to deforest are major that those to preserve, and only the legislation can do little to help to stop the intensive expansion of forest destroy. This condition limits the intensification of the systems of production, and obviously, limits the development of agricultural systems more friendly with the rural development and the preservation of our lands forest. Many systems are now appropriated to intensification of land production. But, the integrated crop-livestock systems are one of them that have the major efficiency in the utilization of the factors of production, and it may have important potential to increasing the food national safety.

A change in the parameters of measurement of the Economic and Social Function of the land (FES) must incorporate the productivity of agricultural or livestock activities. And this may be the route for the break of the extensive unproductive systems and give step to more efficient systems in the use of the agricultural or livestock factors of production. The smallholding and the unproductive big large agricultural lands have given place to the stagnation of the development of the crop-livestock integrated systems of production. Moreover, that condition was the principal topics for the irrationality management of our natural resources, stimulated the degradation of soils and permitted the increasing of illegal market of lands. In the other hand, these conditions was the principal roots of our social tensions and was the principal limiting to access to the food national safety.

b) National farmer's organization

In Bolivia, the rate of national livestock extraction has a range among 12 to 14 %, the first one is proper of South American camels, and the second is representative of meat bovine production. This value is together of Paraguay's value the lowest in the world. It is lower than the world average of 20 %, than that of the CAN of 16 %, than that of the MERCOSUR of 18 % or than that of the EU 15 of 36 %. In other hand, the performance or yield of the canal, this is minor to 52 % and the sacrifice age, product of slow rates of growth, is near to 4 years.

Certainly, to improve these parameters of production should be one of the policies of the sector; the low production performance has a linear relation with the equitable access to the land and with two tied factors: the reduction of the poverty and the environmental sustainability.

The livestock production systems have an average of productivity of 16 kg of corporal mass per hectare. This low production is determined by the application of a system of extensive managing that is reflected in degradation of forage recourses, capacity of carrying low and equal to 0.2 UA bovine per hectare. With this low productivity, the strategy is to access large lands. And, the most important are to access lands of low cost or zero cost. Only in this condition the livestock systems offers utilities.

- What policy or institutional support or changes have you witnessed or read about that led to demonstrated success in the uptake, implementation or spread of integrated crop-livestock systems? Are there successes in other fields that might be applied in this situation?

In order to develop sustainability ecological crop- livestock productions is necessary to participate in the markets of just prices. For it will be necessary:

a) The prohibition of the use of transgenic seeds
b) The prohibition of the production of agro bio fuels
c) To satisfy, as the first priority, the necessity of internal market, and newly later to satisfy the external demand.

There exist a set of policies that must be started by the intention of advancing towards a model of integrated crop-livestock systems. At first, it is necessary to develop effective regulations in order that the producers advance towards a sustainable ecological agriculture. Also, it is necessary to offer to the farmers the experience of alternative models of crop-livestock integrated, so much for small producers as for that median scale.

Topics related to the clean bio technology must be stimulated. Nevertheless, this aspect must develop with the major care, because is important for us not creating technological dependence, and the most important is preserved our genetic diversity.

-Please share any other thoughts on this topic that readers that will inform the discussion.

In Bolivia, policies with focus in topics related to the water and the forest coverage exist; nevertheless, explicit policies with regard to how to avoid and to correct process of soil desertification do not exist. We have to emphasize in policies directed the recovery of soils and forest landscapes already degraded by the human intervention and stimulate the most intensive use of the soils, guaranteeing an integral management of the water resources.

These politics have the purpose of maximizing the agricultural productivity of the soils and of guaranteeing the provision of goods and environmental services (as clean water, and sequestration carbon). With this, we help to improve the “Vivir Bien” (this option instead to be more rich) of the Bolivian people who depend in some degree of agricultural, livestock and forest resources and to encourage the conservation of the nature promoting a mosaic of different uses of the soil.

Best regards,

José R. Campero
DIRECTOR NACIONAL
ALIANZA BOLIVIANA DE LA SOCIEDAD CIVIL

Contribution 18, from Lindsay Coulthard at the Manitoba Zero Tillage Research Association, Manitoba, Canada

-----Original Message-----
From: mztra [mailto:mztra@mts.net]
Sent: Sat 2/20/2010 5:59 AM
To: Crop-Livestock
Subject: Week 3 - Contribution from Lindsay Coulthard at the Manitoba Zero Tillage Research Association, Manitoba, Canada

Hello

These are the perspectives from the Manitoba Zero Tillage Research Association in Manitoba, Canada

- From your perspective and in the context in which you are working, what are the top one-two (1-2) institutional and/or political constraints that undermine the uptake, implementation or spread of integrated crop-livestock systems?

A- The top restraint to the spread of an integrated crop-livestock system in western Canada is the resistance to change from the participants in our production system. Our production system has built itself on the basis of cheap energy and expensive labour. The industry has specialized to a large extent so that the producers can manage their farms with less labour. Our farms have become highly capitalized. The benefits of an integrated farming system have not been demonstrated to these farmers well enough to cause them to look at changing their management.

The second restraint that we see to slow down the spread of crop-livestock integration is the financial support system that is in place in Canada (and in other countries in the world). These programs conceal the true economics of agriculture. There are numerous financial support programs paid for in a large part with taxpayer funds which will cushion the economic effects of bad farm management. These programs allow farmers to continue their business without having to make better management decisions and doing a good assessment of alternative cropping/livestock systems.

- What can/might be done to address these constraints and who (or who together) can make that happen?

A- Better education and more extension of farmers to demonstrate the benefits of integrating crop/livestock systems and cutting the support programs that encourage farm managers to maintain the status quo with their farming operation.

- If you had 5 minutes with a/your Minister of Agriculture (or Livestock, Finance, etc), what message would you want to deliver? What about 5 minutes with the head of national or international farmers' organizations? Any thoughts to share with a relevant private sector representative (inputs, processors, buyers, etc.)?

A- A message to the Minister of Agriculture would be to put additional funding into research, education and extension on conservation agriculture and low input crop production systems. We as agricultural producers have been encouraged for years to rely on chemistry to

provide solutions to our production practices and we have paid a huge price for this method of production. If government support programs were designed more to support beneficial innovation in our production practices and our public research and extension dollars should be directed at conservation agriculture and integrated pest and fertility management techniques. The message would be
similar for the farm organization leadership.

- What policy or institutional support or changes have you witnessed or read about that led to demonstrated success in the uptake, implementation or spread of integrated crop-livestock systems? Are there successes in other fields that might be applied in this situation?

We haven't seen a significant uptake in the crop-livestock integration in Western Canada at this time. The innovative farmers that are beginning to use this strategy are the farmers that we see at tours and meetings looking for an innovation that they can take home and adapt on their farms. They are normally the farmers that will try new things and decide if the technology will work for them. Normally then we will see others take up the technology and it will expand from their. We are at the early adopter stage in western Canada.

- Please share any other thoughts on this topic that readers that will inform the discussion.

Please do keep in mind the three overall objectives of the consultation (what do we know about integrated crop-livestock systems for development - what works and what does not; define next steps for key stakeholders; and guide and empower FAO to better support member countries to harness the development potential of integrated crop-livestock systems) towards which the discussions must aim at over the next four weeks. Also, each week's topic should be addressed in the context of two cross-cutting issues – the role of stakeholders, and capturing public goods and incentives for action.

Lindsay Coulthard

Farm and Extension Manager,
Manitoba Zero Tillage Research Association
Brandon Office: 204-729-8838
Farm Office: 204-725-3939
Cellular: 204-825-7878
email: <mailto:mztra@mts.net> mztra@mts.net

Contribution 19, from Farhad Mirzaei, Iran

-----Original Message-----
From: Farhad Mirzaei [mailto:farmir2005@gmail.com]
Sent: Sat 2/20/2010 8:39 AM
To: Crop-Livestock
Subject: Week 3 - Contribution from Farhad Mirzaei, Iran

From my point of view there are no public initiatives to foster technical expertise aiming to assist integrated systems. In Iran there is more than 100 Faculties of Agronomy, and in only a few of them are working on this discipline. Thus, the majority of technical expertise actually working in Iran comes from agricultural or livestock specialists, but not “system specialists” on integrated livestock -crop system.

A second important point is the lack of easy access to financial resources, which is necessary to implement the required infrastructure to integrated livestock-crop system. Whilst those

resources exist in Iran stakeholders have no effective access to it. Bank managers have less knowledge about integrated livestock -crop system, since proposed performance in projects are much higher than conventional systems
(particularly livestock performance). The financial agents have limited knowledge about integrated livestock -crop system potentialities, both in economical and environmental context.

Kind regards,

Farhad

Contribution 20, from Stephen Twomlow at UNEP, Nairibi, Kenya

-----Original Message-----
From: Stephen Twomlow [mailto:Stephen.Twomlow@unep.org]
Sent: Sat 2/20/2010 3:30 PM
To: Crop-Livestock
Cc: crop-livestock-L@mailserv.fao.org
Subject: Week 3 - Contribution from Stephen Twomlow at UNEP, Nairibi, Kenya

In reply to Antonio Rota (contribution 13), I would like to share with all of the participants a guide we developed for project developers in Zimbabwe with a specific focus on Conservation Agriculture - but many of the key principles hold when it comes to the the all important numbers games

Best

Steve

Stephen Twomlow PhD
Senior Program Officer Biodiversity and Land Degradation
Division of GEF Coordination
United Nations Environmental Program (UNEP)
PO Box 30552 (00100)
Nairobi
Kenya

Direct line: +254 20 7625076
Work Cell Phone: +254 728604550 (International Roaming)
Private Cell phone: +254 726593285 (Kenya only)
skype: steve.twomlow
e-mail: stephen.twomlow@unep.org
web site: www.unep.org

Contribution 21, from John Landers at APDC, Brazil

-----Original Message-----
From: John Landers [mailto:john.landers@uol.com.br]
Sent: Sun 2/21/2010 9:01 AM
To: Crop-Livestock
Subject: Week 3 contribution from John Landers at APDC, Brazil

Amir,

A response to Steve Twomlow's contribution 20.

Dear Stephen,

From our experience in Brazil and what I have seen in my visits to Zimbabwe, I think you are whistling in the wind if you don´t go for as near 100% soil cover as possible with ZERO tillage.

And to go through intermediate reduced tillage systems to get to Zero Tillage has also proved an illusion here. I doubt that Zimbabwe will be much different, but of course, you are on the ground there and must have extenuating reasons for citing the American min-till definition of 30% cover.

Yours truly,

JNL

John N. Landers, OBE
Relações Internacionais / Novos Projetos
Associação de Plantio Direto no Cerrado - APDC
Fone: 55 (61) 3366-5307 / 3366-1984
Fax: 55 (61) 3366-5307
E-mail: john.landers@uol.com.br
End: SMDB - Conjunto 9 - Lote 5
Lago Sul - CEP: 71680-090
Brasília - DF

Contribution 22, from Awuma at the University of Cape Coast, Ghana

-----Original Message-----
From: KOSI AWUMA [mailto:k_awuma@hotmail.com]
Sent: Sun 2/21/2010 8:36 AM
To: Crop-Livestock
Subject: Week 3 contribution from Kosi Awuma at the University of Cape Coast, Ghana

Hi Moderator,

I hereby forward to you the attached information (also pasted below) on experiences in Ghana in addition to comments on week three

Thanks

Yours

Kosi Awuma Ph.D
President, Ghana Society of Animal Production
Snr. Lecturer
Department of Animal Science
School of Agriculture
University of Cape Coast, Ghana
+233 24 327 8719

Integrated Crop-Livestock System for Development - The Way forward for Sustainable Production Intensification

Before addressing the issues for the week, I will need to set the stage by giving some information on crop-livestock integration systems in Ghana.

Two main integration systems could be identified. The Traditional system and the plantation tree crop-livestock system.

The traditional system is the oldest system and found operating in most rural communities in the three northern regions of Ghana namely the Northern, Upper East and Upper West regions. In these areas, where compound farming is practiced, homesteads are far apart enabling households to put the land immediately around their home to crops such as cereals (maize, sorghum and millet) and vegetables production. In these communities, livestock (local domestic fowls including Guinea fowls and ruminants (sheep, goats, cattle etc) keeping is part and parcel of the people and therefore an integral part of rural livelihood (MoFA/DFID, 2002). The animals serve several important functions such financial security, where animals' serve as a "walking bank", insurance against food deficit, social functions such as used in paying bride prices and in religious as well as being used for animal traction in land cultivation and as a means of transportation. Thus in these communities, the animals especially sheep and goats are keep indoors or secured during the cropping season to avoid destruction of the cultivated crops. After crop harvest in case of cereals the sheep and goats are released to glean on the cereal stubbles left on the field while the animal return the dropping/manure onto the field. During the cropping season animal droppings could be hipped outside the homestead to be spread manually on the field surrounding the homestead. These practices definitely return the needed organic plant nutrient to the crop land while the crop stubbles serve as useful feed though of relatively poor quality to the small ruminants. As a means of improving on the quality of stover and straws available to the ruminants during the dry season farmers have been taught and advised to conserve some crop residues especially legume based ones such cowpea and groundnut vines after pods have been harvested to supplement the poor quality roughage from the straws and stover. This had caught on well with farmers to extent that a thriving forage market has developed in Bolgatanga, the regional capital of the Upper East region.

In the case of large ruminants such as cattle, they are herded to grazing on rangeland of mostly unimproved vegetation and crop residues such as rice straw and stover. Within the integrated system while the crop residues become available maintenance diet for the animals during the dry season ranging from 5 to 7 months of the year the animals gleaning on crop fields return the needed nutrients in organic form to the soil.

Plantation Tree crop-Livestock Integration System

The ruminant livestock (cattle, sheep and goats) under plantation crops such as oil palm, citrus, coconut and rubber have been practised in the country for a considerable number of years, The Agricultural Research Station of the University of Ghana at Kade in the Eastern region has researched into and practised this production system for not less than 40 years. The then Department of Animal Husbandry of the Ministry of Food and Agriculture also created a demonstration farm at Juaso, in the Ashanti region, with sheep under oil palm plantation in the 1980 as a means of extension services to sell the idea to potential farmers.

The production system caught on well with farmers in plantation crop production especially in the humid zones of the country. Some large plantation crop companies such as Twifo Oil

Palm plantation (TOPP), Central region and Benso Oil Palm plantations (BOPP), western region introduced cattle into their mature plantations. A survey conducted in the Western region in1991 showed highest integration of 46% in oil palm and livestock (cattle) followed by coconut and livestock (cattle) 37%. Sheep has been used under oil palm and citrus successfully as well.. Livestock in rubber plantation was not very successful since the animals' were knocking off the latex collection cups which tended to an economic disincentive to the rubber production. The introduction of livestock into tree crops was successful and beneficial when the tree crops were more than 6 years old. The benefits have been numerous in terms reduction in labour costs in clearing the undergrowth of the plantation, nutrient recycling and higher offtake in animals leading to additional income.

Plans for further Crop-Livestock Integration:

Currently in Ghana, purely private non-Governmental Organizations (NGO) have started a baseline study on an integrated aquaculture-agriculture (IAA) project in the northern Ghana. This project being supported by the Agricultural Institute of Canada (AIC) basically entails the possibility of introducing aquaculture into two of its on-going projects in northern Ghana. Already, AIC is supporting two societies involved in agricultural development in Ghana. AIC is supporting the Ghana Society of Animal Production (GSAP) through the Canadian Society of Animal Science (CSAS) to improve upon small ruminant and poultry production in selected communities in the northern regions of Ghana. Similarly AIC is supporting the Ghana Institute of Horticulturalist (GhIH) through the Canadian Society of Horticultural Science (CSHS) to work towards the improvement vegetable crop production in selected communities of the northern Ghana. All these projects are geared towards poverty alleviation of the vulnerable groups especially women in the target communities. Now Fish for Africa (FfA) funded by Fish for Africa Fund of Quebec, Canadian based NGO is twinning with AIC in an International Partnership Programme (ITPP) to develop a coupling of aquaculture with vegetables and animal production in the selected communities in the Northern and Upper West region. This project is likely to run for the next 5 years.

This is crops-livestock integration beyond the current thinking with tremendous potential benefits to the communities and the nation at large thus should be supported in every form to succeed. Some of the benefits would include, manure from animal sources for the vegetable production as well as for growing planktons for fish feeding while crop residues from the vegetable farm serve as feed for the ruminant, some discarded grains become available for feeding the local poultry. The additional benefits come in the form of increase in protein supply for human consumption from fish and animals. Finally income levels will rise from the diverse income sources such as vegetables, grains, fish and animals (poultry, sheep and goats).

Challenges will definitely be encountered in the implementation of any of the above programmes but the challenges will be assessed during the baseline study and addressed where possible for smooth implementation of the project.

-- Institutional or Political constraints that undermine the uptake, implementation or spread of integrated crop-livestock system:

The Government of Ghana and its national agricultural policy direction will influence the implementation and spread of integrated crop-livestock system. Furthermore, the implementing agencies at the national and district and community levels will be paramount in the success of the programme. In the case of Ghana, the Ministry of Food and Agriculture (MoFA) through the staff of its technical departments such Animal Production, Crop Services, Veterinary Services and Extension services will be important in its successful implementation and spread. NGOs in agriculture are equally crucial to the successful implementation the spread of the system.

Constraints that are likely to undermine the uptake and implementation of the system will depend on whether such a programme is high on the Government's Agricultural policy agenda and the added financial resource constraints which could affect uptake and implementation.

The crop-livestock integration is not a new concept to Ghana's agriculture as animal production scientists with at least 15 to 20 years experience in the industry cab attest to however, with time policy direction and focus might have shifted from small scale crop-livestock integration to large scale mono-crop and -animal production.

The government of Ghana has recognized livestock as a means of poverty reduction strategy as stated in the Food and Agriculture Sector Development Strategy (FASDEP) I & II which is a working document articulating the contributions of the MoFA towards the overall objective of the Government of Ghana to achieve equitable growth and poverty reduction. The crop-livestock integration fit very well into at least two of the main thrust such as enhancement of food supply and reduction of hunger and the sustainable development of livestock, fisheries and forestry resources among others.

Other related problems to the implementation could be that of population growth leading to pressure on land, urbanization and land tenure system since these are likely to reduce land size available for the compound farming in areas it is practiced and the inability to keep animals in heavily populated areas.

-- What can /might be done to address these constraints and who (or who together) can make that happen?

One major thing will be prioritization of Government's agricultural policy in terms of crop-livestock integration and making sufficient budgetary resource allocating or securing the necessary funds from either domestic mobilization or donor assistance to fund the programme. MoFA, through its identified departments could then be adequately funded directed and monitored to carry out the programme. Research institutions and identified farmer based organizations (FBO) devoid of political manipulations could be vital in implementing the programme. Luckily, Ghana has in place a good research-extension- farmer linkage in the form of Research Extension Liaison Committees (RELCs) creating a good channel for information flow from research through extension to the farmers and vice versa.

-- If you had 5 minutes with a/your Minister of Agriculture (or Livestock, Finance, etc.) what message would you want to deliver? What about 5 minutes with the head of national or international farmers' organization? Any thoughts to share with a relevant private sector representative (inputs, processors, buyers etc)?

I will brief him/her on the importance of the crop-livestock integration as a way forward to environmentally friendly and sustainable agricultural system which should be promoted, made top priority of Government's agricultural policy and cause MoFA and its technical departments to provide position papers for consideration. I should provide him/her with justifiable documents for his/her consideration.

To the head of national/international farmer based organizations I will convince on the idea and benefits of the crop-livestock integration and encouraged hin/her to organize meetings/workshop of their members where experts including myself could address the larger group on the crop-livestock system set up, implementation and benefits. From there they could be a pressure / advocacy group for government's support for the programme.

Week 4 Contributions

Contributions in Week 4 of the crop-livestock e-consultation

From the Moderators

-----Original Message-----
From: Crop-Livestock
Sent: Mon 2/22/2010 12:16 AM
To: Crop-Livestock-L@mailserv.fao.org
Subject: Welcome to Week 4 (February 22-26) of the e-consultation on Integrated Crop-Livestock System for Development

February 22, 2010

Dear Colleagues,

Thank you to all of you who provided your insights and inputs to our Week 3 theme focused on policy and institutional support needed for the implementation and scaling up of Integrated Crop-Livestock Systems for Development.

Now that we have gathered our thoughts on the "what" and "why" of innovative integrated crop-livestock systems, the input and market chains associated with these systems, and the policy and institutional dimensions, it is time to turn our attention to how the research community might respond to take integrated crop-livestock systems forward.

This week (February 22-26) we will focus the discussion on the research needed to generate knowledge and innovative practice to underpin farmer adoption and scaling of promising crop-livestock systems for sustainable production intensification. In our background paper, we identified associated elements around technical, biological, nutritional, landscape, economic, environmental and social dimensions of integrated systems and practices; on-farm and area-wide integration of crop-livestock systems; functional biomass production and prioritization of its multiple role and use; feed and nutritional formulations; animal health management; effective innovations systems and processes; and linking research result to policymaking, etc., all with a focus on addressing the global challenges of food security including issues of human nutrition, as well as the natural resource base and climate change.

Because this is our last week of the e-conference, we invite colleagues who have not yet had the opportunity to also respond to the Questions posed in Weeks 1, 2 and 3 (posted from Crop-Livestock on January 31, February 7, and February 14, respectively).

Let's get started on our research topic:

- If you could secure funding to carry out research on the gaps associated with integrated crop-livestock systems - from your perspective and context - what would you identify as the most critically needed research associated with:

a) On the ground implementation of integrated crop livestock systems? With which actors might you partner to carry this out?

b) The human and social dimensions of these systems? With which actors might you partner to carry this out?

c) Enhancing market chains or incentives to production? With which actors might you partner to carry this out?

- What are the gaps in evidence required to frame a policy intervention or to influence policies or institutional elements that can advance integrated crop-livestock systems.

- How might the research community respond to the structural constraints of carrying out interdisciplinary, multi-institutional and multi-stakeholder efforts? What can donors do to assist in ensuring robust research efforts?

- Please share any other thoughts on this topic or previous topics that will advance our discussions and thinking.

As a reminder, the three overall objectives of the consultation (what do we know about integrated crop-livestock systems for development – what works and what does not; define next steps for key stakeholders; and guide and empower FAO to better support member countries to harness the development potential of integrated crop-livestock systems) towards which the discussions must aim at over the next four weeks. Also, each week's topic should be addressed in the context of two cross-cutting issues – the role of stakeholders, and capturing public goods and incentives for action.

For the technical background document and other related information, please visit the website: http://www.fao.org/agriculture/crops/core-themes/theme/spi/iclsd.

The Week 3 summary will be posted on the website as well as a folder containing all the Week 3 contributions. The documents that came with the contributions during Week 3 will also be available on the website in the documents section.

Thank you again and we look forward to reading from all of you in this final week.

Best wishes,

The Moderators

Amir Kassam
Constance Neely
Theodor Friedrich
Eric Kueneman
E-mail: Crop-Livestock@fao.org

Contribution 1 from Kwaku Agyemang in the FAO Sub-Regional Office for Southern Africa, Harare, Zimbabwe

-----Original Message-----
From: Agyemang, Kwaku (FAOSFS)
Sent: 24 February 2010 13:40
To: Crop-Livestock
Subject: Week 4 - Contribution from Kwaku Agyemang in the FAO Sub-Regional Office for Southern Africa, Harare, Zimbabwe

Dear All,

Below kindly find my Contributions to Week 4. I have provided Answers to the Questions asked. In addition to these answers I attach a Paper I gave at a GFAR Triennial Conference in Dakar in 2003, entitled: Agriculture and Livestock Integration in the Context of the developing World with emphasis on sub-Saharan Africa (K.Agyemang). This paper covers much of the issues raised in Weeks 1, 2, 3 and 4. Furthermore, the paper also contains a list of

some 300 References on the subject of Agriculture-Livestock integration which interested readers may consult.

Warm regards

Dr. Kwaku Agyemang
FAO Sub-Regional Office for Southern Africa
Harare, Zimbabwe

- If you could secure funding to carry out research on the gaps associated with integrated crop-livestock systems - from your perspective and context - what would you identify as the most critically needed research associated with:

a) On the ground implementation of integrated crop livestock systems? With which actors might you partner to carry this out? The area of RESEARCH FOR DEVELOPMENT at the level of ground implementation that I would like to recommend is the testing of a few well-designed ex-ante formulated options that include technical, environmental and socio-economic components. Many at times one PACKAGE is forced on potential users to try. Two or three options tried under same conditions will often result in many of the potential users aggregating around one or two of the options. They may even would like aspects of the rejected options being incorporated into the "acceptable" options. The Research questions would be what of the technical results already known elsewhere can be useful in the production conditions under consideration, what environmental conditions in the area need to be captured in order to make the option feasible, and what market (inputs/Outputs) factors need to be considered for making an option profitable and sustainable. Actors would include a cross-section of the farmers/producers, extension institutions, local government establishments, NGOs, etc. In general terms though since crop-livestock integration eventually tries to bring out the best out interplay of Plants, Soils, Water and Livestock, research that results in technologies that improve soil cover, improve feed production, reduction of nutrient losses and increased production efficiency should be supported.

b) The human and social dimensions of these systems? With which actors might you partner to carry this out?

Research that deals with human and social dimensions of C-L systems should not focus only on the Production side of the equation but also the consumer side. Research on who in the household or community are better suited for the specific integration being proposed, is appropriate. For example, is labour (quantity and duration) involved for promising technologies available at the household? Are children and women equipped to undertake the activities involved in integration? Is the addition of livestock to on-going cropping or horticultural or gardening system going to increase the work load of a category of household members? Are the benefits worthwhile in comparison with labour inputs? On the demand side, are consumers ready for products coming from integrated systems? Are they prepared to pay additional for what is perceived by producers as better products from integrated systems? Research questions will be related to those on markets, consumer preferences, household characteristics, environmental issues and concerns. Actors include Socio-Economic Institutions and, Public-Private Fora with interest in crop-livestock agriculture, urban/inner-town production systems, etc

c) Enhancing market chains or incentives to production? With which actors might you partner to carry this out?

- What are the gaps in evidence required to frame a policy intervention or to influence policies or institutional elements that can advance integrated crop-livestock systems. Areas of Research that analyze the current and past Government policies that have worked against the

take-off of Crop-livestock integration need to be undertaken, and the potential negative impact on the C-L systems estimated to help designing more friendly policies. For example, it would be an interesting research to find out how subsidies on in-organic fertilizers in certain countries has contributed to downgrading the potential management and use of animal and farm manure. What has been the impact of tractorisation on development and use on-farm power such as animal traction. Actors include Government Technocrats and Policy makers.

- How might the research community respond to the structural constraints of carrying out interdisciplinary, multi-institutional and multi-stakeholder efforts? What can donors do to assist in ensuring robust research efforts?

It has been suggested elsewhere that Structural Constraints as related to undertaking research with full complements of disciplines needed for C-L generally result from some researchers not willing to think outside of the box. They are said t be sometimes afraid their planned research will be torn apart by partners who might want to probe more into the logic behind such research. So it is common for Researchers or institutions to approach others of similar thinking, and thereby missing out on useful criticisms. Therefore a new paradigm shift is required where the range of actors is expanded, analyses of the research questions opened up for scrutiny and beneficiaries perspectives sought. Technologies and farming systems modification options coming from such open system of research planning and implementation are more likely to be more acceptable and more likely to be sustainable.

- Please share any other thoughts on this topic or previous topics that will advance our discussions and thinking.

Contribution 2, from Tom Thurow at the University of Wyoming, USA.

-----Original Message-----
From: Thomas Lee Thurow [mailto:TThurow@uwyo.edu]
Sent: 25 February 2010 01:28
To: Crop-Livestock; Crop-Livestock-L@mailserv.fao.org
Subject: Week 4 - Contribution from Thurow at the University of Wyoming, USA

Colleagues:

Here are several thoughts (this has turned out to be more lengthy than I intended) on the very interesting overall discussions prompted by this e-consultation in general and the issues posed for week 4 in particular.

In one of my favorite Sherlock Holmes stories, it is the dog that doesn't bark that is the most important clue. It says a lot about our collective disciplinary activity that there was a lot of discussion/interchange when the focus was on promising crop-livestock systems and innovations of merit, but the discussion trailed off dramatically when the discussion shifted to policy and institutional support needed for the implementation and scaling up.

AN OVERALL LIMITING FACTOR OF INTEGRATED CROP/LIVESTOCK SYSTEM RESEARCH
When I think of such a large topic as integrated crop-livestock systems, I think of management practices geared to the following gradient of conditions:

Relatively reliable climate. Variable climate.
Systems governed primarily Systems governed primarily
by biotic controls by abiotic controls
<---------->

optimize production/profit minimize risk

It is troubling that many research or management publications discuss "production" as if it was synonymous with "profit" and/or "risk management", when in reality these concerns are often quite different and prompt radically different responses by farmers. Most research is designed to focus on expressing the outcome of the innovation in terms of production. The value of the system in terms of profit is harder to document, but some studies make an attempt to do that. However, very few studies approach the problem by targeting minimizing temporal risk. Almost no studies do a sensitivity analysis of the proposed innovation (i.e., analysis of reliability of the proposed system under variable conditions/assumptions over time). Since many farmers and entrepreneurial middle-men developing links in value chains NEED to be risk adverse, adoption of innovations would be helped responses to variable conditions/assumptions were well understood/communicated.

Another problem with focusing on "production" is the failure to realize that pursuit of Maximum Sustained Yield can actually be dangerous if variable conditions are not quickly recognized and efficiently dealt with – an unreasonable assumption given the realities of human nature. Minimizing risk, and then optimizing production within the risk constraint sphere, will be an approach more likely to resonate with poor farmers.

LIMITING FACTOR -- DEVELOPED COUNTRIES

Existing agriculture policies strongly determine what sorts of agriculture is practiced. For example, I grew up in northern Illinois, U.S.A. on a integrated crop-livestock farm. I had 10 uncles that were also prosperous integrated crop-livestock farmers (as were the five generations in the U.S. that preceded them). Today, 12 of my cousins are still farmers, but NONE have integrated systems -- they are either large, specialized grain farmers or run factory-like dairy operations. Why did such a dramatic change occur within one generation? U.S. farm policy very strongly created direct and indirect feedbacks to drive these changes, especially the changes in government philosophy on crop subsidy structures enacted about 40 years ago. The point is that I and my cousins grew up seeing first hand the benefits of integrated crop-livestock systems, there are many generations of "indigenous knowledge" that we have regarding how to successfully operate such integrated systems (i.e., more information is not the limiting factor), each of my cousins would prefer to shift back to integrated crop-livestock systems, but none do so because the current U.S. agriculture policy makes it more likely to be ultimately profitable by crafting big, specialized operations designed to maximize production. Such a policy has indeed succeeded in creating abundant, cheap food for U.S. citizens (note that such polices do not internalize environmental costs {a big problem with value chain analysis in general} nor do they deal with subjective "quality" or moral issues of the U.S. food supply chain). European agriculture farm policy is likewise strongly influential in determining what choices farmers make there.

In sum, in developed countries policy is usually the dominant factor driving farmer decisions, not lack of knowledge about integrated crop-livestock systems. Therefore, it is vital that integrated crop-livestock system research be specifically designed to be policy relevant. How many scientific research journal papers or experiment station publications have you seen that specifically addresses in the study design and analysis the "policy implications" or "management implications (e.g., economic/social/biophysical interactions)" of the research? Of course this is very difficult/costly/time consuming to do, but this is this type of integrated research product that is needed to address the limiting policy relevant information gaps and is therefore likely to have the most resonance in future policy formulation.

LIMITING FACTOR -- DEVELOPING COUNTRIES

In developing countries agriculture policy, of both the developed countries (tariffs and food shipments that often undercut local producers trying to build-up local production capability) and of their own national government, strongly influences what farmers choose to do or not

do. That said, there is greater likelihood in developing countries that existing information/resources have not been effectively disseminated. For example, in cut-and-carry mixed farming systems of SW Kenya, Napier grass is often grown as a forage crop, but the choice of variety that is used can result in a 3-fold difference in yield. Many farmers are using varieties inappropriate for the soil/climate of their farm and do not know that the variety of Napier grass they use can make such a huge difference. Furthermore, a leguminous forage that could be easily grown in the understory of the Napier grass stand, such as Desmodium, is usually not present because people are not aware of this option, or if they are aware, they do not know how to access the seed or cuttings. The pity is that the benefits that these simple interventions can have in increasing milk yield have been documented almost 60 years ago.

In short, there would be huge potential for increased production/profit/risk management if we did a good job of applying what we knew even 20 years ago about mixed farming systems. Often, it is not that these unused innovations were inappropriate -- it is just that the innovations were never effectively disseminated. Why? There are a variety of institutional reasons for this, one big root cause is that the rhetoric of extension agencies (often at all levels) does not match practice -- small-scale, locally consumed production is often simply not a high priority in practice for extension programs. Another is the dissemination message often focuses on production, when the farmer is most concerned about minimizing risk (or at least understanding what the risk to adoption may be).

Best regards,

Dr. Tom Thurow Professor
Department of Renewable Resources
University of Wyoming
Laramie, Wyoming 82071-3354

phone = 307-766-2781
fax = 307-766-6403
e-mail = tthurow@uwyo.edu
http://uwyo.edu/UWRENEWABLE/Faculty/T_Thurow.asp

Contribution 3, from Ralph von Kaufmann at FARA, Accra, Ghana.

-----Original Message-----
From: von Kaufmann, Ralph (ILRI) [mailto:r.von-kaufmann@CGIAR.ORG]
Sent: 25 February 2010 09:52
To: Crop-Livestock; crop-livestock-L@mailserv.fao.org
Cc: Jones, Monty (FARA); Wale Adekunle; Irene Annor Frempong; Emmanuel Tambi
Subject: Week 4 - Contribution from Ralph von Kaufmann at FARA, Accra, Ghana

I thank Prof. Thurow for a superb analysis and illustration of the impact of policy on what farmers decide to do.

I agree with him entirely but I would like to comment on his last paragraph:

" In short, there would be huge potential for increased production/profit/risk management if we did a good job of applying what we knew even 20 years ago about mixed farming systems. Often, it is not that these unused innovations were inappropriate -- it is just that the innovations were never effectively disseminated. Why? There are a variety of institutional reasons for this, one big root cause is that the rhetoric of extension agencies (often at all levels) does not match practice -- small-scale, locally consumed production is often simply

not a high priority in practice for extension programs. Another is the dissemination message often focuses on production, when the farmer is most concerned about minimizing risk (or at least understanding what the risk to adoption may be)."

By changing the word "innovations" to "technologies and policies" the answer to his question 'Why?' would be that the agricultural innovation systems are weak.

There is plenty of evidence that enabling policies are welcomed and good technologies are readily taken up. Any 'good' technology that remains 'on the shelf' and is not being taken almost certainly has a fault that makes it inappropriate to one or more links in the input supply-production-processing-marketing value chain. Belated recognition of that explains the recent increasing interest in establishing innovation platforms which enable all the actors to be engaged in the innovation processes, as and when they need to. An example of this is the multi-donor funded Sub Saharan Africa Challenge Programme which is coordinated by the Forum for Agricultural Research in Africa (FARA) in which the sub-regional organizations (SROs) have established multi-country Pilot Learning Sites in East, West and Southern Africa. Similar adapted approaches are being piloted by the International Livestock Research Institute (ILRI) and others.

The success of the innovation platforms, and their ability to scale-up, will ultimately be determined by the ability to learn how to engage the value chain actors efficiently and cost effectively. It will also require change agents who are skilled facilitators who are able to help the value chain actors get the information they need, when they need it and in the form that is useful to them. These facilitators will need training in the soft systems skills that will enable them to promote learning and problem solving, and to establish and sustain collaboration within and between individual actors and groups. Training in systems skills is increasingly demanded as the work of the International Centre for development oriented Research in Agriculture (ICRA), FARA's UK-DFID funded programme for Strengthening Capacity for Agricultural Research and Development in Africa (SCARDA), the Bill and Melinda Gates Foundation-funded African Women in Agricultural R & D (AWARD) initiative and other such programmes become better known.
Best regards,

Ralph von Kaufmann
Forum for Agricultural Research in Africa (FARA)
12 Anmeda Street, Roman Ridge, Accra
PMB CT 173 Cantonments, Accra, Ghana
Telephone: +233 21 772823/779421, Fax: +233 21 773676
Website: www.fara-africa.org

Personal contact details:

Box 1160, Karen 00502, Kenya
e-mail: r.vonkaufmann@fara-africa.org
Roaming tel: +254 733 634 508

Contribution from Natali KOSSOUMNA LIBA'A at the Université de Maroua, Cameroun.

-----Original Message-----
From: Kossoumna Libaa Natali [mailto:kolibaa@yahoo.fr]
Sent: 25 February 2010 10:36
To: FAO Consultation Crop Livestock
Subject: Week 4 - Contribution from Natali KOSSOUMNA LIBA'A at the Université de

Maroua, Cameroun

Dear Colleagues,

Please, find enclosed my contribution for week 4 (and also pasted below).

Cordially

Dr. Natali KOSSOUMNA LIBA'A
Département de Géographie
Université de Maroua
B.P 55 Maroua - Cameroun
Tel: +237 77 84 48 22
Email: kolibaa@yahoo.fr

Contribution of Dr. Natali KOSSOUMNA LIBA'A
Department of geography
University of Maroua

- If you could secure funding to carry out research on the gaps associated with integrated crop-livestock systems - from your perspective and context - what would you identify as the most critically needed research associated with:

a) On the ground implementation of integrated crop livestock systems? With which actors might you partner to carry this out?

- ✓ I might analyze, with universities, research institutions, NGO, local, regional and international organizations, development project, associations of farmers and of pastorals, the conditions of valorisation of the animals of the exploitations in order to improve management of the fertility. It could be a question of use of the animals for the increase in production and of use of the organic manure. For the moment in the North of Cameroon, the stress is laid on the bovines and the technical recommendations are currently the following ones: production out of cattle shed (less than 5 bovines) and in parks (more than 5 animals), for a use at a rate of 6 tons per ha of manure every 3 years;
- ✓ I might better analyse, with universities, research institutions, NGO, local, regional and international organizations, development project, associations of farmers and of pastorals, the conditions of maintains animals in the exploitations for a better management of the biomass, in particular for significant availabilities in litter and fodder. The local offer of the cultivated biomass strongly depends on the production of the farmers which is influenced at the same time by the practices of the farmers (organic manure, mineral fertilization) and by those of the pastorals (common grazing land). Various modes of management of the biomasses are proposed to improve in the short run (compost produces in edge of the field, manure produced with the cattle shed, in pit or on fixes park, association of the cultures) or medium-term (farming systems on vegetable cover), production;
- ✓ I might adequately analyse with the Universities, research institutions, NGO, local, regional and international organizations, development project, associations of farmers and of pastorals the possibilities of integration of the fodder productions in the rotations. The annual plants proposed for this fodder production can be leguminous plants or the graminaceous ones. On the level of Cameroon at the present time, 4 species use this process. For the leguminous plants (*Stylosanthes hamata, Stylosanthis guienensis and Mucuna pruriens* are proposed. To the graminaceous ones, the choice was made on *Brachiaria ruziziensis*. The trees can also play a

significant role in this management of the biomass, fodder hedge-sharp, ligneous family, etc;

- ✓ I might analyze with the Ministry for the breeding, associations of farmers and of pastorals, the need for organized circulation of the information which would make it possible to the sedentary agro-pastorals to know the moment of the release of the common grazing land. For a few years, the reinforcement of the climatic risks (late or early arriving of the rains), the insecurity and the resurgence of the conflicts with the farmers have led the pastorals to change strategy of transhumance sometimes each year even if the routes and the places remain generally the same ones. The pastorals adopt individual strategies more and more to reach small spaces of pastures. Thus one attends a thinning down of the group decisions around transhumance because of the competition between stockbreeders for the access to spaces of pasture;
- ✓ With the Universities, research centers, NGO, local, regional and international organizations, development project and association of pastorals, there is a need for supporting the pastorals in their adoption of the production and the use of the animal manure. For the moment, the valorisation of the organic manure produced by the animals does not respect yet the standards recommended by the agronomic research of 5 t/ha. Already, certain techniques are in the course of popularization by the SODECOTON near the agro-stockbreeders, like the production under hangar, of which can profit the stockbreeders who do not have or few animals;
- ✓ With the Universities, research centers, NGO, local, regional and international organizations, development project and association of pastorals and of farmers, there is a need to study the possibilities of transfers of biomasses of the pastorals towards the farmers. For the moment, the results show that the organic manure is very limited on the ground of the farmers, whereas it is clearly very high on that of the pastorals because of significant cattle population that they park there. The latter obtain outputs in biomasses much more significant than those of the farmers, but on more reduced surfaces. A complementarities between the stockbreeders and the agro-stockbreeders of the close villages is to be developed and intensify so that the losses of manure are developed better;
- ✓ There might be identification with the state authorities of the conditions of signatures of agreements between States (Cameroun, Chad RCA) for the movements of herds of a state to another. What would make it possible to raise uncertainty which makes the villages populations impotent on the depredations caused by animals coming from the other states;
- ✓ With the state authorities, it might be the research of the load capacity inside even of the areas; this will avoid the conflicts for the occupation of spaces are accentuated because of the demographic development and the increase in livestock;
- ✓ With the Ministers for the breeding, associations of farmers and of pastorals, local, regional and international organizations, development projects, environmental protagonist, it might be the study of the conditions of the safeguarding of great spaces of pasture and of the tracks with cattle for the transhumance seasonal of the herds which are important. The fodder crops could not bring a surplus of food sufficient unless resorting to very intensive farming systems, non compatible with the means of the stockbreeders (irrigation for a permanent crop, strong fertilization and fence). The recourse to transhumance as with the courses of proximity out of the territories of fastener is essential to the maintenance of the cattle; indeed, the rural territory in the North of Cameroon is occupied mainly by agriculture, the breeding and the biodiversity. The agricultural territories are in constant increase because of the increase in the farming population due to the migrations. The increase in number of the bovines and the increase in cultivated surfaces generated the reduction of the territories of breeding. Lastly, the State classified broad surfaces of savannas in exclusive zones of hunting and protection of wild fauna prohibited to the pasture and agriculture. However, administrative authorities as far as traditional do not assume any more their role of arbitration and regulation for an organization harmonious of

the rural territories which are forsaken or implemented of arbitrary manner without objective taking into account needs of the populations, of the requirements of the durable development and social peace.

b) The human and social dimensions of these systems? With which actors might you partner to carry this out?

- ✓ I might with the State and traditional authorities make safe the access and the durable exploitation of the ground so that the stockbreeders and the farmers can durably invest themselves in the use of the organic manure for the fertilization of the ground. Indeed, even if the Cameroonian land legislation exists since 1932, it does not prevent the domination of the common law in rural zone: "*the rural space belongs to the traditional authority which concedes the use of it on its subjects with the proviso of paying the zakkat*". Concretely, no migrant can clear a piece nor to adapt the land one without the authorization of the head of the village which represents the traditional authority. On the other hand, it profits from a right of user and can even put its pieces in hiring. However, the law of 1976 on the management of the national field reinforced the legal arsenal and the capacity of the public services to regulate the conflicts and to organize the occupation of the grounds. But today, the public authorities do not assume any more their role of arbitration and regulation. The space management either is forsaken, or implemented of manner arbitrary without objective taking into account of the needs for the various socio-professional groups;
- ✓ With the associations of pastorals, universities and research centers and the NGO, local, regional and international organizations, the reinforcement of their capacity to fertilize the grounds by the valorisation of the animal manure. The systems of production of the stockbreeders were in the beginning strictly pastoral and evolve gradually to the agro-pastoralism. There exists within these systems a certain synergy between agriculture and the breeding with the consumption of the crop waste products but especially the production and the use of the organic manure for the corn pieces of the pastorals. This has favourable consequences on the agronomic performances their cultures. Indeed, the settlement of the families of pastorals imposes the practice of agriculture to them, in particular the very demanding culture of fertilizer corn. Not very usual the use of the manures mineral and not integrated into the chemical circuits of provisioning of entrants, the pastorals uses part of their animals to ensure the fertilization of their corn. They thus develop all the production of animal manure (dejections of the bovines without addition of litter) available with the generalization of the practice of night parking facilitated by the acquisition of barbed wire. This valorisation of the animal manure modified their systems of transhumance. Formerly, the animals could spend the years without passing by the soil of fastener. Now, they pass there systematically between a month and a month and half to smoke the pieces per annum. It is the case also of many animals which remain in the territories. There is even a system of rotation of the animals between the zones distant from transhumance and the territories of fastener so that a constant number of animals remain in the pieces. In spite of the number of variable animals and pieces between the various exploitations, all the stockbreeders more or less manage to smoke their pieces, thanks to networks of mutual aid;
- ✓ With the associations of farmers and pastorals, incentive of the diversification of the exchanges and complementarities. The passage of the animals on the fields after harvest is also an example of co-operation between stockbreeders and farmers. The first use the crop waste products (straws, stems and raids of cereals, as well as the leguminous plant haulms: groundnut, niébé) to nourish the cattle, and that allows in same time to fertilize the ground for the next agricultural season insofar as the herds deposit their dejections there.

c) Enhancing market chains or incentives to production? With which actors might you partner to carry this out?

With the research centers, NGO, local organizations and associations of farmers and of pastorals, we need to associate the production of the economic manure and the valorisation of the crop waste products. To produce the organic manure is not very current practice in North-Cameroon, apart from some areas over populated. The demonstration of the techniques of manufacture of the manure (improved park, cattle shed dunghill) has not very interested the peasants (farmers as pastorals). To promote the organic manure near the peasants starting from the only demonstrations on cotton plants and cereals, is not enough obviously to convince them to adopt its use quickly. It is thus significant to set up actions on the bovine breeding in the exploitations. The objective being to bring the councils necessary to the farms having of the bovines so that these last develop better their bovine breeding in dry season by a better food (promotion of association *mucuna*/maize or sorghum, systematic collection of the crop waste products) and by a brought closer medical follow-up. Organic production of manure not seeming more like one principal objective, but a by-product of the activity of breeding, whose economic valorisation is possible several manners (sales of animals, animal haulage, milk, leather).

Contribution 5, from Brian Thompson at FAO, Rome.

-----Original Message-----
From: Thompson, Brian (AGND)
Sent: 25 February 2010 15:22
To: Crop-Livestock-L@mailserv.fao.org
Subject: Week 4 - Contribution from Brain Thompson at FAO, Rome

Using improved crop-livestock systems to close the "nutrition gap"

We have reviewed with great interest the various contributions made over the last four weeks of the e-consultation on the integration of crop-livestock systems for rural development. We appreciate the mention of the contribution that such systems have for human nutrition, and in particular the guidance provided by the moderators for the week February 15-19: "....we want to focus the discussion on those policies and institutional supports that must be in place to enable the adoption and spreading of innovations and practices associated with promising crop-livestock systems **for food and nutritional security**.").

Nutrition has an obvious but often neglected role to play in food systems. Nutrition is important and nutritionists need to be engaged because:

1. food systems should be so designed and implemented that they address nutritional needs, the integrated crop-livestock sector offers practical opportunities for achieving this at national, sub-national and smallholder level which need to be acted upon;

2. increasing the diversity of crops and of the livestock can close not only the production gap or the yield gap by symbiotic mutualism or literal cross-fertilization, but can also close the "nutritional gap" by providing a broader range of nutritious, micronutrient-rich, seasonally available supplies of a variety of diverse foods whose consumption can optimize diets - very relevant both for net rural producers and consumers including smallholders; and

3. there is a huge opportunity to match and combine production education with nutrition education including for example the inclusion of nutrition modules in Farmer Field Schools curriculae.

The forthcoming consultation on the integration of crop-livestock systems for rural development (Brazil 23-26 March) is to focus on the needs and opportunities for smallholder

producers. It is clear that if the MDGs are to be achieved and hunger and malnutrition are to be tackled effectively, such a focus must include looking at the needs and opportunities for achieving food and nutrition security. FAO's nutrition Division is interested in the overall nutritional contribution that micronutrient-rich plant foods and those of animal origin can make to nutritional well-being particularly as animal sourced foods have a clear and important role to play in human nutrition given the known deficiencies (essential amino acids, fats, minerals, vitamins) that exist widely.

Nutrition objectives, concerns and considerations need to be more prominently taken into account by agricultural and rural development planners in guiding agricultural and poverty reduction policies and programmes. AGN has been working towards this goal and we have prepared a Concept Note "Narrowing The Nutrition Gap: Investing in Agriculture to Improve Dietary Diversity". This paper presents an overview of agriculture's role in improving dietary diversity and nutrition outcomes in developing countries. Following a discussion on why increasing production of staple crops is not enough to accelerate reductions in malnutrition, the concept of the "nutrition gap" is further developed - the gap between what foods are grown and available and what foods, including animal sourced foods, are needed for a healthy diet. This term helps to differentiate nutrition security from food security and to articulate the concept of dietary diversity, which requires increasing availability and access to the foods necessary for a healthy diet, and increasing the actual intake of such foods. Various food typologies or consumption patterns from around the World are used to illustrate how dietary diversity and quality is often insufficient in a variety of contexts, including those where total dietary energy supply is adequate. A series of agriculture-based interventions are proposed on how agriculture can improve dietary diversity and quality, and thereby accelerate reductions in malnutrition. Finally, a series of policy recommendations are made from raising nutrition's profile on national development agendas at country level, to implementing agriculture-based nutrition programmes and for promoting nutrition security within international contexts. The paper provides a good starting point for our contribution to the debate on integrated crop-livestock issues but further work is perhaps welcome to focus on the crop-livestock sector related to points 1 and 2 above and on nutrition education and the farmer field schools FFS in point 3 above.

We look forward to hearing from list members as well as from the organizers of this consultation, ways in which the crop-livestock sector can best protect and promote nutrition particularly of those who exist on meagre monotonous cereal based low quality diets.

Brian Thompson
Senior Nutrition Officer and Group Leader
Nutrition Security and Policy Group (AGNDP)
C-220, AGN, FAO, Rome, ITALY
Tel.: +390657054153 Cell: +393492375759
e-mail: Brian.Thompson@fao.org
have a look at our website: http://www.fao.org/ag/agn/index_en.stm

---

Contribution 6, from Brian Thompson at FAO, Rome

-----Original Message-----
From: Thompson, Brian (AGND)
Sent: 26 February 2010 17:44
To: Crop-Livestock-L@mailserv.fao.org
Subject: Week 4 - Contribution from Brian Thompson at FAO, Rome

Using improved crop-livestock systems to close the "nutrition gap"

Narrowing the "nutrition gap" – the gap between what foods are grown and available and what foods are needed for a healthy diet – can only occur when national policy makers and members of the international development community recognize that attempts to reduce malnutrition solely via increased production of staple crops are not enough. Agricultural development policies and agricultural development programmes that address food *and* nutrition security are an essential step in reducing malnutrition; they enhance national prospects for improved labour productivity and economic growth, and increase the chances of long, healthy lives for even the most vulnerable.

Agriculture has a crucial role in reducing malnutrition and contributing to better nutrition through improved food security and nutrition security. Improved crop-livestock systems, by improving nutrition, can enhance the quality of life and significantly contribute to achieving MDG 1 and thus make its agenda even more relevant to its clients and the development process.

Agricultural development programmes that aim to address food security by increasing production of staple crops are by themselves often not enough to accelerate reductions in hunger and malnutrition. Malnutrition can occur despite increased food availability and higher incomes for a number of reasons, including poor quality and variety of food i.e. ***low dietary diversity*** which is one of the primary reasons malnutrition persists. Monotonous diets that are too high in carbohydrates and too low in nutrient-rich foods are common in many parts of the developing world, even among households that can afford to eat better. Diets high in starch but low in protein, fat and micronutrients can result in malnutrition even if dietary energy supply (DES) is adequate. Stunting, nutrition-related anaemias, and iron, zinc and Vitamin A deficiencies are just a few examples of the types of ***"hidden malnutrition"*** that can occur in individuals who are consuming enough total energy but not enough macro and micro nutrient-rich foods such as meat, fish, eggs, dairy, legumes, fruits and vegetables. The repercussions of hidden malnutrition can be just as serious as are those from inadequate dietary energy supply.

To ensure increases in production or purchasing power lead to accelerated reductions in malnutrition, agricultural development programmes must focus on ***nutrition security*** not just food security. Nutrition security refers to the "quality" aspect of food production, consumption and utilization by all individuals in a household. While food security may increase the total *quantity* of energy available for consumption, only nutrition security can guarantee the *quality* and *diversity* of food necessary for protecting and promoting good nutritional status and health. Just as improving food security can be thought of in terms of narrowing the gap between current and potential production yields, improving nutrition security can be thought of in terms of narrowing the ***"nutrition gap"*** between current food intake patterns and intake patterns that are optimal in terms of macro and micronutrient content. Narrowing the nutrition gap means improving dietary diversity through increasing availability and access to the foods necessary for a healthy diet, and increasing the actual intake of those foods.

Rain-fed roots and tubers in West Africa: One of the most important staple food crops in West Africa is cassava. Cassava is hardy, drought resistant, maintains acceptable yields on low-fertility soils and is of great importance for subsistence farmers throughout the region. Yam, sweet and Irish potatoes, and taro are other foods grown in this area. Meals typically consist of a starchy staple (e.g. cassava–based *gari or foufou*,) and sauce; the latter can include a variety of ingredients, most commonly peanuts and/or vegetables. Consumption of animal source foods (ASFs) in western Africa may be low, especially among the rural poor. Bushmeat and insects, small livestock and poultry for both meat and dairy, and fish are eaten,

but quantities are often inadequate to ensure nutrition security. Suggested agriculture-based interventions include *selectively breed cassava; introduce cassava leaves as a nutrient rich food; boost red palm oil production:*

Improving the protein content of cassava would be one very important way agriculture could narrow the nutrition gap in West Africa, as this crop is one of the most commonly consumed staples in the region. High protein genotypes have been identified and the current challenge is to increase endogenous proteins containing adequate levels of the desired amino acids within common cultivars. In addition to selective breeding to increase protein content and quality, encouraging consumption of cooked cassava leaves has potential for improving nutrient intakes in areas of West Africa where they are not considered a conventional food source. Vitamin A deficiency (VAD) rates are high in many West African countries. Stimulating production and consumption of red palm oil (RPO), which is extremely high in Vitamin A, is one way to reduce VAD and at the same time generate income in the region.

Irrigated/rain-fed rice in South and Southeast Asia*:* Rice-based food typologies are common throughout South and Southeast Asia. Consumption patterns do vary between and within countries, but most diets consist primarily of rice supplemented to varying degrees with vegetables, pulses, animal sourced foods, and some fruits. Fat and oil intake is often low, especially among low income groups. For many households, especially rural ones, DES is predominantly derived from carbohydrates. For example, based on data from FAO's Food Balance Sheets, 77% of total DES in Laos came from rice in 2002. In Bangladesh, 73% of DES was rice derived in 2003. For Cambodia, the amount was 68%, for Indonesia it was 80% and for Sri Lanka (where total DES is fairly high at 2416 kcals/per capita/day) it was 53%. Although these are aggregate figures and intake patterns vary substantially within and between countries, such statistics are indicative of monotonous diets that are too high in carbohydrates and too low in animal sourced foods and micronutrient rich fruits and vegetables. Although malnutrition in Asia as a whole is decreasing, South Asia still has the highest prevalence rates of malnutrition in the world, and in South East Asia, serious challenges also remain. For instance, stunting prevalence in Cambodia, Laos and Vietnam was 37, 40, and 36 percent respectively from 2000-2007. In addition, the estimated prevalence of iron deficiency anaemia for women and children is high throughout the region; for children under five varying from 50 to 80 percent. The monotonous diets described above are one of the reasons for these persistent high rates of malnutrition. Suggested agriculture-based interventions include *increase cultivation of nutritious dry season crops; integrated horticulture/aquaculture:*

Although rice production cycles vary according to country and region, most areas where rice is grown have dry seasons during which non-paddy rice crops can be harvested. Facilitating cultivation of dry season crops can be especially important in areas where rice mono-cropping is common, as mono-cropping can increase vulnerability to production-based, cyclical patterns of food insecurity. For example, in Bangladesh, cultivation of lentils, peas and other pulses has declined, partly because rice is more lucrative, also because the growing season of pulse crops is longer than that of rice, and pulses require more input and maintenance than do rice crops. Introduction or re-introduction of nutritious, low-input, short duration crops might be appropriate to improve availability and access to a more diversified diet. From an agricultural perspective, mung beans have a short production cycle (approximately 60 days), minimal moisture requirements and improve soil fertility via nitrogen fixation. Moreover, recent improvements in mung beans' nutritional content, pest and disease resistance, and maturation cycle could facilitate their re-introduction. Soybean production for local consumption is another option. Integrated horticulture/aquaculture projects have potential to improve households' access to animal sourced foods, fruits and vegetables. In many areas of South and Southeast Asia, they fit into traditional production strategies. In Vietnam, for example, the VAC (Vegetation, Aquaculture, Cages for Animal Husbandry) system has been

promoted since 1989 as part of a general policy to improve crop diversification and nutrition security. From a nutrition perspective, these strategies are exemplary in that they address deficits in animal sourced foods and fruits and vegetables simultaneously.

Rain-fed cereals in Central and East Africa: The most common cereals used as staples in many areas of Central and East Africa include sorghum, millet, rice and maize. Other foods grown and consumed in this region include cassava, other starchy roots, and pulses. Fruits and vegetables are also cultivated, but production may be limited due to little or no access to water, seeds and other inputs, time constraints, and lack of knowledge regarding horticultural techniques. Livestock production in Central Africa is the lowest on the continent, due in part to endemic trypanosomiasis, which causes anaemia, emaciation, decreased milk yields and death in non-resistant breeds of cattle and other livestock. Typical diets in Central and East Africa consist primarily of a cereal-based porridge or paste (e.g. *nsima* in Malawi, *ugali* in Kenya) complemented by a meat or fish-based sauce, or by a relish which could include meat, fish and/or a variety of vegetables or legumes. Such meals are usually eaten twice a day. Fruits may also be consumed but intakes are highly seasonal and may be limited in terms of access (e.g. budget constraints, poor market infrastructure). Like the other food typologies described above, diets are often lacking in micro and macronutrients and may also be inadequate in terms of energy. The lack of diversity in the Malawian diet is especially pronounced and most certainly contributes to very high rates of stunting (48% in 2004). However, stunting rates are high or very high throughout Central and East Africa (e.g. Chad 41% in 2004; Tanzania 38% in 2004, Central African Republic 38% in 2007). Micronutrient deficiencies are also common. Thirteen countries in this region had prevalence of Vitamin A deficiency above 10% and/or a 20% prevalence of iron deficiency anaemia in 2007. Suggested agriculture-based interventions include *keyhole gardens; increase production of small ruminants and poultry; reduce post-harvest losses:*

Increasing small-scale production of micronutrient-rich foods at the community or household level is one way to improve crop diversity and increase availability of fruits and vegetables. However, implementation is contingent on, *inter alia*, water availability, soil quality, and seed availability. In many parts of Central and East Africa, these factors are of limited supply. Keyhole gardens, which are simple to implement and require minimal inputs, are one solution in such contexts. Trypanosomiasis is one of the constraints facing the livestock sector in Central Africa, and, while production is higher in East Africa, many smallholders in this region could still increase outputs of poultry and small ruminants. Cross-breeding to improve hybrid vigor, increase resistance to trypanosomiasis, and increase meat and dairy yields is one way to improve production. Reducing post-harvest losses also requires greater attention.

Irrigated/ rain-fed maize and beans in Central America: Maize and beans are grown and eaten throughout Central America. Together with sugar, these staples provide the bulk of DES (dietary energy supply) for most households. In Guatemala, for example, almost 90% of DES was cereal (primarily maize), bean and sugar derived in 2003. These items may be complemented by a cow's milk cheese (*queso blanco*), eggs, plantains, avocadoes, bananas, carrots, chilis, onions, tomatoes and/or leafy greens. However, in many cases, meals are lacking in diversity and inadequate in terms of fat, animal sourced food-based protein and micronutrients. Meat is often too expensive for regular consumption, especially among low-income and indigenous groups, and fruits and vegetables may be consumed in insufficient amounts to ensure nutrition security. This lack of dietary diversity contributes to high rates of malnutrition in much of Central America. Suggested agriculture-based interventions include *increase consumption of "trash fish":*

Fish farming is increasing but the fish raised are primarily for export and not generally consumed by the local population. Since many aquaculture ventures displace indigenous species that may be a traditional food source for local populations, the consumption of

indigenous fish species may decline and the end result is an overall decrease in animal sourced foods intake. Moreover, even when farmed species are consumed by local populations, net micronutrient intake can still decrease, as many small, indigenous fish (referred to as trash fish) are actually higher in micronutrients than popular farmed varieties. Other potential interventions include intercropping using the Milpa System, greenhouses, integrate agro-forestry to increase fruit production and extension-based nutrition education.

Finally key policy recommendations for agriculture-based approaches to narrow the nutrition gap include incorporating explicit nutrition objectives and considerations into agricultural policies, programmes and research agendas, building capacity of institutions and individuals at country level, and promoting nutrition security at regional and global levels.

Brian Thompson
Senior Nutrition Officer and Group Leader
Nutrition Security and Policy Group (AGNDP)
C-220, AGN, FAO, Rome, ITALY
Tel.: +390657054153 Cell: +393492375759
e-mail: Brian.Thompson@fao.org
have a look at our website: http://www.fao.org/ag/agn/index_en.stm

---

Contribution 7, from Sandra Santos at Embrapa, Brazil

-----Original Message-----
From: Sandra Santos [mailto:sasantos@cpap.embrapa.br]
Sent: Fri 2/26/2010 10:29 PM
To: Crop-Livestock-L@mailserv.fao.org
Subject: Week 4 - Contribution from Sandra Santos at Embrapa, Brazil

Dear moderator

I send you a small contribution on my experience on beef cattle sustainable production systems of the Brazilian Pantanal, which I consider one of the most sustainable in the world

Sustainable production systems has been constantly debated in recent decades, especially focusing on the influence of cattle on the environment and biodiversity conservation. Actually, one of the main challenges of humanity refers to the production of food associated with the conservation of the environment. Therefore, there is need to understand the functioning of the systems, especially the flow of energy (solar energy), so that there is a balance between the different components of the system (man, vegetation, animals, soils, climate).

There are some parts of the world that are located in marginal and transitional areas that are not appropriate for conventional agriculture as the Pantanal, considered one of the largest flood plains in the world. It does not support intensified technologies and on farm management of landscapes and plant resources would be the best strategy for the conservation of this region which is considered Biosphere Reserve and World Heritage Site. The Pantanal has many landscapes arranged in mosaics, many of which are dominated by grasses as open grasslands as well as savannas dominated by grasses and other herbaceous plants. Therefore, these landscapes allowed to integrate forest and livestock that have been performed for hundreds of years by traditional farmers, which contributed to the conservation of the region. Currently, the main challenge is to contain the replacement of forest landscapes by exotic pastures. In situations of native pastures of low quality, it is recommended to replace or manage part it with native or exotic species, conserving the forest and savanna areas,

maintaining the natural pattern of landscapes. The sustainability of these systems also depends on valuation of environmental goods and services provided by sustainable systems.

I attach two papers on the subject

Best Regards
Sandra Aparecida Santos
Reseacher of Embrapa Pantanal

Contribution 8, from Adrian Catrileo at INIA, Chile

-----Original Message-----
From: acatrile@inia.cl [mailto:acatrile@inia.cl]
Sent: Sat 2/27/2010 3:44 AM
To: Crop-Livestock-L@mailserv.fao.org
Subject: Week 4 - Contribution from Adrian Catrileo at INIA

Dear All,

Please find some comments about the topic of the Week 4 in the e-consultation.

- If you could secure funding to carry out research on the gaps associated with integrated crop-livestock systems (IC-LS)…

a) On the ground implementation of integrated crop-livestock systems.

As some of the contributors have pointed out, including myself, farmers follow markets constraints to implement some specific IC-LS, in fact, market constraints and politics have influenced the implementation of specialized crop or livestock systems rather than its integration. This is because farmers are looking not only to maximize production but also in some way to increase their income. Even small farmers try to get fair income of the production surplus they sale after satisfy their basic nutritional requirements. Then, the implementation of IC-LS has complex interactions between research (INIA or / and a university), the government, the farmers and the industry (processors).

b) The human and social dimensions of these systems.

The role of farmer's organizations is of primary importance. These organizations should be strong enough and representative to enable them to negotiate with agricultural government institutions and the bank actors, in order to participate in defining politics and financial support to the rural sector. Even, nowadays, with increasingly public concern about the way the food is produced and its effects on the environment, consumers associations may play another important role in to the dissemination of the benefits to implement IC-LS.

c) Enhancing market chains or incentives to production.

The industrial actors like slaughter houses, food processing companies, supermarkets and others, which are following consumers' expectatives, are key actors in the added value chain. They should promote prices contracts (according to quantity and quality required) with the farmers and on the other hand, the government should have a policy of economic incentives to those IC-LS which are demonstrated to be less pollutant to the environment.

- What are the gaps in evidence required to frame a policy intervention or to influence policies or institutional elements that can advance IC-LS.

The need to understand the System Analysis Approach at different levels (university, research institutes, the government and donors) and the importance in to study innovative IC-LS, especially at the small farmer level for which this type of agriculture is part of their way of life.

To think in the response of the IC-LS not only in production terms but also in its results in economics terms.

A better knowledge and dissemination of innovative IC-LS developed in the world.

- How might the research community respond to the structural constraints of carry out interdisciplinary, multi-institutional and multi-stakeholder efforts?

Donors should have into account that IC-LS have long term response and the multi-effort research associated to its study must be compensated by adequate funds. Ideally, also farmers and the value chain actors should financially support the research which is proposed to carry out under the IC-LS perspective.

Best Regards,

Adrian Catrileo PhD
Instituto de Investigaciones Agropecuarias (INIA)- the National Agricultural and Livestock Research - CHILE
Phone 56-45-215706 (272)
Fax 56-45-216112
e-mail: acatrile@inia.cl
PoBox: Casilla 58-D, Temuco, CHILE

Contribution 9, from Jorge Grijalva Olmedo at INIAP, Quito, Equador

-----Original Message-----
From: Jorge Grijalva Olmedo [mailto:jgrijalva55@hotmail.com]
Sent: Sat 2/27/2010 1:29 PM
To: Crop-Livestock
Subject: Week 4 - Contribution from Jorge Grijalva Olmedo at INIAP, Quito, Equador

buenos dias,

En relación con el tema 4, en respuesta a la pregunta 3 y 4, mi aporte en el ámbito de las particularidades del Ecuador, es el siguiente:

La participación del Estado y la Cooperación Internacional es esencial para orientar proyectos de desarrollo alternativos que tomen en cuenta las condiciones ecológicas, sociales y culturales de las poblaciones y que guíen toda estrategia de uso sostenible y conservación de los recursos naturales, especialmente los bosques, comprometiendo a la empresa privada y a las comunidades en procesos de co-gestión. Por un lado, partiendo del "principio de responsabilidad ética" estos proyectos deben enfocarse en la intensificación y recuperación de áreas que ya han sufrido un proceso de transformación, conforme a su potencial, sin descuidar incentivos diferenciados que motiven a los productores a mantener áreas boscosas e investigar

usos de la tierra más sostenibles, como los sistemas integrados agricultura-ganaderia.

En apoyo a este propósito, debe considerarse la valoración económica de externalidades ligadas con los bosques y sistemas integrados que sustenten incentivos y medidas de compensación más equitativas, que privilegien la conservación del mismo en términos de simple economía, donde esta actividad presente mayor beneficio que otras actividades como la ganadería extensiva y que al mismo tiempo, hagan viables iniciativas locales o regionales que buscan comprometer a las comunidades con estos objetivos.

En ese ámbito, se requiere intensificar las acciones para el desarrollo de mercados para los servicios ambientales derivados del bosque tales como: secuestro de carbono, provisión de agua, ecoturismo, prospección de la biodiversidad, entre otros, lo cual coadyuvaría al incremento de los ingresos de los productores. El pago por secuestro de carbono podría cumplir no sólo un objetivo ambiental sino también social, siempre y cuando las acciones gubernamentales se encaminen a negociar la inclusión y desarrollo de alternativas "con sombra" entre las cuales se puedan incluir las innovaciones agroforestales, al menos de aquellos predios del sector campesino menos favorecido y más vulnerable, en los acuerdos internacionales de implementación conjunta de venta de este servicio. Asimismo, identificar los productos forestales no maderables, fibras, gomas, cortezas, especias, frutos y productos menores, de potencial socioeconómico e investigar su manejo, aprovechamiento y procesamiento, y desarrollar mercados para estos productos.

De otra parte, la organización y la capacidad de negociación de las comunidades se presentan como una debilidad, por lo cual es imperativo el fortalecimiento de sus capacidades a fin de consolidar condiciones técnicas, económicas, organizativas y de gestión que les convierta en interlocutores válidos en procesos autogestionarios de manejo y resolución de conflictos que involucren sus recursos. El Estado debe garantizar que empresas transnacionales, tales como las petroleras y farmacéuticas, así como organismos nacionales usuarios de servicios del bosque cumplan a cabalidad con los estudios de evaluación de impacto ambiental, para que no menoscaben los derechos de las comunidades, a sustentar el desarrollo sobre la base de sus recursos y a ser compensados por los mismos. Las capacidades e intereses de organismos nacionales e internacionales de investigación y las poblaciones locales deben ser potenciadas mediante alianzas que contribuyan a llenar vacíos de conocimiento en estrategias de uso múltiple de recursos. En este contexto, las innovaciones integradas cultivos-ganado, tienen la prioridad.

A pesar de que las prácticas agroforestales forman parte de sistemas tradicionales manejados por los productores y que la interdependencia entre la silvicultura y la agricultura ha sido reconocida como base ecológicamente sólida para mejorar las condiciones de subsistencia de las comunidades rurales, en el Ecuador, las actividades agroforestales caen en alguna instancia entre aquellas manejadas por los Ministerios de Ambiente y Agricultura, por lo cual es preciso que se definan desde una visión sistémica, la competencia institucional y las responsabilidades estructurales para la investigación y extensión; las alianzas entre las Ong's y instituciones estatales representan una estructura organizacional con potencial para incorporar la agroforestería en la planificación nacional. Asimismo, deben examinarse las reformas políticas necesarias para promover la Agroforestería como sistema integrado, dentro de una estrategia de uso múltiple de recursos, dándole atención preferencial al mejoramiento de la estructura institucional para el desarrollo de mercados de productos arbóreos y apoyo a los esfuerzos de investigación, extensión y promoción campesina.

Futuras investigaciones deben enfatizar en el análisis de los instrumentos de política más apropiados en cada estrategia de desarrollo sostenible involucrando a productores de diferentes categorías. Para los propósitos de desarrollo múltiple del bosque, los estudios de clasificación de la tierra de acuerdo con su capacidad de uso son de igual o mayor

importancia que los inventarios forestales, es necesario que en las decisiones políticas para determinar el uso de la tierra, la información sobre su capacidad de uso sea balanceada con otros factores sociales y económicos, que a veces son los únicos que se analizan, así como apoyar las investigaciones multi-escala sobre cambios de uso del suelo, en donde las técnicas de sensores remotos pueden jugar un papel primordial. Igualmente, hace falta mayor información sobre la capacidad de respuesta de los ecosistemas amazónicos y andinos, establecer el deterioro causado por la intervención antrópica, incluyendo el efecto retroalimentador sobre las características socioculturales de las poblaciones rurales.

muy cordialmente

Jorge Grijalva Olmedo, Ing. Agr. Ph.D
Líder Programa Nacional de Forestería
INIAP, Estación Experimental Santa Catalina
Km 1 panamericana sur, Quito
telefax : 2 690 692
domicilio: 2 232 822
Quito-Ecuador

Contribution 10, from José R. Campero, ABDES, Bolivia

-----Original Message-----
From: José Campero Marañon [mailto:jrcampero@hotmail.com]
Sent: Sat 2/27/2010 8:56 PM
To: Crop-Livestock
Subject: Week 4 - Contribution from José R. Campero, ABDES, Bolivia.

Dear Colleagues,

Below kindly find my contributions to Week 4. I try to give response to three questions from Bolivian context and the perspective.

Best regards,

M. Sc. José R. Campero
DIRECTOR NACIONAL DE LA ALIANZA BOLIVIANA DE LA SOCIEDA CIVIL PARA EL DESARROLLO SOSTENIBLE.
La paz, Bolivia.

A. If you could secure funding to carry out research on the gaps associated with integrated crop-livestock systems - from your perspective and context – what would you identify as the most critically needed research associated with:

From our perspective and context (BOLIVIA)

1) On the ground implementation of integrated crop livestock systems? With which actors might you partner to carry this out?

The principal objective of integrated crop-livestock systems is to produce grain for human nutrition and straws and other by-products in order to produce meat and milk with ruminants. In this context is crucial:

a) To increase the crop production not only the grain but also the straws.

b) To develop nutritional strategies for improvement the utilization of low –quality roughages and straws by ruminants for productive purpose

a. To optimize the availability of nutrients from the fermentative digestion

b. To optimize the microbial growth in the rumen

c. To ensure an effective metabolism in the ruminant

In this way, it is very important to establish agreements with International Centers of Investigation that have worked or that work these topics. The FAO is and it will be the principal actor to articulate the efforts of the developing countries to establish agreements with those International Centers of Investigation. Not only these but also to facilitate the diffusion and validation of those investigations.

To achieve on the ground the development of integrated systems of production, the FAO should establish a program similar to the program of conservation of genetic animal resources that was a successful program.

2) The human and social dimensions of these systems? With which actors might you partner to carry this out?

In Bolivia, the economy based on used of large and unproductive lands (latifundios) reduced drastically the forest area, and also result in an inefficiently land used by virtue of the low cost of the land and the existence of programs of exportation of soy bean or sugar. We hope that a model integrated crop-livestock allows the rational use of the land and the democratic access to the poor people to it.

This model of agricultural production disdained the ecological concept of productions, and the development of the agronomic systems was based in:

a) Opening of new lands, joined problems of inadequate utilization.

b) Substitution of basic cultures for the food safety for exportable items.

c) Introduction of Modified Genetic Seed.

d) Intensive use of machineries and other agricultural instruments.

We think that this one is a topic of political definition and the principal actors to solve the topic of the sustainable and intensive use of the agricultural lands are the government and the organizations of the civil society.

3) Enhancing market chains or incentives to production? With which actors might you partner to carry this out?

We believe that very important for the agricultural products of developing countries the enhancing of the access to the markets in the industrialized countries, especially those markets associated with organic or ecological products. In this line of action, the suspension of agricultural subsidies in the industrialized countries (USA and European Community) is

necessary; only under this condition, agricultural or livestock products from developing countries will have chance of being competitive on the global market.

B. What are the gaps in evidence required to frame a policy intervention or to influence policies or institutional elements that can advance integrated crop-livestock systems.

With only five years left until the 2015 deadline to achieve the Millennium Development Goals, it is clear that is needed to advance intensively to guarantee the food safety in Bolivia. For this reason the integrated crop-livestock systems must be focused in small and medium producers. In this producers' category, the topic of land is key to achieve the food safety and the reduction of the poverty the same as development of agricultural products with added value and the support of the State to the marketing of these products. All this passes for the development of policies with special focus on the reduction of rural poverty.

C. How might the research community respond to the structural constraints of carrying out interdisciplinary, multi-institutional and multi-stakeholder efforts? What can donors do to assist in ensuring robust research efforts?

In addition to promote the capacities of the scientific national community is important the development of participative processes of investigation;. With this intervention logical, the investigation could solve the problems of the integrated crop-livestock systems identified by the producers. The latter concept is very important, to guarantee the efficiency of the investigation.

It is very important that the donors take part in the Directive Committees of the national institutions of investigation. And, the most important is, that the donors will be lined up by the national policies of rural development.

Contribution 11, from Kosi Awuma at the University of Cape Coast, Ghana

-----Original Message-----
From: KOSI AWUMA [mailto:k_awuma@hotmail.com]
Sent: Sun 2/28/2010 9:23 PM
To: crop-livestock-l@mailserv.fao.org; Crop-Livestock
Subject: Week 4 - Contribution from Kosi Awuma at the University of Cape Coast, Ghana

Hi Moderator,

Attached are some answers to issues raised for Week 4 (also pasted below).

Thank you

Kosi Awuma
University of Cape Coast
Ghana

Prof. Thurow's contribution was a well written one, spelling out what killed the mixed farming system of old in the USA and what caused the change from crop-livestock integration system of the developing countries to mono-crop and mono-livestock production systems. Without doubt, extension messages in the developing countries such as Ghana are basically government's agricultural policies largely driven by developed countries policies through donor funding geared towards increased food production to provide food for the ever

increasing population. In which case indigenous knowledge became obsolete and was superseded with "new knowledge" of large scale production depending solely on imported inputs such as fertilizers, improved seeds, improved breeds of animals and feed, all of which had to be imported. In the process, the risk-averse reasons of the farmers in their old fashioned production methods were totally ignored.

Now to some of the questions posed for week 4

- if you could secure funding to carry out research on the gaps associated with integrated crop-livestock systems – from your perspective and context what would you identify as the most critically needed research associated with:

(a) On the ground implementation of integrated crop-livestock systems: with which actors might you partner to carry this out?

In the first place, we need to re-examine available information or conduct fresh study on what has been done before (indigenous knowledge), what worked for the rural farmers and why they were involved in a specific production system as opposed to others as well as the benefits and constraints of plantation crops-livestock integration. Most probably rural farmers who are now used to mono-cropping may need reorientation on crop –livestock integration of old. For example, Ministry of Food and Agriculture, (MOFA) Ghana and DFID, UK carried out some research on the role of livestock in rural livelihood in Ghana in 2002 from which it came out clearly that the reasons most rural farmers kept livestock in addition to their crop farming were at variance with government's policy on livestock production implemented by MOFA.

We will need researchers in animal production, animal health, crop production, social scientists and identified farmer groups.

(b) The human and social dimension of these systems? With which actors might you partner to carry this out?

The farmers both rural and plantation crop owners, farmer based organizations, the research scientists, community leaders i.e. chiefs, Non-Governmental Organizations (NGO) operating in the locality, policy makers and implementers will be required in the research.

(c) Enhancing market chains or incentives to production? With which actors might you partner to carry this out?

Most often, farmers are encouraged to increase production with incentive packages at times, which eventually led increased production leading to seasonal glut on the market with the attendant fall in producer prices. This, in itself, is a disincentive to further production. Thus, for the crop-livestock integration model to work effectively for sustainable food production the appropriate storage system should be put in place to take the produce off the farmers at guaranteed minimum prices to enable farmers concentrate on production. The storage system works into produce processing systems leading to wholesalers and retailers. Along the marketing chain, value could be added to each produce in terms of processing into various forms and packaging. In Ghana, marketing has been in the hands of private small to medium scale operators however there is a need to organize them effectively. Storage seems to be the greatest challenge for food crops especially during the bumper harvest season. This is one single area I expect governments to lead the way and nurture the private sector to eventually take over. For agricultural produce from the developing world to become competitive on the international markets a level playing field should be developed. The developed countries may have to look critically at and possibly remove the agricultural subsidy on their products. If this is impossible, then double standards of forcing developing countries not to subsidize their agricultural inputs should be stopped.

(d) What are the gaps in evidence required to frame a policy interventions or to influence policies or institutional elements that can advance integrated crop-livestock system.

Research information on the benefits of crop-livestock integration as a means of reducing rural poverty, rural-urban drift and environmentally sustainable production system could provide the necessary evidence which must be sold to policy maker for a change in policy direction. The research institutions, the Faculties of Agriculture in the various Universities, the NGOs in rural agricultural development should be instrumental in this.
(e) How might the research community respond to the structural constraints of carrying out interdisciplinary, multi-institutional and multi-stakeholder efforts? What can donors do to assist in ensuring robust research efforts?

The above issues raised should not create any problem for the research institutions or the researchers. They are not new to most researchers or research institutions in Ghana.
The donor institutions or organization including the FAO should be conscious of the quantum of work and amount involved and the time span for each research to be carried out effectively. Donors should be involved in the planning and the supervision of implementation however budgets for their experts coming from outside the project country should be separated from the project budget. This is one item which drained project budgets in the past.

Contribution 12, from José Guillermo Velásquez, Corpoica, Colombia

-----Original Message-----
From: José Guillermo Velásquez Penagos
[mailto:joseguillermovelasquezpenagos@gmail.com]
Sent: Sun 2/28/2010 11:32 PM
To: Crop-Livestock
Subject: Week 4 - Contribution from José Guillermo Velásquez, Corpoica, Colombia

Colleagues,

1. la principal fuente de alimentación del ganado para desarrollo y finalización en Colombia son los pastos de pastoreo, sal mineralizada y agua a voluntad. Algunas explotaciones utilizan suplementación proteica y energetica balanceada, la base de esta suplementación es la soya, maiz, sorgos. En Colombia la Corporación colombiana de investigación agropecuaria - Corpoica, es la que lidera la investigación en el sector agropecuaria en áreas como la alimentación nutrición bovina, recursos genéticos con gran participación de las razas criollas, ecofisiología, agrosillvopastoril, salud e inocuidad. los estudios y apoyo al sector agropecuario son financiados por el ministerio de agricultura, Colciencias, alcaldias, gobernaciones y la industria petrolera, y menor porcentaje por la empresa privada
Los sistemas de producción ganadera, son apoyados con creditos blandos del gobierno Colombiano a los productores, hay un insentivo por la conservación de bosques, por otra parte se viene trabajando en los pagos por servicios ambientales
A nivel nacional se cuenta con una institución policiva que contribuye en la conservación de los bosques, ya se ha permitido los tipos silvopastoreo (cercas vivas) como sistema de reforestación. La industria petrolera de su producción aporta el 1 por 100 para procesos de conservación de aguas y reforestación en donde se incluye las cercas vivas

2. Los sistemas de producción que más predominan en Colombia son del pequeño productor, que abarca un minimo porcentaje del area explotada en sector agropecuarioI, el mediano productor y gran productor es el que tienen mayor cobertura

Los sistemas de producción de carne son manejados de dos formas, con grandes extenciones con baja y mediana tecnologia y los de mediana extención con mediana y alta tecnologia y el pequeño productor que recibe apoyo de las instituciones que contribuyen con el sector agropecuario
Los productores son los principales actores, apoyados por Corpoica y ministerio de agricultura, a nivel regional las secretarias de agricultura juegan un gran papel en el desarrollo del sector agropecuario.

3. Las metas del gobierno es duplicar la población bovina, para lo cual con apoyo de instituciones como Corpoica, viene trabajando en la reducción los días improductivos del sistema bovino con el minimo impacto al medio ambiente. Existen algun tipo de insentivos para cultivos como caucho, palmaienen. En la ganaderia existen creditos blandos que tienen apoyo del gobierno y exoneran porcentaje del credito
un saludo

José Guillermo Velásquez

Contribution 13, from Alan Franzluebbers at USDA-ARS, Georgia, USA

-----Original Message-----
From: Alan Franzluebbers [mailto:alanfranz@gmail.com]
Sent: Mon 3/1/2010 3:20 AM
To: Crop-Livestock
Subject: Week 4 - Contribution from Alan Franzluebbers at USDA-ARS, Georgia, USA

Dear Colleagues,

Some responses regarding the questions for Week 4 –
1. Research needed for integrated crop-livestock systems (ICLS) with special emphasis on:
a. On-the-ground implementation and who might play a role.
Successful identification of the key limiting elements of systems within the region must first be identified. The research hypotheses should then center on how best to optimize crop-livestock balance to meet the opportunities offered within a particular landscape setting. An ideal research focus would characterize the production potentials of multiple facets of a system approach and determine the suite of environmental benefits that might be obtained, as well as identify the turning points where systems might fail and contribute to environmental degradation if not functioning properly.
Economic outcomes must be a key element of the research. Partners in the research would include plant, animal, soil, water, and air scientists working collectively with economists, social scientists, and policy makers to continuously modify systems to eventually obtain a robust set of efficient practices that can be selected for a particular region. Research should be ideally shared among regions to characterize ecosystem services provided by ICLS in different regions so that robust recommendations can be made across regions, as well as identify unique niche opportunities.
b. Human and social dimensions and who might play a role. This dimension should focus on how to promote adoption of truly sustainable ICLS.
How can positive change be incentivized? There is a need to define the goals of farmers and how these goals might be promoted within government support policies.
c. Enhancing market chains or incentives to production and who might play a role.
Developing economical access to inputs and creating viable market outlets are needed. Should markets drive the type of production system employed or should a sustainable production system influence how markets develop as a response? Can farmer activities to achieve sustainability override market prices, and if not, then how can policy instruments be used to support economic, environmental, and social sustainability?

2. What evidence is lacking to frame policy interventions for advancement of ICLS? Clearly defining the ecological, economic, and social outcomes of ICLS, as well as its limitations in achieving broad sustainability goals, could significantly influence policy makers' abilities to understand the value of ICLS – thereby giving them better informed background to promote improved policies for adoption of ICLS on a wider scale.
3. How can research community overcome constraints of carrying out interdisciplinary, multi-institutional and multi-stakeholder efforts? How can donors help? There are no easy solutions, but sometimes well-established researchers without regard to potentially political repercussions simply have to "just do it", because it's the right thing to do. Getting the right team for full cooperation under stressful conditions will not be easy. Securing funding for such broad goals is a challenge. There are some limitations in the university and federal research structure that stifle freedom to pursue such broad social agendas – one change needed is the reward structure for research productivity. We need to pursue such robust research agendas not just by spinning our wheels, but to make progress in getting meaningful results.

With best regards for a successful workshop and robust outcome from the meeting in Sete Lagoas BRAZIL in March!

Alan Franzluebbers
USDA-ARS, Georgia, USA.

Contribution 14, from Lindsay Coulthard at the Manitoba Zero Tillage Research Association, Brandon, Canada

-----Original Message-----
From: mztra [mailto:mztra@mts.net]
Sent: Tue 2/03/2010 3:35 AM
To: Crop-Livestock-L@mailserv.fao.org
Subject: Week 4 - Contribution from Lindsay Coulthard at the Manitoba Zero Tillage Research Association, Brandon, Canada

Hello All,

After having read several of the other submissions there seems to be one thing that stands out. The government policies and programs, primarily in the developed nations have ushered us into systems in agriculture which involve specialized cropping and livestock systems and high levels of commercial input. I was reluctant to forward my comments for the fourth week because I felt that I had put too much emphasis on the problems caused by poorly planned support programs in Canada. However after having read the other submissions I am more convinced that there are serious problems in agricultural policy which are a detriment to sustainable agriculture. My comments on the questions in week four suggest that the research emphasis needs to be toward providing evidence to governments worldwide that sustainable agriculture will only be reached when the farm support programs that are in place in the developed countries are radically changed.
- If you could secure funding to carry out research on the gaps associated with integrated crop-livestock systems - from your perspective and context - what would you identify as the most critically needed research associated with:
a) On the ground implementation of integrated crop livestock systems? With which actors might you partner to carry this out?
The most critically needed research to fill gaps in the crop livestock systems in Western Canada would be an economic assessment demonstrating the benefits to farmers over the long term. These benefits can be demonstrated and accepted by farmers but until the policy makers can be shown that the practice is one step towards sustainability we will continue to see

policy that encourages farmers to accept the status quo and not innovate. Good long term verified economic results are needed to present to policy makers to have them make this change in policy.
b) The human and social dimensions of these systems? With which actors might you partner to carry this out?
In western Canada we have seen a migration of small to medium size farmers moving out of farming. A crop-livestock system which can lower cost of production for both the livestock production and crop production is a practical and sustainable alternative for small and medium sized farms in western Canada. Again we need to have data to prove to policy makers that the current system of support programs need to be changed to encourage farmers to use the crop livestock integration practices that will lead them to sustainability.
c) Enhancing market chains or incentives to production? With which actors might you partner to carry this out?
Market chain development to be successful will be a grassroots movement. We will need to support the innovators in our agricultural industry who are willing to look outside the box for solutions to our marketing needs. In order to see a non factory approach to our markets where the large meat packers demand that the livestock that comes to the factory door is from the cookie cutter so that the packers can maximize their profits researchers will have to support with the innovators to find and fill a niche in the markets.
Research will also have to provide support with data on the sustainability of the ICL systems to policy makers.
- What are the gaps in evidence required to frame a policy intervention or to influence policies or institutional elements that can advance integrated crop-livestock systems.
Governments in the developed countries will need significant proof showing the costs to the farming systems that have come as a result of the support programs they have put in place. The programs have guided farmers into specialized systems which rely almost completely on commercial inputs. We need both economic and soil science related data to prove that an ICLS is a sustainable system.
- How might the research community respond to the structural constraints of carrying out interdisciplinary, multi-institutional and multi-stakeholder efforts? What can donors do to assist in ensuring robust research efforts?
- Please share any other thoughts on this topic or previous topics that will advance our discussions and thinking.

Lindsay Coulthard
Farm and Extension Manager,
Manitoba Zero Tillage Research Association Brandon Office: 204-729-8838 Farm Office: 204-725-3939
Cellular: 204-825-7878
email: mztra@mts.net <mailto:mztra@mts.net>

Contribution 15, from Bruno Gerard, SLP-ILRI, Addis Ababa, Ethiopia

-----Original Message-----
From: Gerard, Bruno (ILRI) [mailto:B.Gerard@CGIAR.ORG]
Sent: Tue 2/03/2010 8:20 AM
To: Crop-Livestock
Subject: Week 4 - Contribution from Bruno Gerard, SLP-ILRI, Addis Ababa, Ethiopia

Dear Colleagues,

Some elements of response to week 4.

Research should help better targeting and setting priorities
Which systems do we want to support in priority and which priority criteria do we use (and how do we rank and combine criteria to look at potential technical, institutional and policy 'solutions' and the sequence in which these have to be addressed?

- Focus on small scale crop-livestock enterprises (seems we have a good agreement on that)
- Addressing food security and poverty alleviation
- Is integration between crop-livestock at the farm scale always the 'best' solution?
- Sustainability (or non-sustainability) and what does that mean and how we envisage possible positive changes through action,
- Faster changing systems requiring technical/institutional/policy support and innovative approaches?
- Systems with potential for quick and large returns (markets,…)? (High potential systems might not be the ones with the most acute poverty problems)
- Chance of success and how do we measure success (livelihood, macro-economic indicators, environmental impact)

Research should have a longer term vision of the possible futures of small scale crop-livestock enterprises and their evolving opportunities and constraints in response to a series of drivers

Most recent forward looking publications have a 2030-2050 horizons. What is our vision of the future of small-scale farms by then? What are the possible pathways out of poverty for small scale farmers and their families? By 2050, I imagine that many farming systems will have drastically changed and we must hope that the next generations will have more livelihood options and off-farm opportunities. Helping the transition, contributing to identify solutions that will permit rural communities to leverage additional income and becoming less vulnerable (better health through better nutrition and better farm income, access to education,…) in order to give the chance for the next generations to access something else. For most systems we are probably looking, in the long run, at less numerous but larger and more productive farms with less people directly living from agriculture, and in some systems a rapid shift to large industrial enterprises (i.e. land deals). This is going to differ across systems – in the trajectory of transition and the end point – some end points will be industrial and some a combination of smallholders…. driven by policies and the huge increase in demand for livestock products

Research should provide the methods, approaches, and tools to put into better use past research findings and existing knowledge

Referring to Mark Powell's contribution in week 2 (and looking at the existing knowledge imbedded in most contributions to this consultation), there are large potential benefits to make better use of and integrate what is known:

- Contextualize scientific knowledge and understand reasons for successes and failures of past initiatives
- A better understanding of resource allocation and decision making processes/rationale/trade-offs by small-scale crop-livestock farmers in response to a range of drivers and constraints and its impact on livelihood and system sustainability, requesting to integrate bio-physical and socio-economic approaches at field, farm and landscape scales. Some examples of recent integrative research can be found in a recent special issue of the European Journal of Agronomy http://www.sciencedirect.com/science?_ob=PublicationURL&_tockey=%23TOC%235023%232010%23999679998%231571291%23FLA%23&_cdi=5023&_pubType=J&_auth=y&_acct=C000001618&_version=1&_urlVersion=0&_userid=995675&md5=a5fe1fbc9e12b03c4fb52956f650a518 , especially the paper by Tittonell et al.
- Develop ex-ante tools to look at possible solutions
- Adaptive research is needed. No point to force-feed 'silver bullet' solutions to development practitioners, farmer communities and other stakeholders through projects. Building capacity of stakeholders for adaptive management should lead to better positive impact than 'blueprint' solutions.

Realistic and workable assumptions for scaling-out need to be developed
- Develop a dialogue and convey clearer messages to policy makers, foster institutional changes and integration of 'crop' and livestock related policies at local, national, regional and global levels (contributions so far on fragmentation of actors was striking)
- Explore the potential of reliable rural banking facilities (credits and savings) to intensify systems: giving the opportunity to farmers to access other forms of savings (in replacement of livestock) could lead, in many systems, to a smaller number of more productive animals (increase income, lower environmental impact, reduced vulnerability). This should be coupled with better market access.
- The need to be realistic and take into account socio-economic

local environments. In that respect, it would be useful to get clarifications on some potential technologies/packages such as CA. If I understood well John Landers' last week contribution in response to Steve Twomlow, no point of zero-tillage if you don't maintain near 100% residues in the field. This most probably implies a near zero chance of adoption in many mixed systems where crop residues significantly contribute to livestock diet: farmer will never give up significant short term benefits given by livestock for a 'difficult to grab' long term productivity increase unless there are other incentives created … In the Indo-Gangetic plains, CIMMYT lead studies (Erenstein, FCR, 2009) showed disaggregation of CA packages by farmers, zero-tillage being adopted but almost no-legume rotation practiced and usually a significant amount of crop residues exported from the field. What does that mean in term of sustainability? Similar disaggregation was observed in Mexico (Erenstein PhD thesis, 1999). Other example, in Niger millet based system, weeding is mostly manual (hand hoe…), requiring 10 men day per ha twice during the rainy season, so leaving more residues on the field would increase labor requirements per unit area (and decrease grain yield as already not enough labor is available to timely weed all the field that were sown), so weeding technologies (mechanical or chemical) is a prerequisite to leaving more CR in the field (see also Giller et al., 2009 in FCR).

Contribution 16, from José R. Campero - ABDES, La Paz, Bolivia

-----Original Message-----
From: José Campero Marañon [mailto:jrcampero@hotmail.com]
Sent: Wed 3/3/2010 9:57 PM
To: Crop-Livestock
Subject: Week 4 - Contribution from José R. Campero - ABDES, La Paz, Bolivia

Dear All:

Some brief thoughts about crop-livestock systems in the Andean Region of Bolivia.

Best regards,
José R. Campero
DIRECTOR NACIONAL DE LA ALIANZA BOLIVIANA DE LA SOCIEDAD CIVIL La Paz, Bolivia
---

§ There are integrated crop-livestock systems across a range of types (on-farm or area-wide) and scales in different agroecologies. Are there system-dependent input supply chain constraints (e.g. seeds of certain legumes, equipment and machinery for minimum soil disturbance and direct seeding, herbicides, livestock feed for specialized systems, etc.) that need to be addressed? Which are these and how have they been or might they be overcome?
In Bolivia, the integrated crop-livestock systems have low efficiency; and, the following factors can be a part of its explanation:
a) The crop-livestock systems are develop in conditions of smallholdings and in the majority of the situations they develop in conditions of high climatic risk (frosts, hailstones or droughts).
b) The external inputs have high costs and in view of the climatic risk, its application in the production process not always results in an increase of the volume of the production.
c) The farmers have only few economic resources. And, the option to use these economic resources in external inputs to improve the productivity of their systems is a crucial decision. The most frequent decision is the increase of the ruminants flock by buy of new units. The increasing of familiar flock constituted in a source of saving and social prestige. Additional, the major quantity of animals allows the farmer to have major quantity of manure, key in the definition of the surface to sowing in the next year. For the rural Andean people, a numerous flock is very important in cases of natural disasters with losses of the part of the flock. Because, always will be a sufficient number of ruminants for the recovery of the size of the flock in a certain period of time.
Therefore, the best options to improve the production of actual crop-livestock systems will be tied to development to the following technologies:
a) To utilization of low external inputs;
b) To improve the actual levels of reproduction and the reduction of the mortality;
c) Nutritional Suplementación with character strategic and directed animals with high nutritional demands;
d) To generate value added to the primary productions; and,
e) To promote the access to the market under communal modalities (way to increase the volume to commercializing), and the participation in markets that pay just prices. That mean, prices of sale that cover the costs of production and its organic quality.

§ Do integrated crop-livestock systems offer an advantage when it comes to incentives/rewards for good practice such as payment for environmental services or access to special markets? If so, what is your experience with these?
The crop-livestock systems can give a positive response to the application of technology. The principal condition for that one is that this one will be compatible with the needs of the whole system of production. This means, that the technologies to apply must consider the system of production to be an alone set. For example, if the technology to recommending is related to the increase of the rates of reproduction and reduction of the mortality; this technology must be associated to:
a) Production of additional forages,
b) Suplementación of mineral, energy and protein with strategic character.
c) Supply of the inputs with opportunity (vaccines, veterinary services, systems of communal marketing); and,
d) The techno package will be including improving the agricultural productions, because this component is very important in order to supply of products or by-products for the animal nutrition.

In the last years, with resources of the IFAD the government of Bolivia implemented the Project UNEPCA of support to the breeders of South Americans Camelids. The Project has to focus on the generation of added value and marketing product with added value. Though, the Project did not consider the improvement of the primary production, the results were satisfactory in terms of reduction of the poverty. Nevertheless, I must admit that in Bolivia, a project of support to integrated crop-livestock systems never was executed.

§ Are there market (local, national, international) dependent value chain constraints (e.g. lack of local processing facilities, food quality/safety regulations, market access, etc.) that need to be addressed? Which are these and how have they been or might they be overcome?

In Bolivia, there is important the standardization of the quality of crop and livestock products, and the research and opening to special niches of market for exotic products as meat or fiber of South Americans Camelids; on the other hand, also there is absent processes of marketing (national and international level) and the sale of agricultural or livestock products with regional etiquette. For example, meat of South American Camelids produced by indigenous Aymaras to 4,500 meters on the level of the sea. Certainly, also it is necessary to develop processes of trazability to the productions of meat and fiber and develop infrastructure as slaughter houses and annexes.

The participation of the departmental and national governments will be crucial in the system implementation of integrated crop-livestock sustainable systems, some general ideas are:

a) To establish a national system of investigation of participative character, that focuses, after checking the scientific and traditional knowledge documented in the past, to giving technical solution to the problems derived from the system application of crop-livestock from the perspective of the producers, considering his economic, social and cultural possibilities to implement the identify solutions to the problem.

b) To establish a national system of transfer of technology

c) To regulate the participation of the departmental, municipal governments and of the producers' organizations in the sustainability of the systems of investigation and technology transfer.

d) To develop an efficient campaign of promotion of products derivate of crop-livestock systems in both: on the domestic and international markets.

This one must be one of the responsibilities of the commercial attachés of the Embassies of Bolivia in the Exterior and it should possess the international organizations' support as the FAO or IFAD.

§ Who are the input supply chain and output value chain actors and how do they inter-relate? Who drives the chains (farmers, input providers, markets, government, etc)? How equitable are the benefits to different actors along the input supply chain and output value chain? Are there examples of input chain and output value chain actors working together to gain more competitiveness and sustainability or stability?

In absence of a governmental system, the supply of inputs is a personal responsibility of every producer, and the costs of the inputs turn out to be very high under this modality. A solution considered in the past, was the participation of the producers' organizations for the purchase of inputs and them sale to the associate producers.

§ Might we see a shift toward greater local/national sustainable markets in light of decreasing availability and increasing costs of transport fuel, climate change, food insecurity, etc.?

Certainly, opposite to the problems of food insecurity that tend to be major in the measure that the negative effects of the climatic change are major; the modernization of the current crop-livestock's systems is, between others, a solution to reduce the poverty.

Contribution 17, from Andrew MacMillan, ex-FAO, Italy

-----Original Message-----
From: Andrew MacMillan [mailto:andrew.macmillan@alice.it]
Sent: 04 March 2010 17:53

To: Kassam, Amir (AGPM)
Subject: Week 4 -Contribution from Andrew MacMillan, ex-FAO, Italy

Dear Amir,

Crop-Livestock Integration: Further Reflections

After reading the material which has been submitted over the past 4 weeks, I am left with the uncomfortable feeling, not for the first time, that the various parties that shape the directions of agricultural development have succeeded in driving it down the wrong roads – and that in this case it has gone so far in the wrong direction that it won't be easy to get it back on track.

Many contributors have extolled the virtues of integrating crop and livestock production in lots of different ways. They have pointed to the inherent efficiencies of these systems, especially in relation to nutrient recycling; the advantages of their diversity in terms of risk reduction, income stability and nutrition; and especially their sustainability. They have also noted the importance to small-scale farmers of their relatively low dependence on purchased inputs. Surprisingly, however, few contributors have highlighted the extremely important role of animal traction in enabling small-scale farmers to keep a much larger area under cultivation than is possible when they are dependent solely on manual tools (an advantage that may diminish as inversion tillage is progressively replaced by "conservation agriculture").

But what has also emerged very clearly that, in spite of their virtues, these systems are disappearing very rapidly in developed countries and beginning to follow the same route in developing countries. This seems to be because market forces (relating to both inputs and products) and the policies and services put in place by governments are all pushing towards greater scale and specialization in farming. The first move in specialization seems to be towards either crops or livestock, which immediately leads to a loss in the benefits that arise from the complementarities that are a feature of integrated systems. So we now see, for instance, massive livestock operations faced with manure disposal problems, while large-scale arable farmers, spurred by subsidies, lament the rising costs of fertilizers and the progressive decline in the organic matter content of their soils.

One of the reasons for things moving in these directions is that no one - other than future generations - has to pay for the negative externalities associated with much of the technology on which this "modernization" has been based. These include the "costs" of cleaning up ground-water resources polluted by pesticides and nitrates; of reversing progressive losses of soil organic matter, leading to fertility decline; of combating massive outbreaks of diseases and pests of both farm animals and crops; or of compensating through social security programmes for the low wages for which farm workers are expected to work, that fail to meet their most basic needs, even for food; and so on. While there have been many references to the potential carbon sequestration benefits of certain farming systems, surprisingly little has been said about the idea that food pricing policies should ensure that farmers and ultimately consumers pay "in real time" for the negative externalities associated with specific production systems, rather than focus on the over-riding aim of keeping food prices low for consumers, regardless of the damaging environmental and social side effects. This would probably shift the balance back in favour of integrated systems that are regarded as relatively sustainable and offer better prospects for small-scale farmers to stay in business by improving their competitiveness vis-à-vis larger specialized producers.

But a second reason for what, on the face of it, would seem to be an undesirable development trajectory, is the now almost universal separation of "livestock" from "agronomy" in training, research and extension. I recall a time in the early 1980s when the Director General of ILCA was censored by members of his board for increasing the Centre's work on crop rotations and

improved animal traction systems - on the grounds that this was straying too far into the crops arena for a livestock research institution!. And many contributors have made references to similar situations. FAO itself has had the greatest difficulty in bridging the livestock-crops divide internally, even though the two relevant divisions fall within the same department.

So we are now left with a situation in which the principal guardians of the kinds of integrated crop-livestock systems that we would like to see expanded are farmers who, for one reason or another, have resisted the pressures to abandon them, and who have taken it upon themselves to experiment, innovate and, in some countries, become successful promoters of improved systems.. If there is a consensus that this is the case, perhaps one of the best things that FAO can now do is to support the emergence of strong associations of crop-livestock farmers around the world, helping them to make the case, nationally and globally, for policies and programmes that favour the expansion of integrated systems and encourage the sharing of experiences and innovations. As was the case in the follow-up to last year's workshop on Conservation Agriculture – in which most of the innovations have also come from farmers - a first step in this direction could be the incubation of a Community of Practice that would ultimately emerge as a self-sustaining institution run by its members.

Many thanks for the opportunity to participate in this exchange.

Andrew

Contribution 18, from Luiz Balbino, Paulo Galerani, and Pedro Machado, Embrapa, Brazil

-----Original Message-----
From: Pedro Machado [mailto:pmachado@cnpaf.embrapa.br]
Sent: Thu 3/4/2010 8:54 PM
To: Crop-Livestock
Cc: Luiz Carlos Balbino; galerani@sede.embrapa.br
Subject: Week 4 - Contribution from Luiz Balbino, Paulo Galerani, and Pedro Machado, Embrapa, Brazil

Dear Sir or Madam

Please find below our comments on the three topics listed in Week 3:
a.. From your perspective and in the context in which you are working, what are the top one-two (1-2) institutional and/or political constraints that undermine the uptake, implementation or spread of integrated crop-livestock systems?
In Brazil, the top institutional constraint is the fragile extension service, both governmental and private lacking on skillful technicians. The top political constraint is the lack of support to the official extension system as well as adequate political will to provide credit availability for long term (4-5 years at least) planning. Financing should be available at a specific time when crop or livestock demands. There is, also, need for a flexible insurance system in order to encourage adoption of the Integration Crop-Livestock-Forest (ICLS+Forest) system. For example, currently there is no difference of insurance costs for farms implementing conservation agriculture including best management practices and farms with any conservation agriculture.
- What can/might be done to address these constraints and who (or who together) can make that happen?
There is need to improve the extension service system in both government and private organizations such as the extension system linked to the farmer´s cooperatives.
- If you had 5 minutes with a/your Minister of Agriculture (or Livestock, Finance, etc), what message would you want to deliver? What about 5 minutes with the head of national or

international farmers' organizations? Any thoughts to share with a relevant private sector representative (inputs, processors, buyers, etc.)?
Dear Minister of Agriculture and Minister of Finance of Brazil, the time now is to increase food supply with simultaneous conservation of environmental services such as climate change mitigation, efficient water use, and preservation of biodiversity. Considering that, in Brazil, there are 180 million ha under low productive degraded pasture system, in which 50 million ha can be converted into high yield efficient agriculture, (we would appreciate if enough) there is increasing demand for credit (is offered) with incentives to promote those products originated from crop-livestock and forestry systems under zero tillage. Payments for environmental services should be implemented as ICLS systems enable aquifer recharge, less soil water erosion leading to a low carbon technology. The forest component in ICLS+Forest may compensate greenhouse gas emissions by ruminants for ICLS+both meat and dairy production.
- What policy or institutional support or changes have you witnessed or read about that led to demonstrated success in the uptake, implementation or spread of integrated crop-livestock systems? Are there successes in other fields that might be applied in this situation?
In Minas Gerais State, the local government is presently promoting the conversion of small degraded agricultural areas into ICLS+Forest exploration organized by the State Agricultural Secretary including Emater MG (the state extension system), EPAMIG (the state agricultural research corporation) , local universities, and EMBRAPA . This is the consequence of tremendous efforts on continuous training and capacity building of the extension service staff.

Kind regards,

Luiz Carlos BALBINO, Paulo GALERANI, and Pedro Luiz Oliveira Almeida MACHADO
Pedro Luiz Oliveira de Almeida Machado
Director General
Embrapa Rice and Beans
Fone: 62 3533-2210
Cel.: 62 9679 0005

Contribution 19, from Jamir Luís Silva da Silva and Jaime Airton Wunsch, Embrapa, Brazil

-----Original Message-----
From: Jamir [mailto:jamir@cpact.embrapa.br]
Sent: Fri 3/5/2010 11:11 PM
To: Crop-Livestock
Subject: Weeke 4 - Contribution from Jamir Luís Silva da Silva and Jaime Airton Wunsch, Embrapa, Brazil

Dear moderator

We are sending some comments on proposed topics. Please consider this contribution from myself and from Dr. Jaime Airton Wunsch.

Our contribution is on the integrated crop-livestock systems (ICLS) in the area of low lands of Brazilian Pampa, which possesses one of the integration systems older of the south of Brazil that is it of the integration of rice irrigated with the beef cattle. This ecosystem occupies an area of 178.243 km2, equivalent to 63% of the state of Rio Grande do Sul, which presents great diversity of species of grassy (450), legumes (150), birds (385) and mammals (90). The territorial extension extends to Argentina and Uruguay. In this Bioma it is located great part of the watery Guarani, larger spring of fresh water of the world.

Around 60.000 km2 this ecosystem it is occupied by the low lands, in which 10.000 km2 are cultivated with rice irrigated annually. The current situation of the ICLS is still quite precarious, presenting low productivity and profitability.

In the current condition, the rice is the component of the system prioritized by the farmer by use the technologies more advanced (new cultivate, systemization of the soil, establishment with direct planting, irrigation, more effective control of the harmful plants, among others), which provided increase of productivity with values of 10.000 t.ha-1. However these techniques almost always implicate in the increase of the production costs and they reduce the profitability.

On the other hand, the livestock has been relegated to a secondary plan with the absence of investments in management of soils, little technical training, the lack of adjustment of the forage offer in the pastures and little use of administration techniques and planning of the property. These aspects have been leading to low productivity (50-90 kg.ha-1 of earnings of a live weight).

To use the ICLS on these soils of low lands is indispensable, for good establishment of the species winter forages and return of the native species, that happens good drainage of the soils, correction of the acidity and recovery of the natural fertility. Another important aspect is the leveling of the land, seeking auxiliary in the drainage and to facilitate the traffic of machines and equipments.

One of the great problems in the use of those areas is that more than 60% of the areas of irrigated rice are cultivated by tenants that don't worry about the maintainable handling of the soil and of the native vegetation that will return. Besides cultivating many years in the same area, when that is producing little these farmers occupy other areas.
Some producers that use ILPF in these low lands have been reaching levels of animal productivity around 600 to 1000 kg.ha-1 of alive weight and of rice above 8.000 kg.ha-1.

To conclude we would like to mention that the integration rice and pasture is indispensable for reduction of costs of the farming and better efficiency in the use of the soil with the direct planting of both components, culture and pastures.
Kind regards,

Jamir Luís Silva da Silva and Jaime Airton Wunsch
Embrapa Clima Temperado
Pelotas, RS, Brazil
Fone: 53 32758488
Cel.: 53 99777668

Contribution 20, from John Landers in Brazil

-----Original Message-----
From: John Landers [mailto:john.landers@uol.com.br]
Sent: Sat 3/6/2010 10:29 AM
To: Crop-Livestock
Subject: Week 4 contribution from John Landers in Brazil
Gentlemen,

I apologize for this late submission, I have been embroiled in selling my property here in Brasilia to augment my one minimum salary pension and have been overworked. I beg that it may be included.

I appreciated very much Andrew MacMillan´s wise observations and would like to expound a bit on policy questions on which I seem to be having insufficient success in changing paradigms.

For some years now I have been focusing on Land Use Intensification as a key issue and the policy options for supporting this, as a means to mitigate de-forestation via incentives to LUI, especially with integrated crop-livestock systems with Zero Tillage (ICLZT). I firmly believe that these will not be sustainable in the long run of an intensive agriculture without Zero Tillage.
The problem with politics is that something takes centre stage and everyone is riveted by that option. In this case it is REDD, which is quite a useful tool if it can be afforded on the scale necessary to make a significant impact . However, it is severely limited in controlling leakage because it does not attack the three main drivers of de-forestation (in Brazil, probably most everywhere else too). These are:
1. expansion of the demand for cattle products;
2. expansion of the cattle herd and concomitant pasture degradadtion;
3. Land grabbers taking possession of public lands for speculative profits.

The farm lobby and agricultural economists need to focus on quantified studies to show the benefits which accrue to ICLZT, including erosion control, whose off farm benefits are huge, biodiversity preservation and carbon sequestration and these benefits need to be used politically to justify incorporating levies on agricultural production which are transferred from consumers to the farmers for their environmental services.

In Brazil, land use intensification and Zero Tillage adoption need to be mandatory and should be a qualifying condition for receiving the environmenatal services payments. The fact that land use intensification has only an indirect impact on de-forestation is society´s problem, government needs to enforce controls on land clearing in order to potentialize LUI. The fact that an alternative is being offered to slash-and-burn would facilitate general acceptance of strict controls on, or, zero de-forestation. However, a huge extension, credit and marketing effort is needed here to ensure that the small actors don´t suffer unemployment and starvation. An important part of this would be a tropical timbers futures market to convert slash-and-burn farmers to profitable timber plantation on wide spacings with pasture in between and annual crops in the first years. This could harvest corporate finance on the scale necessary to solve the problem of re-training these small farmers and the risks should be born by government, in their own interests, with carbon credits as guarantee. One parting shot, small farms are extremely complicated systems and they need THE BEST EXTENSIONS, not the dross. Intensive training of extensionists, with top salaries, and a marketing effort to give them society´s recognition, pride and self-respect for the huge social contribution they are making.

JNL

John N. Landers
Private Consultant in Tropical Agriculture
Fone: 55 (61) 3366-5307 / 3366-1984
Fax: 55 (61) 3366-5307
E-mail: john.landers@uol.com.br
End: SMDB - Conjunto 9 - Lote 5
Lago Sul - CEP: 71680-090
Brasília – DF

Contribution 21, from Giovana Maciel, Hoston e Marcos, Embrapa, Brazil

-----Original Message-----

From: Giovana Maciel [mailto:giovana@cpamn.embrapa.br]
Sent: Sun 3/7/2010 5:52 PM
To: Crop-Livestock
Subject: Week 4 contribuition from Giovana Maciel, Hoston e Marcos, Embrapa, Brazil

Colleagues,

In Brazil's Mid-North, a region of bioclimatic transition between caatinga, savanna, and the pre-amazonia, ICLS has been gaining pace in the Savannas of Piauí and Maranhão, where large farmers predominate. However, ICLS have also been empirically adopted by family farmers in the region.

Problems associated with the existing harsh climatic conditions, such as the short rainy season, have often been faced by these farmers. Moreover, the soil of the region also deserves a special attention since, for the most part, little resilience is observed.

Equally important is the lack of well-qualified workforce. Funds and research efforts should be focused to studies of drought-tolerance mechanisms in plants of short-cycle (early), and soil quality improvement, as well as aspects related to the emission of greenhouse gases.

Using technologies to promote a sustainable production of food, particularly in the Mid-North, is essential to maintain the people from the region in their own rural communities with good life quality. Increasing food production through ICLS to meet current and future demands will guarantee both food security and a direct/indirect source of employment in rural and urban areas.

PS. some abstracts attached confirm the potential of the Mid-North region.

Kind regards,

Giovana A. Maciel, Hoston Nascimento and Marcos Teixeira

Embrapa Meio-Norte
Teresina, PI, Brazil
Fone: 86 3089-9218
