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THE BANGLADESH MODEL AND OTHER EXPERIENCES IN FAMILY POULTRY DEVELOPMENT

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Introductory Papers

A conceptual framework for using poultry as a tool in poverty alleviation

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ABSTRACT

Stimulated by work pioneered in Bangladesh, the paper outlines a conceptual framework for using poultry as a tool in poverty alleviation. There is now evidence from several countries that small poultry enterprises with adequate institutional support targeting the poorest rural women and their families can help them take the first step out of poverty. However, for the concept to work as a poverty breaking tool (i) the beneficiaries must come from the poorest segments of the village, (ii) the cost of producing an egg must be lower than in the commercial sector, (iii) an enabling environment must be established to keep a small flock of hens, inter alia, access in the village to feed, vaccine, vaccinations services, micro-finance, marketing and other inputs and services, and (iv) the enabling environment must contain institutional and political space to provide the people involved the possibilities and opportunities to take the next step out of poverty.

In conclusion it is noted that for this concept to remain an important tool in the fight against poverty, it is necessary to have a reliable tool to document the achieved results and have an institutional and political environment in which sharing of information is encouraged. One of the next steps in replication of the concept will be to institutionalise a paradigm, which encourages processes in which experiences are accumulated and disseminated. The involved staff must learn from mistakes and successes and build up a framework that facilitates training, education, and research.

Key words: poultry, poverty, framework, tool, paradigm.

INTRODUCTION

The title of this paper refers to a smallholder poultry development concept that implies small poultry enterprises targeting the rural poorest, who can take the first step out of poverty by using the concept. The concept is based on well-defined principles that can be used to develop a specific model within a particular area and these principles constitute the framework of the concept.

The smallholder poultry development concept has been developed in a unique learning process in Bangladesh over a period of more than two decades. It is seldom that a development concept, in its basics, is maintained over such a long period and that lessons learned in one project are incorporated in the succeeding project, especially when different donors

are involved. It is also unique that the same stakeholders, and to a great extent the same persons, have been involved from the very formation of the concept till its present stages.

The Bangladesh smallholder poultry model has been analysed and described in several publications (Jensen, 1996 and 2000; Saleque and Mustafa, 1997; Saleque, 2000; Fattah, 2000; Ahmed, 2000; Dolberg, 2001). Furthermore, impact surveys have been conducted (Alam 1997 and Nielsen 2000) and a number of subject specific research papers have been produced such as on breeding (Amber (personal communication) and Rahman *et al.*, 1997) and socio-economic aspects (Nielsen, 1997 and Nielsen, 2001).

The smallholder poultry concept is in a process of being institutionalised through networks. The first network that was created was the International Network for Family Poultry Development supported by FAO (Sonaiya, 2000). With a limited budget, this network has contributed to information exchange with a focus mainly on African conditions. Later, the Network for Smallholder Poultry Development (www.poultry.kvl.dk) was established in Denmark. With financial support from Danida, this networks has been able to address a number of issues related to project implementation support, education and institution building, and coordination of research.

The network is committed to, among other things, support promotion and development of poultry projects in relation to Danida agricultural sector programmes. It may also be mentioned that the idea of setting up a regional training centre in Bangladesh has been launched and that an increasing number of research institutes take up an interest in smallholder rural poultry keeping. One example is the Sokoine University of Agriculture in Tanzania, which over the years has developed considerable capacity on smallholder poultry research.

The smallholder poultry development concept is in the process of being adapted in a number of countries such as Burkina Faso, Benin, Ghana, Eritrea, Malawi, Tanzania, Zimbabwe, Vietnam, Cambodia, Indonesia, and Nicaragua with donor support from Danida, EU, AsDB, IFAD, and the World Bank. In Malawi the adjustment has been through a successful pilot phase and is now in a stage of wider dissemination.

ESSENTIALS

The smallholder poultry concept is currently being tailored to prevailing conditions in other countries than Bangladesh. In this process, it is important to have a clear understanding of the basic elements of the concept or the essentials, which are prerequisites for a successful adaptation. The five most important essentials are:

1. The beneficiaries, the target group, must be the poorest segment of the village population and in particular women;
2. The comparative advantages of village poultry keeping must be sufficient to reduce the cost per egg produced to be less than that in commercial egg production;
3. The concept must comprise an enabling environment, i.e. all input supplies including micro-credit and services shall be timely available in the village;
4. The concept encompasses only the poultry component as the first step out of poverty, but the possibilities and the opportunities for the beneficiaries to take the next step must be built into the enabling environment;

5. Quickest possible attainment of institutional self-sufficiency that is consistent with the overriding goal of poverty alleviation.

The rationales behind these essentials are:

Targeting poor women. A daily income of the value of one egg can have a substantial influence on a very poor familys livelihood while the impact on a better off family will be minimal. Furthermore, experience shows that the entire family benefits more from an income belonging to a woman than an income belonging to a man (Sen, 1999).

Competition with the commercial sector. The smallholders cannot compete with the commercial sector on productivity, i.e. egg yield per hen, because the same management skills and the same production facilities are not available in the village. They can only compete on the input costs by taking advantage of the feed available free of cost in the surroundings; the scavenging feed resource base and other comparative advantages.

Enabling environment. The smallholders are shifting from a no input/low output system to a small input/higher output system. The latter implies a risk both on input cost and on investment. In order to minimise these risks it is important that inputs such as feed, improved quality of chickens, vaccine, medicine and services such as veterinary services, extension services and access to micro-credit are available within the village, when required.

Movement out of poverty. The poultry activity is to be considered as a learning process for the beneficiaries, but it has to be realised that one activity alone is not sufficient to lift a family out of poverty (Todd, 1999 and Dolberg, 2001). The opportunities (the enabling environment) must be available and make it possible for the beneficiaries to establish a small poultry enterprise, to minimise the risks and to take the next step out of poverty by taking a new loan to another income generating activity.

Sustainability - no subsidy at beneficiary level. The poorest women and their families in the villages with financial services and support to establish and maintain small income generating activities require a large amount of funds. The only realistic sources are donor funds, but these will only be available for a limited period to a specific project. Consequently, the concept must be based on donor support to establish the institutional capacity in a specific area to reach sufficient numbers of beneficiaries, and after that the beneficiaries contribution shall be sufficient to cover the institutional operation cost. In this respect it is important that from the very beginning no subsidies are involved at beneficiary level.

VISIONS AND OPPORTUNITIES

More than a billion people live in extreme poverty (on less than US$ 1 a day) and the pressing question is how can development assistance be used most effective to reduce global poverty?

The Development Assistance Committee (DAC) of OECD is the principle strategy setting institution of the major bilateral donors. Some strategies are outlined in DACs publication Shaping the 21st century: The role of Development Cooperation (World Bank, 1998, pp. 9-14). Some of the goals set forth by the donor community are:

- Reducing by half the proportions of people living in extreme poverty by 2015;
- Making progress toward equality of the sexes and the empowerment of women by eliminating disparities in primary and secondary education by 2005;

- Implementing national strategies for sustainable development in all countries by 2005 to ensure losses of environmental resources are reversed both nationally and globally by 2015.

These goals point to a different role for aid, which is more about supporting good institutions and policies than providing capital. Money is important, of course, but effective aid should bring a package of finance and ideas - and one of the keys is finding the right combination of the two to address different situations and problems. (World Bank, 1998, p. 13)

Eradication of poverty has priority on the development agenda and it is realised that money alone is not enough; new ideas and new concepts have to be developed and implemented. To reach the target set by DAC approximately 50 million people must every year be lifted above the poverty line from now till 2015. Furthermore, institutional development, with emphasis on health (WHO, 2001) and education (Sen, 1999) needs to be improved.

The smallholder poultry concept developed in Bangladesh is one of the tools that have proven to be effective in reducing poverty in rural areas. Most notably, poultry production has proven to be a unique entry point for the poorest segment of the village population to reverse the poverty spiral.

The strategy is to develop a model by running a pilot programme in a given area, but with a vision to apply it countrywide. It is therefore important from the very beginning to have a concept of the end-of-project-situation and to incorporate the idea in the poverty reduction policy paper. Focus should be on creating an enabling environment, selection of potential beneficiaries and formation of community groups and on capacity building.

Enabling environment

An enabling environment means access to credit and to all inputs and services required to minimise the risks in investment in income generating activities. It means that things needed are available at time within the local environment from the perspective of those that need them. Before the introduction of structural adjustments, state or heavily subsidized cooperative marketing boards were significant components of such an enabling environment in most developing countries or government departments were deeply involved in providing these services. At the present time the emphasis in development is on democracy and human rights with the associated organisational freedom and space for civil society. Such freedom and space will permit the establishment of organisations - NGOs - that cater to the needs of the poor as it is seen in Bangladesh.

The main elements in the enabling environment for the smallholder poultry model are to allow for the establishment of institutions that work to ensure:

1. access to poultry production and health services;
2. access to feed;
3. access to improved hens;
4. access to credit;
5. access to marketing facilities.

Marketing is normally not a problem for the poorer segment of the village population; on the contrary, the problem is that the poor do not have a marketing problem - they have nothing to sell. However, if the production of eggs and chickens is to exceed the demand within the village, then marketing will be one of the activities constituting an enabling environment.

Establishing an enabling environment must be an integral part of a project. However, when established, the operating and maintaining of the activities constituting the enabling environment must be a pure business operation with full cost recovery.

Community groups

Experiences show that the poor are creditworthy, can manage a loan and make rational investments if they get the opportunity and if they can comprehend the consequences. However, experiences also show that it is a difficult process to reach a level where the poor can comprehend the consequences and are willing to take the risk to invest in an income generating activity. It is always a risk to take a loan.

Establishment of community groups, composed of people of socially equal status, seems to be a valuable tool in empowering the poor. In the group they support each other, they become aware of their own strengths and rights, and they are informed about their possibilities to work themselves and their families out of poverty.

The process of establishing community groups and facilitating group support is not easy; it is time consuming and requires commitments. However, the empowerment process, which the group experiences, is an important element in teaching the group to make full use of the enabling environment and reverse the poverty spiral.

A village group, composed of members of socially equal status, is an excellent entity to disseminate improved technology, a cost-effective entity to disseminate extension messages, and a secure entity for disbursement of loans.

Capacity building

In the early phase, it is important to have a vision of the end-of-project situation and to see the project in a birds eye perspective with one eye, while at the same time with the other eye try to apply the perspective of the poor at the grassroots level.

All stakeholders must be involved in the pilot phase and the implementation set-up must be a mirror of the organisation to be responsible for the wider application of the concept.

Human resource development is often the most important activity in the pilot phase as well as in the dissemination phase.

Bangladesh is fortunate in having NGOs with capabilities to implement poverty alleviation programmes on a large scale. In most other countries, such capacity building needs to be a component in the programme. In this respect, it is important from the very beginning to have a strategy for transformation of the implementing organisation into a sustainable organisation, which is independent of donor support, and to have a strategy for human resource development and for other support that may be required.

Opportunities

The main opportunity is development of an effective tool for poverty alleviation. In Bangladesh 200,000 new households are included in the poultry work every year for a donor support of less than 100 US$ per household, not given to the beneficiaries but used for capacity building and human resource development. Impact surveys show that just two years after the programme is implemented, the number of beneficiaries living below the

poverty line is reduced from more than 80% to below 50%. While these figures suggest that the approach described in this paper may be a helpful tool, it is clear that it cannot stand alone. A governments macro-economic policies need to be pro-poor in order for people to stay out of poverty.

Thus, studies in Bangladesh (Rahman and Hossain, 1995) show that there is considerable movement of households in and out of poverty and this two-way movement resulted in a relatively small decline in the overall poverty with the proportion of extreme poor declining from 31 to 23% and the moderate poor stagnating around 29%. Likewise, an intervention with poultry as described in this paper will not protect poor people in Bangladesh against the natural disasters that hit the country from time to time, but it can help them build up their asset base, which in times of catastrophe is an important tool in the households coping strategies (del Ninno *et al.*, 2001).

However, to return to the main theme of the paper, other groups than the direct target group can benefit from the programme:

1. the enabling environment gives all the villagers access to poultry farm input supplies and services;
2. the concept pave the way for disbursement of micro-credits in a cost-effective way;
3. the village groups will facilitate easier formation of associations through formalised village livestock groups;
4. the concept helps people acquire the skills that are required for a business set-up to distribute input supplies to the villages;
5. the concept can form the basis for a marketing organisation for farm products;
6. the established beneficiary groups can be used by other NGOs, having the same target groups, to implement other activities, such as informal education for drop-out children from primary schools, extension activities, family planning, HIV/Aids prevention, etc.

In short, the initiatives will add to the social capital of the people (Dowla, 2001 and Karlan, 2002).

Closing remarks

The OECD and some politicians in donor and recipient countries have a vision and a strategy for poverty reduction. However, the development community, i.e. the technicians, professionals, researchers, and development workers must also have a vision to develop sustainable concepts ready for countrywide replication. The smallholder poultry development concept is a unique, but unfortunately rare example of such a concept, but it will need to be adjusted continuously on the basis of new experiences to develop a replicable model.

CORE PRINCIPLES

In September 1999, the World Bank Group and IMF decided that nationally owned participatory poverty reduction strategies should provide the basis for all their concession lending and debt relief, which has led to the development of poverty reduction strategy papers (www.worldbank.org/poverty/strategies). These papers cover six core principles underlying the development and implementation of poverty reduction strategies. The strategies should be:

- country-driven, involving broad based participation by civil society and the private sector in all operational steps;
- result-oriented, and focused on outcomes that will benefit the poor;
- comprehensive in recognising the multidimensional nature of poverty, but also prioritise so that the implementation is feasible, in both fiscal and institutional terms;
- partnership-oriented, involving coordinated participation of development partners (bilateral, multilateral, and non-governmental);
- based on a long-term perspective for poverty reduction.

The poultry smallholder concept is tailored to these core principles. Also the five essentials defined in the beginning of the paper are in full accordance with these principles.

ADAPTATION AND REPLICATION

Practical experiences with adaptation and replication of the smallholder poultry concept are rare. However, lessons from the first phases of the process are available and some generalisations are possible. The critical point is still how to operationalise an adapted model, how can it be replicated for wider dissemination. Malawi is in the middle of this process, but it will take some years before the model is institutionalised. This chapter will be more about the adaptation process and less about the replication process (Jere, 2001). The following steps are an essential part of the adaptation process:

1. awareness;
2. development of a specific model through field trails;
3. full scale test, pilot programme;
4. modality development.

Experiences have shown that it is essential to have a facilitator with in-depth expertise in the philosophy of the smallholder concept to guide the adaptation process; otherwise the process may easily be trapped in some of the constraints mentioned below.

Awareness

Awareness is a key word in adaptation of the concept. Prejudice with respect to the capability of the target group is a common attitude among stakeholders and that goes from people high up in government to the village community. An awareness programme must therefore target all potential stakeholders, from the government level to the village community. The awareness process goes through a number of stages:

1. selection of a core group of staff to be responsible for the awareness programme;
2. deployment of a facilitator;
3. exposure to the Bangladesh model (visit to Bangladesh);
4. PRA analysis in a selected pilot area;
5. discussions and workshops;
6. selection of a task force to be responsible for implementation of a pilot project.

Constraints

Constraints, which have to be addressed and that are related to the first step in the adaptation process, are:

Objectives

It may be a wrong strategy to call the concept a smallholder poultry model because it is a general misunderstanding to relate the objectives of the concept to poultry production, e.g. egg production instead of relating the objectives to poverty alleviation. This was also the case in Malawi and the approach to formulate a Malawi model focused at the beginning mainly on disciplines related to poultry production and less on the socio-economic parameters.

The objective of applying the concept is poverty alleviation; poultry is only an instrument in the process of reversing the poverty spiral. It is important that this objective is clear and understood by the stakeholders at the outset in order to prioritise the socio-economic disciplines in the project formulation.

Target group

It is surprising so many organisations and individuals that have a policy to target the poorest, but either on purpose or in reality exclude the poorest segment of the population from their activities. Common phrases are: the poorest do not have the capability to learn, the poorest are lazy, the poorest have chosen to live in poverty, or it is better to start with the better off and then the poor will benefit through a trickle-down effect - an approach, which has been rejected long ago.

The truth is that it is troublesome to have the poorest as the target group. It demands a lot of work and commitment and the project staff do not have the experience to work with the poor. However, the example from Bangladesh clearly shows that the poorest both have the capability and the willingness to work their way out of the poverty if they get the opportunity.

In Malawi, the project has been trough the same obstacles. The donor-supported projects, which were assumed to support the smallholder poultry concept, had in fact on purpose excluded the poorest segment. The local decision makers were reluctant to target exclusively the very poor and the same reluctance was observed in the village communities. The turning point was a very committed project staff that understood the objective of the Bangladesh concept and was willing to try to involve the poorest of the village population in the programme. They worked hard and committed in order to reach the poorest in the village.

The results from two full-scale test villages have been promising. In one of the villages there was only one family out of 55 potential families that did not contribute with savings and participation in group activities. In the other village, there were only three families out of 35 that did not want to participate or contribute.

Easiness

At first sight, the smallholder poultry concept is a very simple concept and an obvious entry tool for poverty alleviation programmes. It seems to be a common mistake, however, to think that it is easy to adapt the concept to different conditions. It is not just a simple matter of establishing a production system with, for instance a chicken rearer and a number of smallholder key rearers and organise a vaccination programme. Socio-economic parameters are often an overseen element and repeatedly it is completely neglected that the target

groups are the poorest segment of the village populations. Another critical end neglected aspect is sustainability; the enabling environment must be maintained on pure business conditions. That is of utmost importance.

Even though the components constituting the concept may all be simple, it must be realised that the interaction between the components is a complicated matter. Furthermore, the target group is one of the essentials of the concept and to approach this group is far from being a simple matter.

Cultural, social, demographical, and infrastructural environment

A common objection with regard to replication of the Bangladesh concept is the differences in the cultural and the social environment between two countries. That is of course a relevant objection and differences do exist. The fundamental question is, do the poor basically behave the same way, independent of cultural and social differences?

Preliminary observations indicate that the majority of the poorest wants to and is able to work themselves out of poverty if they get the opportunity. This behaviour seems to be independent of cultural differences and this observation is also supported by experiences from replication of the Grameen Bank concept. Amartya Sen, in his book Development as Freedom (1999) describes similarities in the behaviour of the very poor in his capability approach to poverty alleviation.

This does not imply that cultural differences are of minor importance, but only that target group response when exposed to the concept is very similar. The approach to organise and implement the concept has to be adapted to the prevailing conditions in a specific country and that is a complicated process.

Village model development

In general, there is very limited knowledge about modern poultry production among villagers and extension staff, and it is important that facilitators in a model development are aware of that. Another important aspect is that the actors must have been exposed, in one way or another, to the Bangladesh model as it is today. It is of equal importance that the facilitator is aware of the complexity in the Bangladesh model and that the model has been developed over two decades. In short, simplicity is a key word in the first stage of formulation of the first prototype. Even though the first phase in the development of a village model has focus on the technical aspects, it is important that all involved in this process are aware of the essentials of the concept and are true to the idea behind these essentials. The model development can be divided into three steps:

1. draft model formulation;
2. field test;
3. model adjustment.

The draft model should be kept as simple as possible and with focus on the key rearer. In fact it can be so simple that the model is composed of only the key rearer, based on local hens, and the supply and service activities. In Malawi, the model is composed of key rearers with 5 HYV (high yielding variety) hens and three local hens, model breeders with 10 HYV parent hens, feed sellers and vaccinators as one enterprise, and egg sellers.

The field test must focus on simple technical aspects, but encompass protection, vaccination and supplementation. The basket system (chickens kept under a basket the first weeks of life) has proven to give a good protection, but the techniques have to be learned. Vaccination is an essential part of the field test, and the test will often reveal that vaccination against Newcastle disease is not enough to protect the chickens against epidemic diseases. Supplementation of feed is also an essential element, but it is important to optimise the use of the scavenging feed resource base.

The first field test may need some adjustment both regarding the components and regarding the technical aspects. In Malawi, it was necessary to conduct a new field test before the full-scale test was carried out.

Full-scale village test

Design of a full-scale test depends on the actual institutional structure of the involved agencies such as government, NGOs, and micro-credit providers. It also depends on the capability of the involved institutions. There are four important elements in the design of a test:

1. the villagers must experience the test as if an ideal institutional set up is in place and no subsidies shall be given to the beneficiaries;
2. all test activities at village level must mirror an end-of-project situation;
3. all potential stakeholders must actively participate both in design and in implementation of the test;
4. a strategy for all activities must be set up to simulate an end-of-project situation.

It shall be stressed that the villages selected for the full-scale test must be different from those selected for the field test. The villagers in the latter are spoiled by free goods and will expect the same in the next test.

Modalities

The strategy is of course that a programme for wider dissemination of the model must succeed the full-scale test. It is also obvious that such a programme requires donor support and involvement of a number of stakeholders, government, NGOs, private sector, village authorities and the beneficiaries themselves. The modalities for the next phase are essential elements in the full-scale test and the modalities must include:

1. specification of stakeholder responsibilities;
2. specification of activities, especially those involving donor or government support;
3. cost estimate of each activity;
4. supervision and monitor system including indicators.

The objectives are to develop an implementing organisation involving the government, NGOs, private sector and support institutions and organisations, and to develop a strategy for countrywide dissemination of the model.

PARADIGM

paradigm in this context means: 1) a framework concept comprising a set of mutually supporting activities, 2) a set of values expressing or clarifying the impact of the framework activities on poverty alleviation, and 3) methods to continuously improve and disseminate the concept and knowledge related hereto (Jensen, 2000). This paradigm is in many ways

inspired from Thomas Kuhns The Structure of Scientific Revolutions (1970).

It is important to be aware of the circular aspect of the approach in the paradigm and not, as is often applied, the linear approach. This means that impact has to be measured against socio-economic parameters related to poverty and not against production parameters related to poultry.

Accessibility to information and experiences is troublesome with very limited number textbooks, databases, journals, or other media in which results and findings are published, and no training institutions directly targeting the concept. However, there has in this respect been progress in the past five years. The World-Wide Web has been an important media for dissemination, institutional networks have been established, and the idea of a regional training centre in Bangladesh has been introduced.

The challenge is to continue and to refine this process. Poverty alleviation is complicated and especially in the case where the target group is the poorest segment of the village population. It is also naive to believe that it can be done without a substantial donor support. However, knowledge and cooperation is of equal importance.

The smallholder poultry concept is an important tool in the fight against poverty, but the objectives can only be accomplished if we have an effective instrument to share information and a reliable tool to document the replication ability and achieved results. One of the next steps will be to institutionalise a paradigm in which experiences are accumulated and disseminated, a paradigm which is adjusted according to mistakes and successes, and a paradigm which has a framework that facilitates training, education, and research.

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ABBREVIATIONS

AsDB	Asian Development Bank
DAC	Development Assistance Committee
Danida	Danish International Development Assistance
EU	European Union
HYV	High Yielding Variety
IFAD	International Fund for Agricultural Development
IMF	International Monetary Fund
NGO	Non-Government Organisation
OECD	Organisation for Economic Co-operation and Development
PRA	Participatory Rapid Assessment

Semi-Scavenging Poultry Flock

Hans Askov Jensen

SUMMARY

Defining semi-scavenging as a system in which poultry flocks are under partly controlled management and where the scavenged feed account for a significant part of the total feed eaten, the goes paper goes on to describe the Bangladesh Rural Advancement Committee (BRAC) model as it is organised in production, supply and service lines. The technology transfer approach of the model is briefly discussed. Data of recent field surveys and on-farm studies are used to undertake a financial evaluation. Factors affecting feed supply in a scavenging system are discussed using data from different locations.

It is concluded the model is the most structured and most carefully designed available for smallholder poultry development, it has the potential to open new grounds in smallholder and scavenger poultry production. While the institutional set-up, structure and implementation procedure are well developed and documented, the technical part of the model needs still further documentation. However, there is no doubt that the model is viable, but also, that there is a great potential for technical improvements.

Key words: semi-scavenging, poultry, organisation, financial evaluation, location effect, technical improvement.

INTRODUCTION

The terminology semi-scavenging is used for small poultry flocks under partly controlled management and where the scavenged feed account for a substantial part of the total feed consumed. A Semi-scavenging Poultry Model (Saleque and Mustafa, 1996) is an integrated system to provide supplies and services to establish and to maintain a semi-scavenging poultry sector.

Scavenging poultry account for far the largest number of domesticated animals in the developing countries. Scavenging hens are, however, more or less neglected as an income generating activity by institutions as well as by the poultry holders themselves. The main activities to improve scavenging poultry holdings have been introduction of cockerel exchange programs and vaccination campaigns. However, the effect has been rather small because they have not been followed by other management activities.

In Bangladesh there has, during the past decade, been developed a successful model for semi-scavenging poultry holding. In 1996 it was established more than 800,000 semi-scavenging smallholders and the number is now increasing with more than 100,000 per year.

The smallholder, the producer of the end product, constitute around 95% of the total number of small entrepreneurs involved in the model.

THE BANGLADESH MODEL

Organization

The Model is a three pronged organization where each prong has its specialized functions. The institutional structure behind the Model is the Government through the Department of Livestock Services, DLS and NGO's, mainly Bangladesh Rural Advancement Committee (BRAC). In figure 1 is shown the three lines involved in the Model and the tasks of each line.

Production line

1. Breeders (model rearers). Small low cost parent farms with 25 parent hens and cocks per farm. The hens are kept in confinement and fed with balanced feed. The Parent Stock are of improved breed such as White Leghorn, Rhode Island Red and Fayoumi and the males and females are of different breeds.
2. Mini hatcheries. Small low cost hatcheries operated with close to 100% solar energy. Black pillows filled with rice husk are heated in the sun and the eggs are placed in a cylinder between 2 pillows for hatching. Each hatchery has a capacity to hatch 1,000 chicken per month.
3. Chicken rearers. Small rearing farms, each with a capacity of 200-300 chicken. The chicken are reared in a low cost house from day old to 8 weeks of age. The chicken are fed with balanced feed supplied by the local feed seller.
4. Smallholders (key rearers). Small farms with only 10 hens, mainly improved breeds supplied by the chicken rearers and a few Desi (local) hens. The hens are kept under semi-scavenging conditions and fed 30-70% supplemented feed and scavenge for the remaining part.

Supply line

1. Parent stock. The parent stock are supplied by the Directorate of Livestock Services to market price for day old chicken. The breeds are mainly Fayoumi, White Leghorn and Rode Island Red.
2. Feed. The feed is supplied by a number of small feed sellers located in the villages. The sellers purchase local by-products from the milling industry and mix it with fish-meal, vitamins and minerals. A feed seller sells about 1 ton of feed per month.
3. Vaccine/medicine. A number of poultry workers are trained to vaccinate the birds. The vaccine is supplied free of charge by the Government but the poultry workers charge a vaccination fee.
4. Marketing. The eggs are collected by egg collectors and marketed in the nearby towns or the poultry holders sell the eggs and chickens themselves in the village.

Service line

1. Group formation. The involved NGOs form small village groups with some 30 members. The groups hold weekly meetings to discuss relevant subjects and new poultry holders are selected from the groups.
2. Training. Before a poultry holder is established she has been through a 4 days training programme followed by refreshment courses.

3. Credit. Depending on the activities each member is provided with a small loan ranging from USD 25 to USD 200. The repayment period is 1 year.
4. Extension. Extension services are provided as a cooperation between the Government and the involved NGOs.

The organization of the Model is well developed and well functioning. There is, however, a big gap on the technical side. The scientific resource base for semi-scavenging poultry holdings is rather weak and a professional network for this discipline is not established yet (Dolberg, 1996).

Smallholders

Smallholder structure:

Smallholders constitute 95% of the units in the integrated model shown in figure 1. The sustainability of the model relay fully on the viability of the smallholders because all other links are established to serve the smallholders.

A smallholder unit is a rather complex operation and, even small in size, it comprises several activities as shown in figure 2. This complexity of activities makes it possible for the individual smallholder to adapt her operation to the prevailing market conditions and demand.

The use of Desi (local) hens as a value adding element for the eggs produced by the exotic hens is an essential activity in the smallholder set-up.

Transfer of technology

The structure of a smallholder unit does in many ways mirror an entire poultry sector with parent stock, hatchery, rearers and broiler and egg producers. The infrastructure is further supported by the supply and service functions which are an integral part of the model.

The concept behind the Bangladesh Smallholder Livestock Project implies that 10% of the population in the project area are directly involved as smallholders or in one of the supply and service activities. There is in this way an environment established for others to establish themselves within the poultry business. The smallholders' increasing standards of living serve as examples of the viability of poultry holdings and thereby establish the awareness of using poultry as an income generating activity.

FINANCIAL EVALUATION

The investment to establish a smallholder unit amounts to some US$ 30 allocated as 50% to pullets and Desi (local) hens, 25% to housing facilities and 25% as working capital. The cash flow is positive from the first year of operation and the average annual profit is between Taka 3.000 and 6.000 or US$ 75 to 150 (Alam, 1996).

In table 1 is shown the distribution of income and operation cost for a smallholder belonging to the Smallholder Livestock Development Project. The figures are from a survey planned by Hanne Nielsen (Nielsen, 1996) and conducted by Jahangir Alam (Alam, 1996).

TABLE 1. DISTRIBUTION OF INCOME AND EXPENDITURE PER WEEK

Income	Amount (Taka)	Percentages
Sale of egg	94.7	76.42
Sale of chicken	10.29	8.30
Home consumption of eggs	7.07	5.70
Home consumption of chicken	1.12	0.90
Other poultry income	10.74	8.66
Total income	123.95	100.00
Expenditure		
Feed	19.68	61.26
Transport	0.31	0.95
Medicine/vaccine	1.27	3.97
Labour	9.11	28.38
Others	0.09	0.28
Total expenditure	32.12	100.00

Source: Alam, 1996.

Another survey conducted in 1994 and mainly in Tangail District showed that income from sale of chicken is higher than indicated above (Jensen, 1995).

Sensitivity analyses are presented in tables 2 and 3 of a smallholder with both exotic and Desi (local) hens. The parameters used in the analyses originate partly from surveys and partly from information provided by Bangladesh Rural Advancement Committee and cover a normal year of production.

TABLE 2. SENSITIVITY ANALYSIS FOR 6 HYV HENS

			Gross profit	(Taka/year)
Parameter	**standard**	**variation**	**standard**	**+variation**
Egg yield, hd, %	50	+5	1066	+226
Age at lay, month	7	-1	1066	+202
Feed sup. rearing, kg	6	-1	1066	+56
Feed sup. lay. g/h/day	70	-10	1066	+184
Mortality rate, %	25	-5	1066	+68

TABLE 3. SENSITIVITY FOR 4 DESI HENS

			Gross profit	(Taka/year)
Parameter	**standard**	**variation**	**standard**	**+variation**
Clutches per year	3	+1	2170	+703
Hatchability, %	67	+10	2170	+267
Mortality, chickens, %	50	-10	2170	+299
Mortality, adult, %	25	-5	2170	+30
Feed sup. g/hen/day	0	+10	2170	-158
Feed sup. kg/chicken	0.5	+0.25	2170	-116

Even though the main income seems to come from the Desi (local) hens it is stressed that income is based on hatching eggs from the exotic hens.

LOCATION EFFECT

The cornerstone in the semi-scavenging system is that scavenged feed constitute a substantial part of the total feed consumed. As such, there are two prerequisites to the system:

1. Scavenged feed shall be available in sufficient amounts.
2. Birds must have safe access to scavenge the feed available.

Sufficient feed available for scavenging depends on an area's carrying capacity influenced by factors such as cropping patterns and on the density of birds. Regarding the problem with density it can be solved in a manner seen in an location in Orissa, India, where each household maximum is allowed to keep 4 hens. Another method is to increase the amount of feed available for scavenging.

Predators are one of the main constraints met by scavenging poultry holdings. Especially young chicken below 8 weeks are vulnerable to predators which can account for more than 80% of the mortality.

Even though, the birds are kept in confinement as in the semi-scavenging model, predators are still a threat.

Performance data from three locations in Bangladesh are shown in table 4. A detailed description of the scavenging conditions at the three locations is under preparation. However, Manikganj is the area where the model has been developed and Bangladesh Rural Advancement Committee as well as the villages have experiences in this type of poultry holding, which may be the reason for the good results. Rajshahi is a typical sugar cane area with many predators and with scarcity of feed to scavenge.

TABLE 4. LOCATION EFFECT ON PERFORMANCE, 6 TO 11 MONTHS OF AGE

Traits/location	Jessore	Manikganj	Rajshahi
Number of egg/hen	48	740	33
Mortality, diseases, %	19	11	16
Mortality, predators, %	1	0	8
Sup. feed g/bird/day	59	41	52

CONCLUSION

The Smallholder Model developed in Bangladesh is the most structured and the most carefully designed smallholder poultry programme in any developing countries. Chicken mortality has been brought down to an acceptable level and the resource consumption, mainly feed, seems even to be competitive with the intensive poultry production.

The model has a potential, apart from improving the living conditions of the smallholders, to open new grounds in smallholder and scavenger poultry production.

The institutional set-up, structure and implementation procedure are well developed and documented. The technical part of the model needs still more documentation of performance and structure of the operations. However, there is no doubt that the model is viable, but also, that there is a great potential for technical improvements.

ACKNOWLEDGEMENTS

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The semi-scavenging poultry-rearing concept as implemented in the Participatory Livestock Development Project (PLDP)

INTRODUCTION

Poultry's rearing is an integral part of agri-business in the farming communities. About 90 per cent of rural households in Bangladesh rear poultry and it is an important source of cash income for rural poor families. Local breeds (desi) predominate in rural traditional poultry keeping, with small flocks kept under a scavenging system with feed made up of household waste, homestead pickings and crop residues. With the absence of additional feeding and animal health inputs, the productivity of the local hens is low and losses due to diseases and predators are high. The productivity of the local hen is about 40-60 eggs per year, compared to an industrial battery hen, which lays 280 eggs annually.

The main target group of PLDP activities is destitute women. Experience has shown that poor rural women are constrained to manage the entire household with extremely limited resources, and therefore they develop as better managers than their male counterparts. When a woman benefits, her entire household benefits and the impact is more sustainable. Traditionally the ownership of backyard poultry is almost entirely in the hands of women and therefore poultry are a unique tool to reach the poor women with minimum disturbance of the patriarchal family pattern.

The development of the semi-scavenging poultry-rearing concept as implemented in PLDP has been under development over several years. The development started in the early 80'ties in collaboration between the Department of Livestock Services (DLS) and a national NGO (BRAC). Initially, efforts were made to increase the productivity of local breeds by cockerel exchange, but it failed due to various reasons. In order to reduce bird mortality, a trail was introduced were poultry birds were vaccinated regularly in five intervention villages for one year. The positive results in terms of reduction in mortality rate and increase in bird population led to the conclusion that vaccination must be an integral part of any intervention to promote poultry rearing as an income earning activity.

It was then decided to involve women in the vaccination work and to let them vaccinate for a fee, using vaccines supplied free of cost from the government. However, it was under this programme observed that the pullet supplied by the government and other farms were in short supply and suffered high mortality in the scavenging rearing system. It was therefore decided to buy day old chicks from the government farms and let selected, trained and supervised rural women rear the day old chicks for two months in confinement in houses built on their homestead plots and thereafter sell the chicks to other women.

The advantage was that the chicks would become better adapted to the rural environment. These initiatives led to the development of a rearing model that has been and is still under constant development. The model includes supply of improved chicks, common disease prevention and training in improved rearing under semi-scavenging conditions.

The basic feature of the model is a smallholder with some 10 hens supported by a number of small entrepreneurs, all available in the village, to provide the inputs and the services needed to maintain the flock. The concept is glued together by community groups, awareness programmes, training, and access to micro-credits. Even though the different entrepreneurs are established as an integrated production chain, each unit operates on free market conditions and is free to sell to customers outside the chain.

In relation to the model a substantial amount of research has taken place and among the findings is that cross-breed hens from a Fayomi hen and a RIR cock is among the best to cope with the semi-scavenging rearing system and at the same time have a high egg production.

THE POULTRY MODEL

The poultry model is simple in its basic design but aspects have been added to improve the model and that makes the complete model rather complicated. The basic model is a supply chain consisting of the following elements/beneficiaries:

Pullet Rearer:

Small rearing farm receiving the breeding stock such as Fayoumi pullets of 2-3 months of age and the requisite number of Rhode Island Red cockerels of one month old from Government Poultry Farms and rear those up to 18 weeks of age, where they are sold to Model Breeders. (2 Pullet Rearer per Area Office).

Model Breeder:

Small low cost parent farms with a breeding stock of 54 Fayoumi hens and the requisite number (6) of Rhode Island Red cocks received either from the project site or directly from Government Poultry Farms. The Model Breeders are to produce quality fertile eggs to be used for hatching purpose. The fertile eggs are in the basic model to be sold to Mini Hatcheries but a substantial part of the fertile eggs will be sold to Key Rearers who hatch them under local (desi) broody hens. (24 Model Breeders per Area Office).

Mini Hatchery:

Small low cost hatcheries operated with solar energy and kerosene. Black pillows filled with rice husk are heated in the sun or by means of kerosene and the eggs are placed in a cylinder between two pillows for hatching. Each hatchery has a capacity to hatch 1,000 chickens per month or alternatively ducklings. In the basic model the day old chicks are sold to the Chick Rearers but Key Rearers also purchase day old chicks to be reared by the broody hen. (6 Mini Hatcheries per Area Office).

Chick Rearer:
Small rearing farms, each with a capacity of 200-300 chickens/batch and 4 batches per year. The chickens are reared in low cost houses from day-old to 8 weeks of age. The chickens are fed with balanced feed. The 8-week-old birds are mainly to be distributed to the Key Rearers. (40 Chick Rearers per Area Office).

Key Rearer:
Small farms with only around 5 crossbreed layers for the production of table eggs. The hens are kept under semi-scavenging conditions and fed with 30-70% supplementary feed. Additionally 4 local (desi) hens are kept to hatch eggs preferably from Model Breeders and rear chicks from Mini Hatcheries. (About 3853 Key Rearers per Area Office and this group consist 95% of the beneficiaries

Besides the above outlined basic model, or supply chain, there are some beneficiaries involved in servicing the poultry keepers:

Poultry Workers:
A number of Poultry Workers are trained to vaccinate the birds to control diseases. The vaccine is supplied through the Area Office and the Poultry Worker charges a vaccination fee. (100 Poultry Workers per Area Office).

Feed Seller:
The Feed Sellers are trained to mix feed or sells pre-mixed feed to make available the necessary supplementary feed to the poultry keepers. (10 Feed Sellers per Area Office).

Egg Collectors:
Table eggs are collected from the Key Rearers by Egg Collectors to be supplied to a community sale centre or to the wholesaler at the near by market. (10 male Egg Collectors per Area Office).

SOME ASPECTS AROUND IMPLEMENTATION OF THE POULTRY MODEL

The credit received by the women involved in the poultry model is between US $ 16 and US $ 86. This credit has to be repaid in weekly instalments normally starting from week one and to be finalised within one year. The effective interest rate on the credit is around 30% per annum. The experience of repayment is that it is very high - normally close to 100%. One of the reasons for this high repayment rate is probably because the beneficiaries are organised in a group and under group pressure to keep their commitments.

It was experienced that the Key Rearers had difficulties within repayments before the pullets started laying. To overcome this problem the Key Rearers were instructed to keep some (4) desi hens for brooding purpose. This brooding activity quickly generates some income and is very profitable if managed according to guidelines (hen and chicks in confinement the first month and supplementary feeding to the chickens the second month).

The establishment of the poultry model in an area and the supply of input (day old chicks, parent stock, vaccine and drugs) are organised by an Area Office. An Area Office

first has to identify the beneficiaries and get them organised in a group structure. Then the beneficiaries have to be trained for the various poultry activities they are going to get involved in. Finally the beneficiaries will receive a credit to enable them purchase the equipment and poultry stock needed for the poultry activity they have been trained. To make an Area Office financial viable experience shows that they need to service around 6,000 beneficiaries with financial services.

The involvement in the poultry model will generate some cash income but often not enough to change the life of the involved drastically. It is said that the income is appreciated as it is a steady income, and it so to speak giving the icing on the cake (financing school fees and uniforms for children, financing improved housing facilities and the like).

It might be that one of the most important outcomes of the women's involvement in the poultry model is that they get exposed to operate a business with credit money. The normal practise is that when a beneficiary has repaid the first loan the beneficiary can obtain a new loan. For this second and subsequently later loans there are no restrictions in how this loan should be utilized as long as they maintain the poultry activity. It is often seen that these later loans are utilized for purchase of goats, a calf, a sewing machine or a rickshaw for their husband.

In addition, beneficiaries express that apart from access to financial services, another important benefit from being part of a village organisation is increased mobility and access to information and social networks, and further that this improves their status in the community.

Case Studies

ASIAN EXPERIENCE

Semi- Scavenging Poultry Model Production Chain

The word semi-scavenging is used for small poultry flocks under partly controlled management conditions and where the scavenged feed accounts for a substantial part of feed consumed. Under this semi-scavenging system the poultry model production chain (PMPC) has been developed for the target beneficiaries, particularly women in rural areas for their higher income and self- sustained employment. The poultry model concept was started with a joint effort of DLS and BRAC at field level from early part of 1983 with some support from world food programme (WFP). At the initial stage, intensive vaccination drive against Ranikhet disease and day old chick rearing were introduced through the women beneficiaries. With the growing demand, other support services were gradually introduced as Key rearer, Feed seller, Model rearer and Mini hatchery to transform into poultry model production chain.

With the success and usefulness of the model for the target beneficiaries, Smallholder Livestock Development Project (SLDP-1) was developed and implemented through IFAD and DANIDA support in 80 South Western upazila during 1993-98 periods. Based on its documented positive impact on income generation, self employment and homestead nutrition for the target beneficiaries, another project Participatory Livestock Development project (PLDP) was prepared and put into operation through ADB and DANIDA support in 89 upazila of North and North central area of Bangladesh from July, 1998 with same Poultry Model Production Chain.

During the process of implementation of PLDP, some significant changes both in technology and management aspects in poultry models particularly in Key Rearers, DOC Rearers, Model Breeders have been brought about to strengthen the PMPC for higher income and better sustainability at beneficiary level. The comparative changes are shown in tabular form as follows:

TABLE 1. LOCATION EFFECT ON PERFORMANCE, 6 TO 11 MONTHS OF AGE

SL	Model	SLDP-1	PLDP and SLDP-2
1	Key Rearers	a) 10 exotic hens and 1 cock of different breeds were used.	a) 5 exotic hens particularly sonali breed are used with no cock.
		b. No definite management system was there.	b) Definite management system has been introduced both for rearing exotic and broody hens.
		c) Local broody hens were incorporated for extra income to repay the credit till exotic birds were in production.	c) 4 local bigger size broody hens have been incorporated so that 20-25 hatchable eggs available from MB can be set in a designed egg setter for highest % of hatchability.
		d) No Programme was there for rearing, feeding and management of hatched chicks by broody hens.	d) Rearing of hatched chicks from broody hens for the 1st month has been designed with feeding and management in ' Polo' system.
		e) No specific management system was there for exotic birds, broody hens and their hatched chickens for daytime and nighttime.	e) Specific day shelter and night shelter have been arranged for exotic birds, broody mothers with their chicks.
		f) No specific breed was advocated for exotic birds.	f) Sonali breed has specifically been advocated in terms of their higher production rate and better adaptability in rural situation
		g) Semi scavenging system in key rearing was not appropriately understood by implementing agency	g) Semi scavenging system of key rearing has been appropriately understood for higher income and better sustainability.
2	Model Breeder	a) No specific breed was used.	a) Pure line of Fayoumi hens and RIR Cocks have been used for production of hatchable eggs of Sonali to be used by broody hens.
		b) Total number of birds were 23 having 20 females and 3 males of different breeds.	b) 54 number Fayoumi females and 6 number RIR cocks have been used for viable income.
		c) Rearing of birds was done in floor system	c) Rearing of birds has been strictly advocated in 'Macha' system.
		d) Hatchable eggs produced in MB were sold in open market or to mini hatchery.	d) Hatchable eggs produced in MB have been sold to Key Rearers to be used by broody hens and MH
		e) No price was fixed for hatchable eggs.	e) Higher price of Tk 4/= each has been arranged for the hatchable eggs for sustainable income
3	DOC Rearer	a) No specific breed was advocated for DOC rearing	a) Sonali DOC has been advocated for rearing.
		b) Rearing of DOC was mostly done in floor system	b) It has been arranged strictly in 'Macha' system.
		c) Both male and females were reared and after 8 weeks of rearing, they were sold to KRS in same way.	c) Female DOC of Sonali has been advocated for rearing. In case both male and female have been reared, males have to be isolated in 1st month and reared next one month separately. It helped both male and female better management and feeling. After 8 weeks female chicks are distributed to KRs and male was sold to open market.

cont.

SL	Model	SLDP-1	PLDP and SLDP-2
4	Feed Seller		No change
5	Poultry Worker	There was no provision of credit.	This has been arranged.
6	Mini Hatchery	Mini Hatchery was used for both hens and ducks eggs.	Mini Hatchery has been used for ducks eggs only.
7	Egg Seller	a) They used to sell both hatchable and table eggs.	a) There has been provision for selling only table eggs. The distribution of hatchable eggs to KR and MH has been arranged by PA with the beneficiaries.
		b. There was no provision of credit.	b) There is provision of credit.

With the process of implementation of SLDP-1 and PLDP, the PMPC has taken a significant shape in both technological and management aspect. But all these have not yet been considered enough that PMPC has gained well consolidated and solid background for ensuring sustainable higher level of income for target beneficiaries at rural level.

Provision has therefore, been made for Adaptive Research in both PLDP and SLDP-2 for working indepth study at beneficiary level so that all loopholes and gaps in different stages of PMPC could be overcome based on scientific background. Provision has also been there for 50 fellowships leading to M Sc degree in BAU and Academic Research for Fellowship in their thesis will be undertaken on different poultry and duck model related problem at the beneficiary level. Initials steps for undertaking both Adaptive and Academic research have already taken up. It is anticipated that activities in this regard will start very soon.

FIGURE 1.

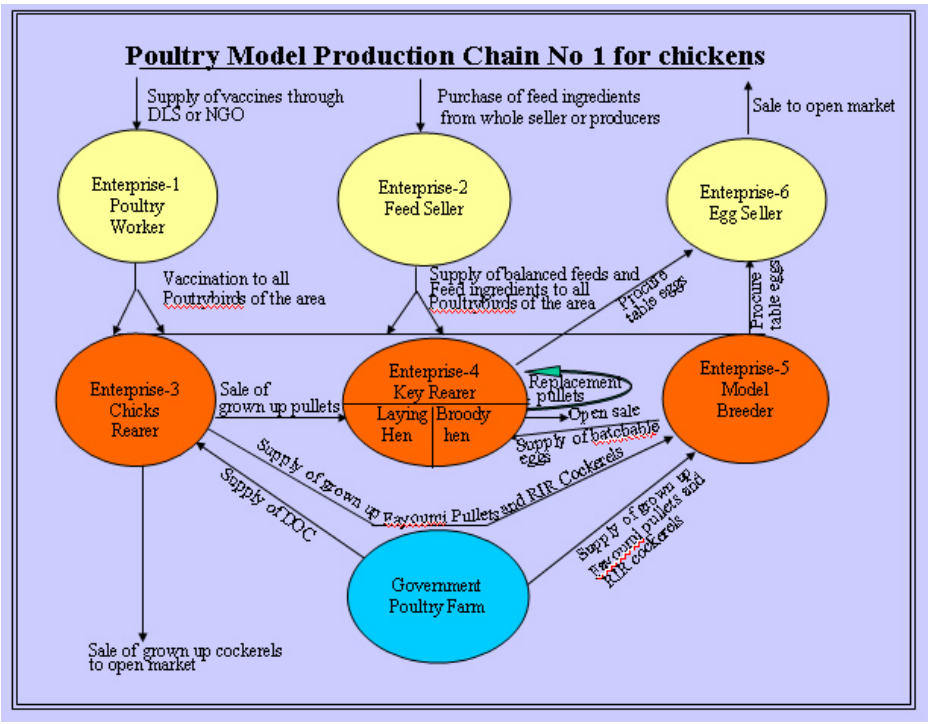
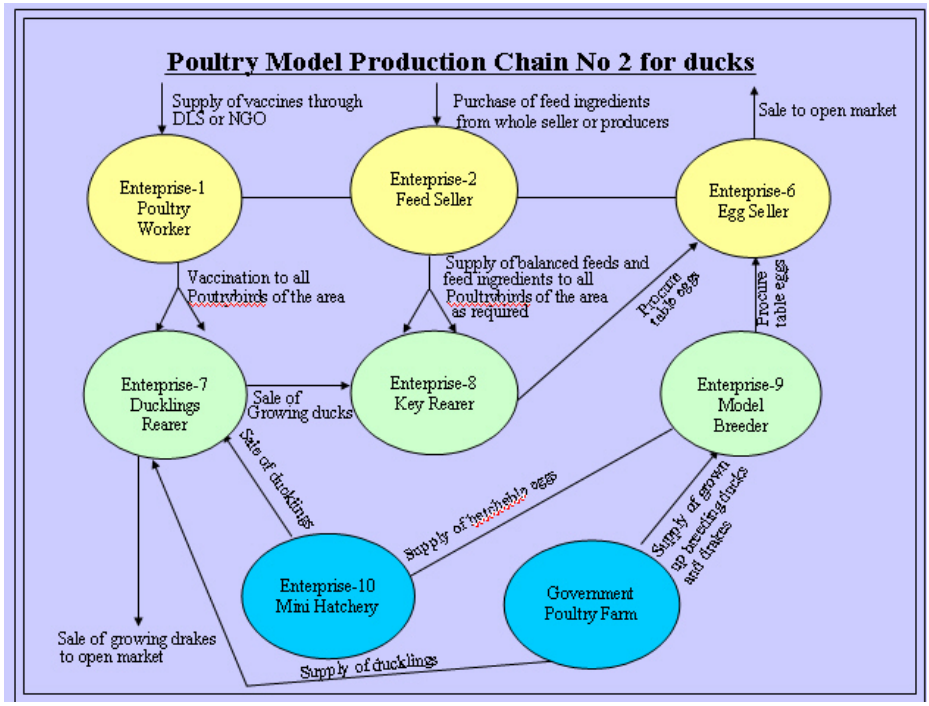


FIGURE 2


Poultry Model Production Chain No 2 for ducks
Supply of vaccines through DLS or NGO
Purchase of feed ingredients from whole seller or producers
Sale to open market
Enterprise-1 Poultry Worker
Enterprise-2 Feed Seller
Enterprise-6 Egg Seller
Vaccination to all Poultrybirds of the area
Supply of balanced feeds and feed ingredients to all Poultrybirds of the area as required
Procure table eggs
Procure table eggs
Enterprise-7 Ducklings Rearer
Sale of Growing ducks
Enterprise-8 Key Rearer
Enterprise-9 Model Breeder
Sale of ducklings
Supply of hatchable eggs
Supply of grown up breeding ducks and drakes
Enterprise-10 Mini Hatchery
Government Poultry Farm
Sale of growing drakes to open market
Supply of ducklings

Village poultry production in Vietnam

Vietnam is a tropical country in Southeast Asia. It is "S"-shaped and stretches 2000 km from North to South. Its area of 329.566 square km supports a population of 78 million of whom 80% are involved with agriculture.

During the last 5 years the agricultural output of Vietnam has grown at about 4% per annum and contributes about 25% of GDP and generates 60% of exports. Production of the major crops, principally paddy rice, grew sharply between 1990 and 2000. Animal production contributes 27% of the agricultural output. Per capita consumption of livestock products in 2000 was 32.4 kg of meat including 5.0 - 5.5 kg of poultry meat and 53.3 eggs and 0.5 litre of fresh milk. Seventy seven percent of meat produced is pork, 16% poultry including duck and 7% red meat, mainly from buffaloes and cattle.

Animals and poultry form an integral part of village life and have important social functions in Vietnam. They are important source of cash income for village families and provide a cheap source of protein for rural people.

CURRENT VILLAGE POULTRY PRODUCTION SITUATION

The population of poultry in Vietnam increased rapidly from 1990 to 2000 with an annual increase of about 9.5%. In 2000 total population of poultry was estimated about 196 million including nearly 50 million ducks and muscovy ducks. This is double the estimated population in 1990.

Total production of poultry in 2000 was 270,000 tons that increased 1.5 times when compared with those in 1990.

The numbers of poultry in the whole country are relatively big but the egg and meat production are still low because most of them (approximately 75% of poultry population) are kept in small households with local breeds. The size of chicken herd is about 10 - 20 chicken per family that consume mainly locally available feed.

The productivity of local poultry in Vietnam is moderate and quite variable. The body weight of 5 month old local chicken broiler is only 1.3 - 1.5 kg and local laying hens produces 70 - 80 eggs per year. The annual live weight off-take varied from 0.8 kg to 2.1 kg of meat per head and from 9.9 egg to 25.5 eggs per head depending on the different agro-ecological zones. The productivity is weak given the low initial production base and the potential for increased productivity through better nutrition and cross breeding.

Because local chicken meat is perceived to be more tasty and of higher quality than that of many exotic breeds, during the last few years village chickens production has increased in response to consumer's preference for local breeds.

There is a diversity of local breeds raised for different purposes. More than 10 indigenous and native poultry breeds have been raised in different parts of Vietnam. Their use in

practice and production has contributed to the conservation of poultry genetic resources in Vietnam. The most popular breed is the Ri, raised in the North, and Ta vang and Tau vang in the South. They are dual-purpose breeds, slow growing but adapted to scavenging and the hot climate. They have high resistance to diseases and parasites.

Consumers prefer some breeds because of the yellow colour of feathers and skin, features that are favored for the frequent spiritual festivals held in Vietnam and for family offerings. Some breeds are raised for specific purposes: Choi and Tre breeds for village cockfights; and Ac for making traditional tonics to benefit people who are old or sick.

Some other dual-purpose breeds have been imported during recent years such as Tamhoang and Hoa Luong Phuong from China, Nagoya from Japan as well as Sasso from France. They are used for cross breeding with local breeds. The crossbreds such as R1, BT1 have shown that their growth rate and carcass rate is considerably higher than those of local breeds while good tasting egg and meat still remain.

Chickens are raised in every village in Vietnam and 75% of the national flock is kept under traditional village conditions. Villagers use free-range, back yard or semi-intensive systems, but not intensive systems.

Poultry production in Vietnam is often integrated with pig rearing and aquaculture in villages. Fish-chicken-pig integrated farming system has been considered as having the highest rate of profit on total cost and farm area.

Most farmers keep chickens, but the smaller flocks contain only few birds. The average flock size 10 - 20 chicken per family and they consume mainly local feed. Other poultry such as ducks, including muscovies, and geese and quail are also kept in villages. The daily management of small flocks of poultry is usually the responsibility of women and children.

The size of chicken flocks vary during the year due to the market needs. The peak of production occurs between December and February for Lunar new year of Vietnam when the price is the highest because consumption of chicken is part of the tradition

POULTRY DISEASES AND CONTROL

Poultry diseases are considered the largest threat to traditional poultry production in Vietnam. Newcastle disease is the main fatal disease of chicken. The disease is endemic in the country and outbreaks are reported throughout the year with a peak during the months of November to March. Viscerotropic velogenic forms of the disease are frequently confirmed by diagnostic laboratories. Fowl cholera and fowl pox are also common disease in village chicken. In villages where Newcastle disease is controlled by vaccination, fowl cholera has become the most economically important disease for traditional chicken production.

Vietnamese government has encouraged our farmers to actively participate in vaccination campaigns against major infectious disease of poultry, firstly Newcastle disease. The first vaccine against Newcastle disease that was produced in Vietnam was the Asplin F strain. This was followed by the Mukteswar strain and La Sota strain. Recently a new type of Newcastle disease vaccine called "I_2" thermostable vaccine has been developed from Australian I_2 strain.

This vaccine has been highly appreciated by the farmers and rural development officers because of its preventive efficacy and ease use. In 2000, 12 million doses of the thermostable vaccine was produced and sold in Vietnam. Recently the use of vaccines for prevention

of infectious diseases in poultry has been increasing due to effective extension activities and the preventive efficacy of vaccination campaigns. Generally, the incidence of ND in village chicken depends mainly on availability of the vaccine and capacity of villagers to properly use it.

Thanks to frequent vaccination campaigns, incidence of ND decreased sharply and chicken population increased rapidly in many villages. Outbreaks of fowl cholera are reported all year around but usually are concentrated at the beginning of the rainy season. The serotype of local pathogenic Pasteurella multocida isolates was determined as type A1. Fowl pox is also a fatal disease of young chickens. The disease has been present over the whole of the country for a long time and caused great loss in chicks and young chickens in villages.

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In addition to infectious diseases, parasites and nutritional disorders are also problems in village chickens. Traditional raised chickens have severe worm and fluke infestations. They often cause intestinal disorders and low productivity. The common anthelminthic pharmaceuticals that are available in Vietnam are tetramisol and levamisol.

Village chickens obtain feed mostly from their natural environment by scavenging. They also receive supplementary feed usually paddy rice or some commercial concentrate at the end of the day. Supplementary feed varies from 10 to 30% of total daily feed intake depending on the family's economic situation, age of poultry and production stage as well as current market price. The insufficient daily feed intake causes poor growth rate and low productivity. Recently the nutrition of village chicken has been improved considerably by introducing a new technology to successfully raise earthworms at the household level using ruminant and pig manure mixed with decayed rice straw. Another technology for the proper conservation of paddy rice, maize and peanut at family scale have prevented mould growth.

Case Studies

AFRICAN EXPERIENCE

Family Poultry Development in Mozambique

Filomena dos Anjos and Robyn Alders

SUMMARY

Family poultry plays a key role in rural Mozambique where two thirds of the population lives in absolute poverty. Examples are given of three programmes that promote poverty alleviation and food security through improved production of family poultry: firstly, the control of Newcastle disease in village chickens; secondly the cooperative production of broilers in peri-urban areas of Maputo; and thirdly, activities implemented by the Veterinary Medicine Faculty that include the characterization of local chicken ecotypes.

INTRODUCTION

Mozambique is located in South East Africa and covers an area of 802,000 square kilometres. In 1999, the population was estimated to be 16 million (52% female and 48% male) with 71% of people living in rural areas (INE 1999). Two thirds of Mozambicans live in absolute poverty, surviving on less than a quarter of a US dollar per day. It is estimated that 72% of the general population is illiterate. Illiteracy is higher among women (85%). (MAP *et al.* 1999)

Most of the rural population is involved with agriculture. Mixed farming (crop production and livestock raising) is most common. Rural households grow food and cash crops and generally have a small surplus for sale. The species of livestock in the family sector vary from small monogastric species (chickens, ducks, pigeons, guinea pigs, guinea fowl, rabbits, pigs, turkeys and geese), small ruminants (goats and sheep), large monogastrics (donkeys) and large ruminant species (cattle). Approximately 70% of the 3 million rural families in Mozambique raise chickens, around 30% raise goats, 20% ducks and pigs, and only 4% are cattle owners, and rabbit owners comprise 3% (GRM International 2001). Of all the livestock species, chickens are most likely to be cared for and owned by women.

Chickens are possibly the major livestock contributor to the diet in the family sector. They also play a major role in poverty alleviation and food security at the household level. There are no barriers to chicken meat consumption (religious or otherwise; although in some areas the consumption of eggs by women and children is prohibited) and so they are the most common source of protein of animal origin. They constitute an income source, are used for rituals, assist with pest control and supply manure.

Research has revealed that Newcastle disease (ND) is the major constraint to chicken production in rural areas, causing mortalities of 50 to 100% of birds annually (Mavale 1995).

Family poultry development in Mozambique currently focuses on the control of ND in rural areas, the distribution of crossbred chickens and the production of broilers in peri-urban areas of the capital city, Maputo.

CONTROL OF NEWCASTLE DISEASE IN RURAL AREAS

Between 1996 and 2001, the Mozambican National Veterinary Research Institute (INIVE) and the Australian Centre for International Agricultural Research (ACIAR), in collaboration with the National Directorate for Livestock and the National Directorate for Rural Extension, implemented a research project in Mozambique on the control of ND in village chickens. The basic objective of ND control in village chickens was to improve food security in and assist with poverty alleviation of rural and peri-urban households. The project involved: laboratory testing of thermostable, live ND vaccines (NDV4-HR and I-2); field testing of these vaccines; the development of appropriate extension material; and attention to cost-recovery and cost minimisation issues.

The use of thermostable ND vaccine was essential due to the difficult conditions in rural Mozambique where the cold chain is often absent or unreliable. The NDV4-HR and I-2 ND vaccines performed well under these adverse conditions (Alders *et al.* 1999). The NDV4-HR vaccine is a commercial vaccine and requires foreign exchange for its importation. As foreign exchange is not readily available in Mozambique, ACIAR provided the I-2 ND vaccine master seed free of charge to INIVE to enable the local production of a ND vaccine suitable for use in village chickens. However, it became apparent that to make ND control activities sustainable, attention had to be given to social and economic aspects of the work. Linkages with communities were facilitated by collaboration with NGOs such as VETAID, World Vision and Heifer Project International.

The implementation of an effective ND control program in Mozambique has resulted in increased chicken numbers, increased household purchasing power, increased home consumption of chicken products and increased decision-making power for women (Bagnol 2001). Despite the need to control ND in village chickens, it has been difficult to achieve a sustainable control program. Experience has shown that a sustainable ND control program is composed of four essential components: an appropriate vaccine and vaccine technology; effective extension materials and methodologies that target NGO, veterinary and extension staff as well as community vaccinators and farmers; simple evaluation and monitoring systems of both technical and socio-economic indicators; and economic sustainability based on the commercialisation of the vaccine and vaccination services and the marketing of surplus chickens and eggs.

A range of extension material was produced by the project to facilitate access to key information for all those involved with ND control activities (from National Directors to farmers). The material includes a field manual (Alders and Spradbrow 2001), a training manual (Alders *et al.* 2002), a laboratory manual (Young *et al.* 2002), a flip chart, a vaccination calendar, a vaccination poster, a vaccination song, radio programs, a play, basic vaccine usage instruction sheets, information for vaccine distributors, a pamphlet and a video. Much of this material has been made available on the internet (http://www.vsap.uq.edu.au/ruralpoultry).

The Australian Agency for International Development (AusAID) is proposing to build on the ND control research conducted in Mozambique by supporting a three year project (expected to commence in June 2002) that will seek to establish sustainable ND control activities in rural areas of Mozambique, Tanzania and possibly Malawi.

PERI-URBAN PRODUCTION OF BROILERS

The General Union of Cooperatives in Maputo (UGC) has a total of 5,500 members, 95% of whom are women (UGC 2001). It has been assisting members in the production of broilers in peri-urban areas. In 2001, over 2,000,000 broilers were produced.

Groups wishing to produce broilers initially receive a loan to enable the construction of a poultry house, provision of a water source and equipment (feeders, drinkers, etc). The loan is granted without any collateral and its repayment, including interest, usually takes 6 to 7 years.

After beneficiaries receive basic training in poultry raising techniques and elementary rules of business management, the UGC provides credit in the form of the necessary production inputs (day old chicks, feed, poultry extension and veterinary assistance). At the end of the production cycle (6 weeks), the "commercialisation brigades" collect the broilers and send them to the abattoir or to the live bird market.

All details are recorded and once the birds are sold, the accounts are done. The credit provided for the chicks, etc is repaid and of the gross profit (the difference between sales revenues and production costs), 50% is used to repay the initial loan and the remaining 50% is handed to the producers. In the case of a producer experiencing a loss, UGC will reschedule the loan provided that adequate justification is given.

ACTIVITIES IMPLEMENTED BY THE FACULTY OF VETERINARY MEDICINE

The Veterinary Medicine Faculty supports a number of projects that focus on village poultry and peri-urban chicken production. The characterization of local chicken ecotypes is underway as is the development of a breed of laying hens suitable for egg production in peri-urban areas. The Italian Government, through the FAO, is financing a project entitled "Establishment of long term support to the rural village family poultry sector". The project was developed to support rural families who suffered losses during the floods in 2000. With the assistance of the Veterinary Medicine Faculty and NGOs, the project will distribute village-adapted chickens imported from South Africa (Ovambo, Venda, Naked Neck and Koekoek breeds).

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Développement de l'Aviculture Familiale au Burkina Faso

Charles Luanga Ouedraogo

INTRODUCTION

Au Burkina Faso l'élevage représente 12% environ du PIB et constitue la deuxième source de recettes d'exportation après le coton. En ce qui concerne particulièrement les animaux à cycle court, la volaille locale (poules, pintades …) est sans conteste la plus importante tant du point de vue des effectifs (plus de 22 millions) que de sa contribution à la formation des revenus des producteurs en milieu villageois.

L'aviculture traditionnelle utilise des souches locales rustiques, à croissance lente. La contribution de l'élevage familial de volailles atteint facilement 70% de la production totale de volailles et dans le cas du Burkina Faso, les poulets villageois représentent 2/3 de l'élevage familial de volailles. Ces volailles apportent des revenus frais et sont utilisés pour des dons ou des sacrifices, parfois comme capital de démarrage chez les jeunes.

Les volailles de race locale sont prisées, car elles ont meilleur goût, justifiant ainsi l'existence de circuits établis d'approvisionnement des villes en volailles locales en provenance des campagnes, mais aussi le développement d'élevages de race locale dans les zones périurbaines. Mais chaque année, cet important secteur paie un lourd tribut dû à une conduite insuffisante des élevages (maladies, précarité des habitats, de l'alimentation …).

LES ENJEUX

Cette filière dite traditionnelle est un enjeu économique important pour l'Etat en raison de la rentrée de devises qu'elle engendre. A titre illustratif, les exportations ont rapporté en 1998 environ 1.200 millions de F CFA pour la seule destination de la Cote d'Ivoire. Mais elle est aussi un enjeu social, culturel et économique pour les populations car, la volaille rentre dans diverses formes de compensation des valeurs de plusieurs de nos sociétés et elles sont à la base de la formation des revenus microéconomiques de plusieurs couches de la population paysanne du Burkina Faso. En rappel, les modalités d'exploitation du cheptel avicole villageois, appréciées sur la base d'enquêtes par le PDAV sont les suivantes:

- ventes: 40 %;
- auto - consommation: 25 %;
- dons: 20 – 25 %
- sacrifices: 10 %.

Dons et sacrifices sont des fonctions sociales très importantes pour lesquelles on a recours aux volailles. La pauvreté dans nos sociétés est caractérisée par des revenus limités, un manque de nourriture, un accès limité aux services sociaux de base. De ce qui précède, pauvreté rime avec insécurité alimentaire et déséquilibre alimentaire. En terme monétaire,

on peut rappeler que le seuil de pauvreté est établi dans notre pays à 72 069 FCFA de revenus annuels pour un adulte et que 45,3% de la population totale vit en dessous de ce seuil. Globalement, près de 94% des personnes vivant en dessous de ce seuil résident en zone rurale.

Pour faire face à ces phénomènes structurels, la commercialisation des volailles par les paysans ou encore l'incorporation des œufs et de la viande dans les rations alimentaires constituent des moyens efficaces. A cet égard, l'aviculture traditionnelle contribue à la réduction de la pauvreté et partant à la réalisation de deux enjeux alimentaires importants pour le Burkina Faso: La sécurité et l'équilibre alimentaire. Ainsi, l'expérience du Programme Spécial Sécurité Alimentaire (PSSA), montre qu'avec un investissement initial de 75 000 FCFA permettant d'acquérir un coq améliorateur et 10 poules de race locale, un poulailler, on peut obtenir un revenu annuel de 21 000 FCFA dès la première année et près de 40 000 FCFA après 5 ans, compte tenu des amortissements.

De plus, le petit élevage d'une manière générale est une activité maîtrisée par les femmes, dont le rôle central dans l'économie familiale et l'accès des enfants à la santé et à l'éducation n'est plus à démonter. L'exemple du Groupement Villageois Féminin de Safané dont les membres ont bénéficié d'un appui en matériaux de construction et d'un coq de race est éloquent. En effet l'aviculture a permis de générer des revenus qui ont été utilisés pour soutenir et développer les activités traditionnelles des femmes qui sont l'artisanat, et le petit commerce. Par ailleurs, la volaille pouvant être vendue toute l'année a permis ainsi de faire face à des dépenses imprévues comme celles liées à la santé.

Malheureusement, chaque année, au sortir de l'hivernage et au démarrage de l'harmattan, les maladies aviaires déciment les volailles et créent ainsi des incidences économiques importantes pour les paysans et réduisent le potentiel exportable de volailles.

Les contraintes majeures qui entravent le développement de l'aviculture villageoise concernent:

- les difficultés d'ordre sanitaire: la situation sanitaire de la volaille est préoccupante; la pseudo peste aviaire qui décime parfois plus de 50 % des effectifs;
- la faiblesse du niveau alimentaire en général et protéinique en particulier due à une utilisation de plus en plus généralisée de pesticides et à la méconnaissance des techniques d'amélioration de l'alimentation expliquent cette situation;
- l'inexistence ou l'inadaptation de matériels d'élevage (mangeoires, éleveuses...);
- la précarité des conditions d'habitat et d'hygiène entraîne des pertes souterraines (retards de croissance des jeunes, désertions des nids par les couveuses...) d'une part et exacerbe les mortalités d'origine pathologique d'autre part;
- la faiblesse de la formation, de l'information et de la sensibilisation des producteurs contribue à les maintenir dans un état d'arriération par rapport aux techniques améliorées de production.

Le tableau ainsi peint est à l'origine de la faiblesse de l'offre en volailles (poules et pintades) comparée à la demande. En effet, en plus des besoins ordinaires pour la consommation des populations, la demande est également tirée par les besoins en volailles pour les sacrifices (les populations pratiquent fortement la religion des ancêtres) et pour l'exportation.

ORIENTATIONS POLITIQUES ET STRATÉGIES DU GOUVERNEMENT RELATIVES AUX ANIMAUX À CYCLE COURT

Elles accordent une place importante au développement du petit élevage villageois. Ainsi, la Note d'Orientation du Plan d'Action de la Politique de Développement du secteur de l'élevage au Burkina Faso qui a été adoptée par le Gouvernement en Novembre 1997 opte pour un renforcement de l'aviculture villageoise š travers:

- la lutte contre la maladie de Newcastle, la mortalité des pintadeaux et les autres affections virales ou bactériennes;
- l'amélioration de l'habitat, de l'hygiène et de l'alimentation;
- la formation, la sensibilisation, l'information et l'organisation des producteurs.

À cet effet, la Note préconise la poursuite des activités du PDAV et surtout l'élargissement de son champ d'action à l'ensemble du pays.

Quant au Document d'Orientations Stratégiques (DOS) des secteurs de l'Agriculture et de l'Elevage à l'horizon 2010, qui consacre l'approche filière, la volaille y figure en bonne place. Il en est de même du Plan d'Actions et du Programme d'Investissements du secteur de l'Elevage qui a retenu le développement de l'aviculture villageoise comme programme prioritaire.

Enfin, le document Cadre Stratégique de Lutte contre la Pauvreté (CSLP) a choisi au titre des programmes prioritaires de l'Axe 3 l'élargissement des opportunités pour les pauvres grâce au développement de l'aviculture villageoise comme moyen d'améliorer les revenus monétaires des producteurs en milieu rural.

LA STRATÉGIE D'INTERVENTION DU PROGRAMME DE DÁVELOPPEMENT DES ANIMAUX VILLAGEOIS

Le Programme de Développement des Animaux Villageois (PDAV), initialement Projet de Développement de l'Aviculture Villageoise a été créé en 1978 grâce à l'appui technique et financier de la République Française.

A partir de janvier 1996, le PDAV intègre l'élevage de basse-cour qui faut-il le rappeler est parmi les nombreux modèles de productions animales connus, de loin le plus pratiqué. Ce type d'élevage composé de volailles, de porcs, d'ovins, de caprins et de lapins est reconnu sous le vocable d'Animaux villageois à cycle court. La préservation du sigle et le changement d'appellation s'imposèrent de façon évidente. Devenu service rattaché au Secrétariat Général du Ministère des Ressources Animales, le PDAV aura pour principal objectif le renforcement de la capacité des élevages villageois à cycle court afin de générer des revenus au profit des ménages ruraux.

La stratégie d'intervention du PDAV consiste à induire des améliorations à partir de petites technologies maîtrisables par les producteurs ruraux et qui ne bouleversent pas les caractéristiques fondamentales de l'aviculture villageoise: matériel génétique local, investissement minimal …

Cependant au cas par cas, des améliorations plus profondes (métissage, concentration des effectifs) pourraient être apportées et ce, en fonction du profil du producteur… Dans cette démarche, le PDAV s'appuie sur des relais importants que sont les Vulgarisateurs Volontaires Villageois (VVV) qui sont en fait des producteurs modèles et leaders d'opinion au niveau de leurs villages. Ces VVV sont particulièrement chargés de la mise en œuvre des

programmes d'action sanitaire et d'amélioration zootechnique.

Cette stratégie d'intervention est rendue nécessaire du fait de l'atomisation des exploitations avicoles villageoises et du nombre très limité de vétérinaires privés dans les zones rurales.

Le PDAV a surtout accentué ses activités sur la protection sanitaire de la volaille par une campagne de vaccination contre la maladie de Newcastle, le déparasitage interne et externe, la mise au point et la vulgarisation de techniques et méthodes de production améliorées.

Les activités du PDAV ont permis d'augmenter le taux de couverture vaccinale contre la maladie de Newcastle qui est actuellement de l'ordre de 14%. A titre indicatif l'effectif vacciné a été de plus de 3 000.000 têtes en 2002. En matière de formation vulgarisation une solide expérience a été capitalisée. Ainsi:

- Plus de 3 500 VVV ont été formés et recyclés;
- Plusieurs centaines de villages ont été sensibilisés en techniques améliorées de production.

PERSPECTIVES

Dans le cadre de l'initiative Pays Pauvres Très Endettés (PPTE), des producteurs recevront très prochainement un appui en divers matériaux de construction pour la mise en place de poulaillers de type amélioré. Cet appui en équipement s'accompagnera d'une formation de plusieurs centaines de VVV et de leur équipement en vélos.

La mise en œuvre de petites unités avicoles familiales au delà des revenus substantiels qu'elles procurent aux producteurs en milieu rural entraîneront à plus ou moins court terme le développement d'un certain nombre d'activités connexes aussi bien en aval qu'en amont de la production. Il s'agit:

- de l'installation de petites unités de production de compléments alimentaires à base de produits locaux. En effet, toutes les améliorations proposées entraîneront nécessairement une augmentation des effectifs pour lesquels les disponibilités alimentaires devraient être améliorées. Du coup, des spéculations comme les céréales et le soja verront leurs productions tirées vers le haut du fait de l'existence d'une demande et du développement d'un circuit monétarisé pour leur commercialisation;
- des abattoirs et centres de conditionnement: ces unités permettront de mettre sur le marché des produits préparés dans de bonnes conditions d'hygiène et bien conditionnés pour les besoins d'une clientèle spécialisée et pour l'exportation.

CONCLUSION

Comme nous venons de le voir, l'aviculture familiale peut contribuer à lutter contre la pauvreté. Il n'est pas trop assujetti aux aléas climatiques, contrairement à l'élevage des ruminants. Ne nécessitant pas d'investissements trop élevés au départ, son développement aura incontestablement des effets bénéfiques sur la société Burkinabé.

Case Studies

LATIN AMERICAN EXPERIENCE

Perspectives of family poultry

H. de Vries

INTRODUCTION

This document is written to pass on some data and experiences and to formulate some observations about the perspectives of family poultry, in particular scavenging chickens.

The comparative advantages of scavenging chickens, being lower costs of housing and reduced costs of feeding, are mentioned many times. Nevertheless, improvements are often sought by changing the system to one of confinement. It is the author's opinion that it is possible to improve the performance of the system while maintaining the comparative advantages.

In the development of this hypothesis, this article will discuss:

- the introduction of commercial strains to the scavenging system
- better fine-tuning of the feed intake apart from scavenging
- some other management interventions.

THE INTRODUCTION OF COMMERCIAL STRAINS

Many fears and doubts are still expressed when commercial strains are introduced to the free-range system. These birds, however, perform very well, and practice has already overtaken the extension, because in many countries hybrid layers are kept on free range.

The common practice is for pullets of about 10 - 12 weeks old to be sold /distributed to the chicken-rearing families. This has replaced the distribution of cocks, an activity executed during the seventies.

The author has actively (Mozambique, Zambia) and passively (Nicaragua and Bhutan) been involved in this distribution. Hybrid layers can do well on free range. Productions of 150 eggs per hen per year with only maize supplementation, to 180 eggs per hen per year with supplementation of concentrates, have been achieved in Zambia. These productions were achieved with quantities of maize and concentrate of around 70 grams per hen per day. Calcium (Ca) was supplied in the form of oyster shells. However, there were signs, later diagnosed by the author, that the production suffered from nutritional stress.

Sustainability, or, in other words, replacement of the hybrids, needs special attention. Women in Nicaragua were hatching eggs of hybrids using local hens. According to them, these pullets produced well. However, the author knows of no confirmatory data. It is necessary to systematically compare how the off-spring of local cocks and hybrid layers produce. The author considers that the factor of broodiness could be the most important one to influence the production of the off-spring. Reproduction at the homestead could be raised to a further extent, if improved cocks were also supplied.

Alternatively, it could be quite possible that a constant supply of pullets about 12 weeks old, already vaccinated against fowl pox and Newcastle, could be the most recommendable

strategy. Central raising has the advantage of decreasing costs in raising bigger numbers, vaccinating them, and decreasing mortality among the chicks, a parameter that is reported to be very high in family poultry. Some experts consider that this way of supplying pullets is not sustainable, but pullets are actually readily available in the relevant market places.

In order to judge what is best, data needs to be collected about the off-spring of hybrid layers, to reach a conclusion as to whether it is preferable to reproduce hybrid layers in the back yard or to regularly purchase replacement pullets. Another topic needing investigation is the productive life span of hybrid layers in the field.

FEEDING

The basis of the whole system is free-range, where the chickens use 50 % of their daily time to scavenge for insects and weeds. In addition, they are supplemented with grains and by-products from the farm. It has been stated that improving this feeding system has no value, because the genetic capability of local hens does not respond well to this improvement.

However, when commercial strains are introduced, it could and should be quite possible, that with a small addition in supplements, a relatively strong response in performance can be achieved. It is necessary that more data be collected about the quantity and quality of food that chickens find when they scavenge around, and the interaction with the feeds supplied, so that determined food supplements can be suggested.

In the process of getting more data for a broader view on feed requirements and feeding habits of free range chickens, the following set of data were collected at Muy Muy, Nicaragua, in the course of 1995 / 1996.

Maize consumption

The feeding system in Muy Muy was fully based on the supply of a maize supplement to the chickens. In November 1995, a monitoring exercise with 18 families was executed. On two consecutive days per family, how much maize each family gave to their chickens was registered. The overall quantity was corrected for the young stock and the cocks that were around. Weighting factors were: small pullet 0.3, big pullet 0.6 and cocks 0.8. The calculation revealed that every family supplied, on average, 92 grams of maize per adult hen per day. This is a substantial amount, but November is immediately after the harvest.

Feed consumption of 10 layers at a feed bar

The question arose as to what layers would eat if they could have free access to different feeds. Students of a secondary agricultural school designed a feed bar, and registered feed selection and consumption by improved layers on free range. This was done with one family, which had about 10 hybrid layers. (Her local chickens were temporarily passed over to a family member. Rice bran, maize, meat scraps and limestone were supplied ad libitum. On average, over a period of 2 months, the layers consumed the following quantities per day:

TABLE 1: FEED CONSUMPTION OF 10 HYBRID LAYERS ON FREE RANGE

Feed consumption per	chicken per day (grams)	Protein% (estim)	grams
Maize	87	9	7.8
Meat scraps	14	45	6.3
Rice bran	18	13	2.3
Limestone	5.5	-	
total	124.5	13	16.4

The production of the hybrids during those months more than 80 %.

It was not possible to repeat this experiment. Researchers are challenged to see if they can get the same results elsewhere.

The outcome of this experiment gives some guidance. It gives the impression that if the layers have the possibility of increasing their protein intake, they surely do. The same goes for calcium intake. However, when chickens have the possibility of consuming feed ad lib in the free-range system, it appears that any cost savings on food are eliminated. The economic advantage of no cost feeding is lost, and the aim is just the other way round. The comparative advantage of free range is the feed cost reduction. In this dilemma, the question arises, if it could be economical to keep feed supply restricted to a little maize but supply the layers also with some kernels of soybean meal, or just peas? This recommendation is further validated because analysis of crop contents seem to indicate a level of protein that is too low, a conclusion also reached by Huque (1999).

Calcium (Ca) consumption

It is expected that free range layers need to be supplemented with a Calcium source to achieve a higher egg production level. In Nicaragua, a few times Calcium was supplied to farmers, and they were advised to supplement their layers. Farmers argued, however, that they did not see any effect. A survey by two students in Nicaragua showed differences between 2 groups, each of 3 families, with hybrid layers on free range, one group with the supplementation of limestone, and the other without. More eggs were produced in the group with limestone. The survey, however, suffered from organisational difficulties.

Huque (1999) found that the Ca content of the feed of scavenging laying hens in Bangladesh was close to the requirements, supporting the observations of the farmers in Nicaragua. If there really is no need to supply a calcium supplement, this would relieve farmers using hybrid layers in the scavenging system of a big burden. It would be good if the results from Bangladesh could be confirmed in other places.

OTHER MANAGEMENT INTERVENTIONS

Decrease mortality of young chicks

The loss of young chicks is high all around the world. High mortality rates are reported, and the author also found a 50% decrease in number amongst chicks up to 6 weeks of age. It seems that the families generally accept this. It is normal for those chicks to die or get lost. Some projects recommend methods to protect the young chicks. The movable pen

is the most adaptable one. But in practice, it is rarely seen that young chicks are serious protected. What can be the reason that the families do not consider the loss of chicks as an economic loss? Is it because they would not have enough feed anyway? Is it because they only need a few replacements? Is it because the investment in time and money is not expected to be repaid? A socio economic survey could enlighten the extension service.

Optimise hatching results

Hatching is another factor with different outcomes. It cannot be true that the women do not know how to hatch the eggs, but significant differences are found. The author found differences in hatching rates of 40 % between women. Probably care and prioritisation are relevant factors here.

Care

What is care ? When families supplied the same amount of feed to the same hybrid layers in Zambia, the author found differences between families, the reasons for which could never be traced. Is there a factor in animal production that is called love, already accounting for extra production? Can it be said: "if you want more eggs, you have to talk to the chickens!"

Diseases and losses

The free-range system has an advantage above confined with regard to diseases. With more freedom the chickens suffer less from diseases. But loss to predators is a price for the free-range condition. In local situations it has to be judged if this price is worth it. Another advantage in dealing with mixed flocks is the natural vaccination process, by which some viruses are passed from the adult chickens to the young chicks. The threat, however, is Newcastle. Many initiatives to vaccinate flocks of chickens at the villages have failed. In this case, the central raising of pullets has an advantage.

CONCLUSION

The improvement of chicken production on free range is possible. Commercial strains can do well on free range, and increase egg production. Furthermore, extension efforts could be directed to hatching techniques and ways to protect chicks.

Research could be directed towards a better understanding of the nutritional behaviour of the free-range chickens, and to techniques of supplementation to increase production.

Furthermore, research could answer questions such as:

1. What is the potential of hybrid layers kept under free range, with maximum concentrate supply.
2. What is the response of free-range layers to feed restriction (keeping in mind the back yard conditions or the scavenging feed resource base)?
3. Is the supplementation of Ca necessary?
4. Which type of supplement could be economical, when maize (or other grains) is used from the home farm?
5. Is there general advice which could be given about the number of chickens certain backyards could support?

6. What is the production of layers produced and raised in backyards (cross and pure-bred)?
7. How long can hybrid layers on free range produce well?
8. What are the socio-economic reasons for not protecting the young chicks?
9. Does care add to production. Is it holistic (love for chickens), or better management?

LITERATURE

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Cuban experience in the familiar production in eggs and poultry meat

Manuel Pampón Balado

RESUMEN

El modelo cubano de producción familiar de huevos y carne de aves se ha extendido a todo el país y ha contribuido a los programas de Nicaragua y Haití. El programa incluye granjas de reproductores y plantas de incubación para la producción de pollitos que se venden a los criadores vacunados contra la Viruela Aviar y el Newcastle. Se desarrollan genotipos de gallinas semi-rústicas de altas condiciones de rusticidad capaces de producir de 180-190 huevos anuales pudiendo sexar al día de edad la descendencia por el color del plumón. Están incorporados al programa el pato Pekín cubano que alcanza 187,5 huevos al año y el pollo para carne que puede pesar 1,4 kg. Se ha establecido un programa de monitoreo y vigilancia epizootiológica que garantiza la detección y control de enfermedades.

La alimentación de las aves de traspatio se produce con alimentos que van desde maíz y soya hasta desechos de cosechas pasando por los subproductos de la industria azucarera. Se hicieron recomendaciones para la cría de aves y el desarrollo de equipos rústicos. Con todos los resultados se elaboró y desarrolló un programa de capacitación y preparación de los criadores de los cuales existen más de 700 mil en el país que poseen 6,7 millones de aves, cuyas producciones contribuyen a la seguridad alimentaria y la elevación de los ingresos familiares, mejorando sus condiciones de vida. Los nuevos genotipos creados han incrementado la biodiversidad de las aves con mayores rendimientos productivos en huevos y carne de aves.

ANTECEDENTES

En Cuba se alcanzó un alto nivel de producción de huevos y carne de aves lográndose en la década de los 80 una producción por persona al año de 250 huevos y 9 kg. de carne más las importaciones de carne que se hicieron.

Al presentarse las dificultades económicas producto del derrumbe de las economías de Europa del Este las producciones avícolas se deprimieron a un 50 % en la producción de huevos y a un 25 % en la de carne lo que no permite cubrir las necesidades de consumo de proteína avícola a la población cubana.

Esta situación obligó a desarrollar un programa de producción de huevos y carne de ave en zonas montañosas, rurales y suburbanas a partir de cruzamientos con aves autóctonas procedentes de patios de campesinos, denominados semi-rústicas, que son capaces de producir huevos y carne de aves con un nivel aceptable de rendimientos productivos y en

condiciones de sostenibilidad con un consumo mínimo de piensos industriales.

Otras especies de aves se han incorporado al proyecto, recuperándose la estirpe de patos "Pekín criollo" que existían en el país pero no se utilizaban en el programa. Se creó también una gallina de más peso corporal con el objetivo de producir carne la cual se generalizan actualmente. El proyecto cubano se promovió en Centroamérica y el Caribe, existiendo aves cubanas en Nicaragua y Haití; Venezuela y República Dominicana se han interesado en la adquisición de la gallina semi-rústica y en conocer el programa establecido en Cuba.

Los objetivos del programa incluyen la producción de huevos y carne de aves con un mínimo de pienso industrial, lo que contribuye a la seguridad alimentaría de la población cubana; mejorar los resultados productivos de las aves autóctonas; repoblar de aves las zonas rurales y suburbanas, contribuyendo a incrementar la bioseguridad y la elevación de los ingresos por la venta de aves y huevos no consumidos por la familia.

ESTRUCTURA GENERAL

Liderado por el Instituto de Investigaciones Avícolas (IIA) se desarrolló un programa de investigaciones que incluyó la formación de nuevas estirpes de aves y patos que respondieran a las condiciones de cría de las familias. Se crearon granjas de reproductores con estas aves, que incluían plantas de Incubación para la producción de pollitos que después de iniciados los primeros días y vacunados contra las enfermedades de viruela aviar y newcastle se venden a la población.

Las investigaciones incluyeron un programa de control de enfermedades así como la ubicación de veterinarios a nivel territorial; el estudio de diferentes fuentes de materias primas alternativas de uso local y la formulación de raciones para la alimentación de las aves; se estudiaron equipos avícolas no convencionales así como tecnologías adaptadas a la cría de traspatio.

Con este caudal de resultados investigativos se desarrolló un programa de capacitación de los criadores que contó con la decisiva participación de los autoridades municipales y locales del gobierno, el Ministerio de la Agricultura y las Empresas Avícolas

FORMACIÓN Y CARACTERIZACIÓN DE LAS DISTINTAS ESTIRPES DE AVES:

Sin los genotipos adecuados no pueden desarrollarse los programas de producción familiar, ya que los mismos necesitan de características propias que le permitan sobrevivir, reproducirse y producir huevos y carne de aves.

Para la producción de huevos y carne de aves se creó la gallina semi-rústica, a partir de cruzamientos de aves procedentes de patio de campesinos con la raza Rhode Island Red, cuya progenie mantiene las características de rusticidad de las gallinas criollas, se reproduce por incubación natural, tiene baja mortalidad, es capaz de producir sin piensos convencionales, se comporta bien ante condiciones ambientales adversas, puede producir de 180-190 huevos al año en granjas de reproducción con huevos de alta fertilidad y baja conversión. En condiciones de crianza de producción familiar puede producir de 10-12 huevos mensuales con alimentos producidos locamente.

Por necesidades del programa y a partir de la gallina semi-rústica se crearon dos nuevos genotipos para el sexado por el color del plumón al día de edad. La forma paterna es por-

tadora del gen dorado y la materna del gen planteado, la progenie producto del apareamiento de un macho dorado con una hembra plateada es sexada por el color, siendo las hembras de color predominantemente rojizo y los machos de color predominante blanco. Las características productivas de ambos genotipos superan los indicadores del cual provienen:

La raza de patos Pekín Blanco criollo está difundida en el país la cual tiene rápido crecimiento y multiplicación, rusticidad y vigor, además de un manejo fácil se adaptan a las condiciones más variadas y admiten alimentos muy diversos, constituyendo una vía para la obtención de carne, huevos, plumas e hígado graso. Las hembras en 10 meses de puesta alcanzan 187.5 huevos.

Se creó un híbrido de carne de plumaje coloreado y de mayor calidad organoléptica que el pollo de engorde criado en condiciones intensivas. Este híbrido tiene la rusticidad necesaria para ser criado con métodos artesanales y de forma extensiva y prolongada a partir de pequeñas inversiones. Alcanza a las 9 semanas de edad un peso vivo de 1400 g.

PROGRAMA DE CONTROL DE ENFERMEDADES

Se practica un monitoreo serológico y de vigilancia epizootiológica sobre las aves que garantiza la detección y control de cualquier enfermedad.

Las gallinas se entregan a los criadores vacunadas contra las enfermedades de viruela aviar y Newcastle.

Las principales afecciones que se diagnostican en las aves del programa de producción familiar son las enterobacteriosis y la micosis digestiva, muy propias de este tipo de crianza.

Alimentación

Los reproductores de gallinas semi-rústica, de patos y de pollos de campo, que producen los pollitos que se entregan a la población son alimentados con dietas con todos los requerimientos, dado que su objetivo es producir polito de un día sanos y fuertes de excelente calidad.

La alimentación de las aves de traspatio se producen con alimentos de origen local que van desde maíz y soya hasta desechos de cosechas, pasando por los subproductos de la industria azucarera. La mezcla de harina de hojas de follaje con melaza pueden ser incluidas hasta en un 20 % en las dietas de ponedoras. Harinas de hojas de boniato, yuca o plátano secados al sol pueden ser incluidos hasta en un 10 % sin resultados adversos. Diferentes fórmulas de pienso se han recomendado para ser aplicadas localmente a partir de la disponibilidad de productos y los propósitos de las aves.

La disponibilidad de alimentos es sin duda el problema más crítico del programa de avicultura familiar dado que las producciones agrícolas con destino a la alimentación de las aves es todavía un aspecto sin resolver.

Equipamiento y tecnologías de cría:

Un aspecto no descuidado del programa ha sido las recomendaciones para criar aves de traspatio y el desarrollo de equipos rústicos y no convencionales tales como bebederos, comederos, nidales, casetas y otras necesarias. Téngase en cuenta que se puede contar con estirpes de aves adecuadas, buen programa de salud y de alimentación, pero si se cometen errores graves en el sistema de alojamiento de las aves, el cuidado de la higiene,

el suministro de agua fresca, la ubicación de los locales y equipos, se puede terminar en un fracaso total.

Capacitación y preparación de los criadores:

En Cuba en los últimos años se han incorporado miles de criadores a la producción familiar de huevos y carne de aves, la inmensa mayoría de los cuales tenía poca o ninguna preparación en el manejo, alimentación y cuidado de gallinas y patos, por lo que paralelamente se ha desarrollado un amplio programa de capacitación entre las mismos que incluyó talleres nacionales, congresos nacionales, talleres regionales, encuentros con criadores, conferencias a profesores de Instituto de enseñanza agropecuaria, videos para la televisión, folletos y otras formas de superación. Las autoridades municipales y locales de las distintas instituciones del ministerio de la agricultura han nombrado representantes para dar atención a la avicultura familiar y han jugado un papel importante en la preparación de los criadores, en el suministro de aves y en la atención sistemática al programa.

RESULTADOS OBTENIDOS

El programa se ha extendido a todo el país y en él participan casi 700 mil criadores los cuales tienen en su poder 6,7 millones de aves. En el año 2001 la producción alcanzó 428 millones de huevos y 8700 t de carne de aves lo que contribuyó a la seguridad alimentaria de la población cubana. Debido a las características de los mercados locales, los criadores vendieron sus excedentes a precios razonablemente favorables lo que permitía elevar los ingresos familiares, mejorando así sus condiciones de vida.

El modelo de programa cubano ha permitido repoblar de aves las zonas rurales y suburbanas de todo el país, la creación de nuevos genotipos ha incrementado la biodiversidad con aves de mayor rendimiento productivo en huevos y carne. Los niveles de producción alcanzados no se hubieran obtenido por la vía de la producción intensiva ya que el país no tenía recursos para adquirir en el extranjero las materias primas necesarias para elaborar los piensos.

En Cuba no existen diferencias apreciables de géneros y tanto los hombres como las mujeres han recibido el beneficio del programa.

Additional Papers

Common diseases of smallholder poultry and their control in Bangladesh

Mondal, M. M. H., Das, P. M., Haque, M.A. and Islam, M. K.

INTRODUCTION

Bangladesh, the world's biggest delta landscape is situated between 20° 34′ and 26° 38′ north latitude and between 88° 01′ and 92° 41′ east longitude. The country is bounded on three sides- west, north and east - by India with a small strip of boundary with Myanmar at the extreme south -east. In the south lies the Bay of Bengal.

The climate of Bangladesh is dominated by tropical monsoon with high to fairly high rainfall and an equable temperature. The relative humidity varies from 40% to 99%. The country is one of the most densely populated and least developed in the world. The majority people live in rural areas and are solely dependent on agriculture, and from time immemorial the system of agriculture is very much integrated consisting of crop, fishes, livestock and poultry.

More than 80% traditional farmers still raise native scavenging chickens, with little or no inputs, mostly for domestic consumptions and petty income. However, in recent years due to rapid urbanization around major cities lands are becoming scarce for crop production, and also due to increased demand for meat and eggs in the urban areas people are switching over from scavenging native chickens to commercial chickens, which are mainly exotic purebred and/or hybrids, and various crosses. The commercial layer or broiler farms operated by low-income group people in rural situation, with around fifty or more chickens, raised in semi-intensive to intensive operations in our study have been put under 'Smallholder Poultry' (SP).

Recently, Rahman *et al.* (1997) have highlighted the prospects of rearing exotic hens by the rural poor in Bangladesh. They found SP projects as important tool for poverty alleviation and social empowerment for the poor, especially for the rural women. Seeing the prospects, various government and non-government organizations (NGOs) have come forward helping distressed women and unemployed youths across the country in establishing SP farms so as to make them self reliant. However, in the existing socioeconomic and environmental conditions SP farming yet is not so profit making because of various problems including diseases. And coupled with many other problems diseases have been encountered as the number one problem so far.

The geo-climatic conditions and attached territorial location of the country with India and Myanmar is very much conducive for the development and spread of a wide variety of diseases. The economic losses caused by different diseases in terms of low production,

mortality and cost of medicine is enormous. In this paper an attempt has been taken to focus on the most commonly occurring diseases of SP in a rural development project and their control at farmers level, and possible suggestions thereof.

METHODS

This study was conducted in a rural setting at Bailor and Kanthal union of Trishal, Mymensingh, located at about 100 km north of Dhaka and about 18 km south of Mymensingh district headquarters on both sides of the Dhaka- Mymensingh highway. This is a moderately highland area and less frequently gets inundated during floods. The major part of the area is under rural electrification and well communicated with the district headquarters of Mymensingh.

Majority people of this area are poor and involved in agriculture with little lands and infrastructures. Considering the poor economic backgrounds of the common people the local Rotarians underscored the need of poverty alleviation in the area through improved agriculture, and livestock and poultry development. Consequently, the Rotary Club of Mymensingh, Bangladesh district 3280 with the financial support of the Rotary Foundation of Rotary International launched its 3-H (Health, Hunger and Humanity) project in two phases 1988 to 1992 and 1995 to 2000 named 'Livestock and Poultry Development Project' and 'Integrated Farming Development Project', respectively.

Amongst the many objectives of the projects, SP development was a focal target to help income generation of the women and unemployed youths. To this end, side by side of rearing of indigenous chickens, improved pure breeds (White Leghorn, Rhode Island Red, Fayoumi, and Australorp) and various crosses (Sonali, and Rupali), and ultimately different high yielding layer and broiler hybrids were introduced in the area. Farmers were motivated, trained and where possible incentives, loans were provided. Later a poultry hatchery unit has been established near the project centre to facilitate distribution of day old broiler and layer chicks. A qualified Veterinary Surgeon and several trained auxiliary personnel/ vaccinators were deputed for disease surveillance, treatment and control. We as a counterpart of the project management monitored the disease situations in SP in the project area during the period from May 1995 to April 2000.

As a consequence, sick and/or dead chickens brought by the SP contact farmers and/or project field personnel at the project clinic were investigated for various diseases/ ailments. The diagnosis was based on history, clinical signs and symptoms, clinical examinations and postmortem lesions. Factors influencing diseases, and treatment /control measures adopted by the farmers were recorded.

RESULTS

In this investigation as many as 20 different diseases were recorded including deficiency disorders (Table 1). The most common diseases were, infectious bursal disease (IBD), Newcastle disease (ND), salmonellosis, mycoplasmosis, vitamin and mineral deficiency disorders, colibacillosis, fowl cholera and coccidiosis. Incidences of IBD, ND, colibacillosis, mycoplasmosis, coccidiosis and deficiency disorders were very high in chickens aged between 3 weeks and 4 weeks, where as salmonellosis was common in laying hens.

TABLE 1. COMMON DISEASES OF SMALLHOLDER POULTRY ENCOUNTERED AT THE ROTARY INTERNATIONAL PROJECT, KANTHAL AND BAILOR OF TRISHAL, MYMENSINGH FROM 1995 - 2000 (N= 24258).

Category	Disease	Number affected (%)	Total (%)
Infectious diseases (viral, bacterial, mycoplasma, fungal, etc.)	Newcastle disease	5336 (22.00)	73.37
	Salmonellosis	3820 (15.75)	
	Mycoplasmosis	2546 (10.50)	
	Colibacillosis	2127 (8.77)	
	Fowl cholera	1885 (7.77)	
	Aspergillosis	1184 (4.88)	
	Lymphoid leukosis	485 (2.00)	
	Necrotic enteritis	268 (1.10)	
	Infectious coryza	86 (0.35)	
	Aflatoxicosis	37 (0.15)	
		23 (0.09)	
Parasitic diseases	Coccidiosis	1024 (4.22)	7.30
	Ascaridiosis/Heterakiosis	212 (0.87)	
	Cestodiosis	209 (0.86)	
	Ectoparasitosis	326 (1.34)	
Deficiency disorders	Riboflavin (vitamin-B2) deficiency	1034 (4.26)	11.51
	Thiamine (vitamin-B1) deficiency	927 (3.82)	
	Biotin/Choline deficiency	530 (2.18)	
	Encephalomelacia (Hypovitaminosis E)	18 (0.07)	
	Mineral dificiency	284 (1.17)	
Miscellaneous diseases Infectious bursal disease	Non-specific pneumonia	785 (3.24)	7.82
	Visceral gout	395 (1.63)	
	Heat stroke	327 (1.35)	
	Ammonia intoxication	390 (1.60)	

Infectious diseases:

Of the reported cases, more than 73% birds were affected with infectious diseases (mostly viral and bacterial) causing high morbidity and mortality. In some farms mortality was even up to 100% due to IBD and/or ND.

IBD or Gumboro disease: The disease occurred in the chicken flocks in intensive management mostly. Clinical signs included vent picking, depression, ruffled feather, rapid weight loss and whitish diarrhoea. Chickens died due to severe dehydration. Postmortem showed haemorrhages in the thigh and/or pectoral muscles, and the bursa of Fabricius was swollen.

ND or Ranikhet disease: It was a very common disease in the project area in semi-intensive system of rearing. The affected birds showed varied types of symptoms. These included difficult breathing, cough, loss of appetite and sudden drop of egg production. Paralysis of the leg and/or wings along with torticollis and in coordination of movement was also noticed. Greenish/greenish white diarrhoea was a common feature. Postmortem examination revealed petechial haemorrhages in the proventriculus.

Lymphoid leukosis: The disease affected the heavier breeds of chickens during pre- and post- production stage. Enlargement of liver and spleen with white nodules of various sizes were the characteristic postmortem lesions.

Salmonellosis: This was recorded in about 11% cases. The affected chickens showed inappetance, slow growth, and debility. Chalky white materials were found to attach with the vent. Diarrhoea and subsequent dehydration was very common. There was catarrhal enteritis, peritonitis and pericarditis and also in long lasting cases ruptured yolk materials in the abdominal cavity.

Fowl cholera: The disease was common in scavenging native chickens, which also affected hybrid chickens in the project area. The affected birds showed fever, anorexia, mucous discharge from the mouth and nasal passage, and diarrhoea. The most striking sign was cyanosis of combs and wattles. Postmortem lesions included swollen liver with focal coagulation necrosis. Lungs were also congested and pneumonic.

Mycoplasmosis and/or Chronic Respiratory Disease (CRD): It was observed in about 9% cases and usually occurred sub-clinically. Clinically the disease was manifested by tracheal rales, nasal discharge, cough, anorexia and emaciation. On postmortem fibrin deposition on the surfaces of visceral organs were common.

Colibacillosis: It was recorded in about 8% cases. Chickens died suddenly showing no visible symptoms. However, postmortem examinations revealed petechial haemorrhages in the spleen, heart and liver.

Necrotic enteritis: The disease was detected in less than 1% cases characterized by anorexia, listlessness, ruffled feather, emaciation and diarrhoea. The main lesion consisted of necrosis and haemorrhage in the wall of intestine and in some cases necrosis of the liver.

Infectious Coryza: The disease has been encountered occasionally with the symptoms of serous and/ or mucous discharge from nostrils, facial oedema and conjunctivitis.

Aspergillosis: The disease was recorded in about 2% cases characterized by gasping, ruffled feather and depression. The carcasses were very much cachectic. Yellowish and/ or whitish nodules of various sizes and shapes were seen mostly in the lungs, and sometimes on the intestinal surface, pleura and peritoneum. Respiratory passage was plugged with mucous exudates.

Parasites and parasitic diseases: In all, about 8% chickens were affected with various parasites. Among the metazoan parasites, Ascaridia galli, Heterakis gallinarum, Raillietina spp. and Capillaria spp. were detected. However, only A. galli and tapeworms caused intestinal obstructions in some cases. The most striking effects of A. galli infection in layers were drop in egg production and in broilers stunted growth. In A. galli affected broilers the breast and thigh muscles were very much emaciated. The only protozoan disease of considerable economic importance was coccidiosis. About 5% chickens died due to intestinal/caecal coccidiosis. The disease was characterized by droopiness, depression, ruffled feathers and blood mixed diarrhoea. On post mortem the affected intestinal tract, particularly caeca were swollen and congested. Ectoparasites like lice,flies, flea, red mite and scaly leg mite were detected in some laying flocks. Whereas, housefly caused great nuisance to the broiler flocks.

Nutritional deficiency diseases: About 12% birds were found affected with nutritional deficiency disorders. The most common was hypovitaminosis B (thiamine and ribofla-

vin). Thiamine deficiency caused paralysis of the neck muscle and the affected birds were in star gazing position. Deficiency of riboflavin caused curled toe paralysis. Vitamin E deficiency was characterized by encepalomalacia, ataxia, subcutaneous oedema, in coordination of movement, prostration and death. Deficiencies of calcium, magnesium and selenium have been observed in growing and layer chickens.

Miscellaneous diseases: About 8% diseases were encountered in this category. Among the diseases/conditions, non- specific pneumonia was very frequently detected. The other conditions were visceral gout, heat stroke and ammonia intoxication. Visceral gout was detected in laying hens above 20 weeks age. The affected birds showed anorexia, listlessness, dizziness and drop in egg production. Postmortem examination revealed deposition of chalky white materials in the visceral organs and the kidneys were enlarged. In several occasions both layers and broilers died due to heat stroke during hot summer months. At necropsy muscles looked just cooked, in particular the breast muscles. Ammonia intoxication due to production of ammonia gas in the poultry litter was also detected in poorly ventilated houses. The affected birds showed the symptoms of leg and wing paralysis and blindness.

Treatment and/or control at farmers level: A great majority of the farmers in the locality did not practice proper treatment and/ or control regimens to combat poultry diseases. Feeding, housing, medication, vaccination, and disposal of dead birds and waste materials were very casual and haphazard. The farmers reported to the project veterinary clinic or elsewhere for help only when a large numbers of productive birds were sick and/ or dead. Farmers vaccinated their flock mostly against ND, fowl pox and fowl cholera with the help of the project. They had very little opportunity to go for vaccination against IBD (gumboro), Marek's disease, salmonellosis, mycoplasmosis and other emerging or re-emerging epidemic diseases. Therefore, farmers were mostly dependent on antibiotics and sulphur drugs to keep this disease incidences minimum. About 95% farmers used coccidiostats as a feed additive, and to get rid of helminth parasites (A. galli and others) majority farmers used anthelmintics. Farmers cared very little about ectoparasitic problems.

DISCUSSION

In spite of growing awareness in commercial poultry farming, cost effective poultry rearing is still in a nascent stage in Bangladesh. In particular, SP farming in Bangladesh is facing a major seat back towards sustainability due to various diseases/ ailments. On average 30% poultry birds die annually due to diseases (Ahmed and Hamid, 1992). BRAC experiences also suggest about 35% to 40% poultry die due to various diseases and predators (Saleque, 1999).

Various biological, cultural, social and economic factors greatly influence healthy flock management in the villages. High chick mortality has always been found associated with poor feeding, housing and health control practices. Although farmers, poultry development specialists, research workers and poultry health related academics believe diseases are the main obstacle to profitable poultry production in Bangladesh but no disease surveillance programme has been undertaken so far. Therefore, obviously there is a dearth of published literature in the field of village poultry and/ or SP in the country. Based on our present observation IBD and ND are the two main diseases causing high mortality in SP.

In Bangladesh IBD is an emerging disease. The disease first occurred in an outbreak form in 1992 and caused mortality as high as 70% in layers and 30% in broilers (Islam, 1996). However, in present systems of SP farming mortality ranged from 10% to 20% (Bhattacherjee *et al.*, 1996; Islam, *et al.*, 1998). Immunization history suggests, in spite of vaccination of the chicken flocks with imported IBD vaccines mortality could not be checked. IBD vaccines are not produced in Bangladesh; therefore, it is imperative to search for a suitable vaccine that is antigenically related with the IBD virus prevalent in Bangladesh. ND is an old disease endemic in this country, causing havoc in scavenging chickens.

Very recently, due to available vaccines (BCRDV and RDV) in the country the situation has been changed significantly. However, in our observations faulty farm management and improper vaccinations have led the farmers to heavy losses due to ND. As reported by Kamal (1989) and Islam *et al.* (1998) incidences of ND varied from time to time and place to place, which is also our present observation. Salmonellosis is always a problem of economic concern.

Although the disease has been reported in several forms depending on the causal agents but in this study most of the cases were suggestive of pullorum disease. Usually young chickens are severely affected with pullorum disease but in the present investigation laying birds were the victims. Salmonella vaccines are imported but not readily available to the common farmers. Colibacillosis was often found associated with mycoplasmosis. Strict hygienic measures and proper sanitation at all levels of farm management has been found the best method of control but a few farmers were able to adopt the practices.

About 2% birds depicted symptoms of brooder pneumonia (aspergillosis) and a very few with aflatoxicosis. The mycotoxicosis /aflatoxicosis should not be neglected, since it could be an important inducing factor to many infectious diseases (notably IBD, salmonellosis and colibacillosis) in hot, humid and rainy months in Bangladesh. It is a widely held view that mycotoxicoses can led to increased susceptibility to infectious agents because it impairs disease resistance through an alteration of various defence mechanisms (Thaxton *et al.*, 1974). Although endo-parasites (Ascaridia and Heterakis) have been regarded as the main impediment of profitable production of poultry in tropical countries including Bangladesh (Islam and Shaikh, 1967; Oyeka, 1989; Jansen and Pandey, 1989; Mondal and Qadir, 1991); but it was not the case in this study. May be the heavy mortality caused by infectious diseases overshadowed the impact of less fatal parasitic ones.

On the contrary, farmers dewormed poultry routinely in the project area and also tried to clean poultry manures at regular intervals. Incidences of coccidiosis are also decreasing in Bangladesh because of routine use of coccidiostats and use of vaccines in some selected organized farms. But it will take time to reach coccidial vaccines to the smallholder farms. Necrotic enteritis was though not very common but it should be regarded as an important disease since it has been found associated with coccidiosis causing severe production losses in broiler industry (Vissiennon, 1996).

A high rate of deficiency disorders in SP reminds us scarcity of quality feedstuffs and careless feeding practices. An increasing trend of nutritional deficiency disorders may be correlated to faulty ration formulation, and indiscriminate use of feed additives and antibiotics. All the diseases under miscellaneous category like non-specific pneumonia, heat stroke and ammonia intoxication, were related to poor/ faulty housing and/ or feed and water management.

A closer look at SP farming showed that in spite of training and motivation farmer's attitude towards healthy poultry management was still hazy. Most of the farmers vaccinated their flocks without maintaining cool chain and indiscriminately. The principles of bio-safety are yet difficult to implement by the SP growers because of various socio-economic barriers. Moreover, various deadly diseases are getting entrance through the importation of parent stocks, because we do not have adequate quarantine facilities. Quality feedstuffs, vaccines, medicines, chicks, and disease diagnosis facilities are still far from the reach of the majority SP farmers. Without taking any effort to tackle all this problems of SP farming on a regular basis, mere ad hoc programme will not help SP farming to grow anymore in the country, because disease situation might get worsen in the near future.

ACKNOWLEDGEMENTS

Sincere appreciations are due to Prof. Dr. M. A. Huq, the Director of the Project, Rtn. Reg. V. Collard, Coordinator Australian Co-sponsor Club, District 9600, Brisbane, Australia and members of the Rotary Club of Mymensingh, District 3280, Bangladesh for necessary help. We are also grateful to the 10th AITVM Conference Organizers and the Network for Smallholder Poultry Development, KVL, Copenhagen, Denmark for kindly accepting the paper for an oral presentation. The generous sponsorship offered by the organizers to the first author for presenting the paper in the conference is also thankfully acknowledged.

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Questionnaire to assess training needs in the area of village poultry production

PREPARED FOR PARTICIPANTS IN THE INFPD E-CONFERENCE. MAY 2002.

Name:

Position:

Institution:

Postal Address:

Tel:

Fax:

E-mail:

Highest academic qualification:

1. For how many years have you been working with village poultry?

2. How did you gain your knowledge of village poultry production?

3. a) What specific training on village poultry production have you completed?

   b) Who conducted this training?

c) How was the training conducted?

d) What were the best aspects of this training?

e) How could this training have been improved?

4. What areas of village poultry production would you like to know more about?

5. Do you have access to - (Please tick the correct response)

a) A computer?	Yes	No
b) A printer?	Yes	No
c) E-mail?	Yes	No
d) The internet?	Yes	No
e) Any comments?	Yes	No

6. What reference material on village poultry do you have access to:
   a) In your own collection?

   b) In libraries?

7. What specific reference material on village poultry would you like to have easy access to that you currently lack?

8. Would you be interested in studying for a Graduate Certificate in Village Poultry Production? (Details on last page; please tick the correct response)

   Yes No

   Any comments?

9. Would you prefer to study for the Graduate Certificate in Village Poultry Production - (Please tick the correct response)
   a) Fulltime at the University of Queensland? Yes No
   b) Part-time as a distance education course? Yes No
   c) Any comments?

10. Would you be interested in studying for a Graduate Certificate in Small Scale Production and Quality Control of I-2 ND Vaccine? (Please tick the correct response)

    Yes No

    Any comments?

11. Would you prefer to study for the Graduate Certificate in Small Scale Production and Quality Control of I-2 ND Vaccine - (Details on last page; please tick the correct response)
    a) Fulltime at the University of Queensland? Yes No
    b) Part-time as a distance education course? Yes No
    c) Any comments?

Thank you for completing this form. The information you provide will be used to prepare training courses that will meet the needs of workers in the field.

Please return the form to Dr Robyn Alders at robyn@tropical.co.mz or please send it by fax to +258-1-475172 marked for the attention of Dr Robyn Alders.

GRM International, an Australian Consulting Agency, is working with the University of Queensland to establish an International Village Poultry Centre that will provide a wide range of services. One of the services will be the provision of training that will lead to the award of Graduate Certificates, one on the small-scale production and quality control of I-2 ND vaccine and a second on village chicken production.

Proposed UQ Graduate Certificates

Each Graduate Certificate will consist of eight units of coursework based on four subjects, of two units each. The Graduate Certificate courses will be run as distance learning courses over at least 13 weeks with students coming together for part of this time in a suitable location. If students do not wish to study fulltime, then the course may be done part time over 40 weeks. Students will require access to e-mail and preferably to the internet also.

The prerequisite for entry into the course is a degree in veterinary science from a recognized university or an approved degree from elsewhere, or evidence of relevant training and work experience to satisfy the Head of the School of Veterinary Sciencethat the student is suitably qualified. Prospective students will have to submit a formal applicationand will have to meet the English requirement of 6.5 in IELTS with a score of 6 for writing. During the course, students' practical skills and theoretical knowledge will be assessed, the latter via the completion of problems and small assignments.

Small Scale Production and Quality Control of I-2 ND Vaccine Graduate Certificate

1. Introduction to ND, ND control, ND diagnosis and ND vaccines.
2. Introduction to laboratory management and maintenance; and practical aspects of I-2 vaccine distribution and cost-recovery.
3. I-2 ND vaccine production.
4. I-2 ND vaccine quality control, registration and field testing.

Village Chicken Production Graduate Certificate

1. Village chicken farming systems, gender, sociocultural aspects and economics.
2. An introduction to avian physiology and pathology.
3. Diagnosis, treatment and control of common diseases and production constraints.
4. Extension methodologies, participatory constraint identification and development of control strategies.

Chicken Production Systems

Murray Maclean

INTRODUCTION

Chicken production systems are usually classified according to the intensity of production, either intensive, semi-intensive, or traditional, and the primary output of production, either meat or eggs. The more intensive the production system, the more capital is invested, the higher the management level required in terms of input management and product marketing, and the higher is the poultry enterprise contribution to the whole farm income.

In Cambodia, traditional village-level chicken raising is carried out by nearly all farming families. The emphasis is on meat production for sale and home consumption but eggs are sometimes collected and sold instead being hatched. Very few traditional raising units at village level have been elevated to semi-intensive level.

In recent years there has been an increased number of intensive egg and meat production units near to Phnom Penh and Battambang, utilising imported breeds and prepared feeds.

This discussion will be limited to traditional raising as carried out by rice-farming families.

BREEDS

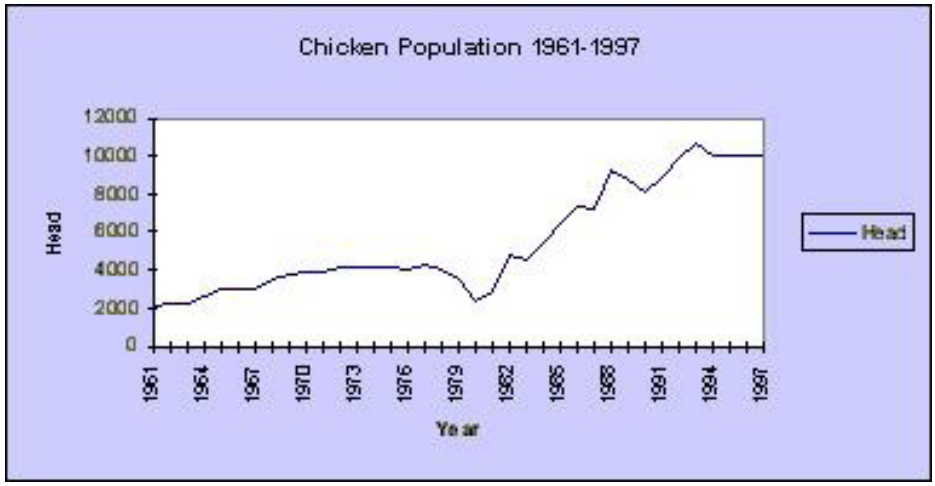
There appear to be four major breed types of chicken in Cambodia, according to Gauthier (1995), quoting Sarom (1995) as follows: Jai chickens: These are small poultry, with yellow/orange feathers with white spots, and red crest. These are considered to be closely related to the original forest-type chickens Sompuwv chickens: A large chicken with deep yellow or red feathers, commonly found near the Vietnamese border, but also in other places. It has a reputation produces lar Skuoy chickens: These have black shiny feathers, and a red comb. Fighting chickens: These are large chickens wit long legs, the males commonly used for fighting.

Farmers commonly refer to two types, the jai and the kok, the former referring to the small local chicken, and the latter to a larger local chicken type. The majority of village chickens are crosses between the various types, and are commonly referred to as "local" breed chickens, with the result it being very difficult to identify any specific breeds. Similar to village chickens throughout the world it is well adapted to minimal input village scavenging conditions, where nutrition is poor, and parasitic and infectious diseases are common. In Cambodia as in other countries in the region, village poultry raising is characterised by regular outbreaks of disease, presumably Newcastle Disease, that causes a high rate of mortality.

NUMBERS - NATIONAL BASIS

MAFF Statistics 1996-97 indicate a total poultry population of nearly 11.5 million, which is of the order of 1.2 poultry/head of population. It is difficult to estimate the proportion of these that are ducks, since separate statistics are not always maintained for the two major types of poultry. FAO reports that 1996 chicken numbers as 10,100,000. The following table shows numbers of chickens in Cambodia from 1961 to 1997 according to official statistics.

FIGURE 1
Chicken population in Cambodia 1961-97, in,000 head. Source FAO 1997



This shows a large increase the chicken population over the period from 1961 to 1997, in a similar pattern to that seen in the pig population. According to these figures, chicken numbers were in 1997, approximately 2.5 times the number of chickens in 1969.

It should be understood that the above figures should be taken as a general guide only. Leaving aside the unlikelihood of chickens being counted accurately, there can be enormous within year variations as to the number of chickens, at least on a village basis, due to disease outbreaks that kill many chickens. Sources also vary as to the actual population. For example, Tichit (1982) records that there were 4,700,000 chickens in 1967, whereas FAO source used above records 3,080,000 chickens.

DISTRIBUTION

The distribution of poultry throughout Cambodia is shown on the following map. It shows the concentration of the poultry population in the populated provinces around the major market in Phnom Penh.

LIFETIME PRODUCTION

Cambodian village chickens begin producing eggs at around 6-7 months old, when they weigh from 1.2-1.5kg. They begin by going through a laying period of 15-20 days, during which they lay about 11-13 eggs. There is usually no specialised hen house for the hens to stay in at night, and where eggs can be safely deposited.

The hens incubate the eggs by sitting on them for a period of 21 days. Of these eggs, only about nine will hatch into chicks. Once hatched these chicks follow the mother hen for a period of about two months, after which they will fend for themselves. At this stage males can be distinguished from the females by their larger appearance and crest development.

By six months of age, there is likely to be only about five surviving chicks due to deaths due to the effects of parasitism, poor nutrition, infectious disease, and predation. The males are usually sold or eaten at this age, when they weigh around 1.5 kg. Some females may be sold or eaten, but it is necessary to keep some females for breeder replacements.

If hens do not die during disease outbreaks that regularly sweep through the villages, they may be kept by the farmer until they are 2-2.5 year old. By this stage they are considered old and their egg production has dropped. In fact, hens that survive the disease outbreaks are often proudly announced as such by the farmers.

This pattern of reproduction and production from a hen in one year, without serious disease outbreaks is illustrated below:

FIGURE 2

Pattern of reproduction of one hen in one twelve month period, with some indicative numbers of chickens in each age group, numbers of chickens sold, and timing of sales.

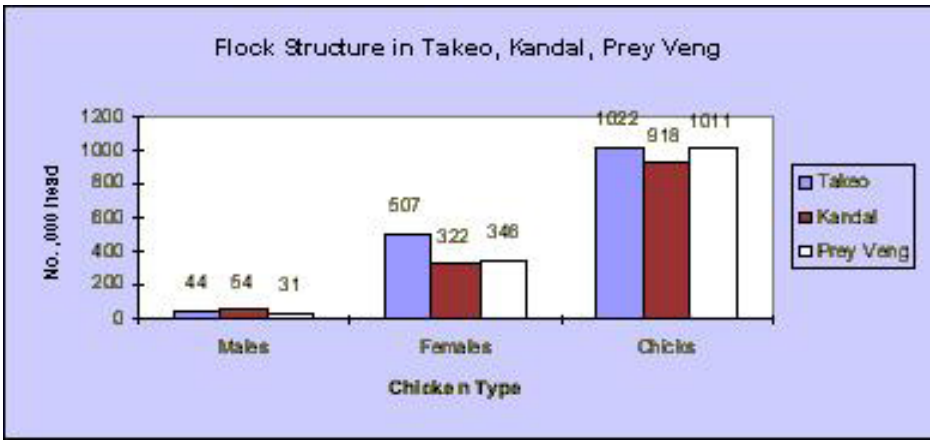
Mth	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Hen	1	1	1	1	1	1	1	1	1	1	1	1
	12	9	7	5	5	5	5					
				12	9	7	5	5	5	5		
	5						12	9	7	5	5	5
	5	5	5	5						12	9	7
Youn	10	14	12	10	14	12	10	14	12	10	14	12
Sold	4			5			5			5		

12	12 Eggs-laid, and incubating, total 32-34 days
9	9 Chicks following the hen, period 2 months
5	5 Chicks scavenging free from the hen, aged 2-6mth

PROVINCIAL FLOCK STRUCTURE

A MAFF 1995 survey found the following relative numbers of adult males, adult females, and chicks.

FIGURE 3
Flock Structure of chickens in Takeo, Kandal, Prey Veng. Source MAFF survey 1995



This table shows similar flock structures in the three provinces, their being on average one male to every ten females, and 2.5 chicks to every adult female. The survey was carried out in May so it is possible that many villages would have recently had an outbreak of disease which would be expected to reduce numbers of chicks.

In a theoretical flock structure, where hens consistently raise five chicks to 6 months of age, in four clutches a year, the flock structure would show a ratio of chicks to adult females of around 13:1, much higher than the 2.5:1 shown in this table. This may indicate some non-laying hens or a high death rate in young chicks. In the survey results, it is suggested that there is a large number of non-laying hens, but the question asked to farmers in the survey was ambiguous therefore it is difficult to interpret.

FAMILY FLOCK STRUCTURE

The regular occurrence of disease that kills a large percentage of chickens dominates the pattern of flock structure through the year, and forces the farmer to retain many of the young females to try to ensure that he continues to have breeding hens to keep producing.

In a self-replacing flock of one hen which regularly replaces breeding females, and has a no serious outbreaks of disease, the following flock structure is seen:

FIGURE 4

Flock Structure of one-hen self replacing flock in a 12 month period, during which there are no serious disease outbreaks. No eggs are sold. Inside the squares are indicative numbers of chickens for each age group. See table above for legend.

Mth	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Hen	1	1	1	1	1	1	1	1	1	1	1	1
	12	9	7	5	5	5	5					
				12	9	7	5	5	5	5		
	5						12	9	7	5	5	5
	5	5	5	5						12	9	7
Youn	10	14	12	10	14	12	10	14	12	10	14	12
Sold	4			5			5			5		

In this model, the breeding female is replaced at the age of one year. This means that one young female each year needs to be retained as a replacement. Average chicks per hen is 12.8, and sells 19 chicks per year.

In the real situation in Cambodia, there are regular outbreaks of disease that kill many chicks and some hens. The following is an example of a flock with a serious disease outbreak at the end of May that kills 90% of chicks, but no hens.

FIGURE 5

Flock structure of a flock with a serious disease outbreak at the end of May that kills 90% of chicks, but no hens. No eggs are sold from the flock.

Mth	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Hen	1	1	1	1	1	1	1	1	1	1	1	1
	12	9	7	5	5	1	1					
				12	9	0	0	0	0	0		
	5						12	9	7	5	5	5
	5	5	5	5						12	9	7
Youn	10	14	12	10	14	1	1	9	7	5	14	12
Sold	4			4			1					

In this model, average chick per adult is 9, and sells 9 x 6mo chicks per year.

A model of a flock in which there are two outbreaks, end of May and end of November, in one (November) of which the hen is also killed appears as follows:

FIGURE 6
Example of a single-hen self replacing flock which there are two outbreaks, end of May and end of November, in one (November) of which the hen is also killed.

Mth	1	2	3	4	5	6	7	8	9	10	11	12
Hen	0	1	1	1	1	1	1	1	1	1	1	0
	0	0	0	0	0	0	0					
				12	9	1	1	1	1	1		
	1						12	9	7	5	5	1
	0	0	0	0						12	9	0
Youn	1	0	0	0	10	1	1	10	8	6	14	1
										1		

This flock has an average chick to hen ratio of 5:1, and sells one 6mo chick only.

The real situation is probably somewhere between these last two examples, that is 1-2 serious outbreaks of disease per year, with low-level disease in between times. With such a high level of disease, it would not be surprising that farmers would collect and eat or sell eggs

FEEDING STRATEGIES

Village chickens are free range scavengers that are fed supplements, which are primarily energy supplements, of white rice or paddy, which is usually cast over the ground in the yard of the house. Gautier (1995) states that young chicks may be given a supplement of white rice equivalent to 250 grams/day/10 chicks (amount equal to one can or kompong), and that an adult hen with her chicks may be given from 50-250 grams paddy/day. Some farmers give nothing to the chickens from November to April, considering that there is sufficient rice in the ricefields.

ECONOMIC CHARACTERISTICS

Indicative Gross Margins of a single hen flock with three scenarios of health control are shown below. Scenario one is poor health control and two disease outbreaks per year, the second is poor health control and one disease outbreak per year. The third is good health control and no disease outbreaks per year.

TABLE 1. INDICATIVE GROSS MARGINS FOR SINGLE-HEN ENTERPRISE WITH VARYING DEGREE OF HEALTH CONTROL.

	Health Control	$GM/year	Comment
1	Poor	1.67	Two outbreaks per year
2	Poor	2.89	One outbreak per year
3	Good	5.79	No outbreaks

The above table shows the large effect of health on profitability. In the good health option, only vaccines and treatments are carried out. No extra housing is provided.

The following is an example of scenario one above:

TABLE 2. INDICATIVE GROSS MARGIN FOR SINGLE HEN SELF REPLACING FLOCK THAT EXPERIENCES REGULAR DISEASE OUTBREAKS.

Item	Unit	Value Unit	No. Units	Total	Comment
1. Costs				1.70	Total
Purchase	Head	1.70	1	6.75	
Feed costs	Kg	0.30	22.50	8.45	
2. Income Chicks	Head	1.30	6	9.80	Total
Eggs	Kg	0.04	8	0.32	
Groos Margin				1.67	

Role of Small Scale Poultry in Rural Livelihoods Project

Syed Yousuf Hussain

INTRODUCTION

The Department for international development (DFID) UK has planed a very large mission partnership initiative in State of Andhra Pradesh (India) in primary education, Employment generation, Poverty eradication, water conservation. DFID is a partner in scaling of water shed activities by supporting capacities building, livelihoods support, convergence of other scheme and services collectively called "WATER SHED + ACTIVITIES" Through Andhra Pradesh Rural Livelihood project (APRLP) in five drought prone district having 14.8 million human population with geographic area of 8.6 million hac., aver rainfall 677 mm, working in 16 mandals, 105 villages with 13 pilot NGO's. A.P having biggest SHG in country 4.1 lakhs, 5.5 million members with saving pound 80 million, government assistance 30 million pound, loans assistance from bank 40 million pound total corpus of 150 million pound.

SUPER GOAL

Reduction of poverty in D.P.Dist of A.P under water shed scheme

Goal: - Effective and sustainable approach to eliminate poverty by enhanced livelihood of village poor by improve livestock activities in 13 pilot mandal through NGO's.

Support Services From APRLP

A. Technical
   1. Training model preparation
   2. Participatory training
   3. Exposure visit to Poultry Farm and Poultry products selling centers.
   4. Grounding, Evaluation and monitoring

B. Financial
   1. Support to SHG by financial agencies
   2. Direct finance support by community
   3. Support matching grands from project directors, DPAP.

APPROACH

1. Concept ualization of project by APRLP
2. Orientation course for project Implementing Authority (PIA) or NGO's--- APRLP_ Resource person
3. Capacity building of PIA for project appraisal ---- RP

4. Prepare operational plans ----- DCBC_ PIA
5. Social mobilization ------ DCBC _ PIA
6. Capacity building of primary and secondary stake holder ----- DCBC
7. Identification of target group ---- DCBC
8. Preparation of action plan ----- R.P., DCBC
9. Preparation of training model---- R.P
10. Identification of resource center ------ DCBC
11. Grounding, evaluation, monitoring---- R.P

Our Role: - Livestock consultant, development and implementation of livestock activities, short term consultant review every after 6 months and also a Resource person for livestock project.

PROCEDURE

In one of the identified pilot PIA i.e. Devarkonda mandal of Mahboobnagar Dist under DASM, NGO's three days training for 35 SHG leaders under taken in Sanjiveeni charitable trust a resource center (R.C.) having necessary infrastructure for training running industrial training institute and other activities. Selected SHG leader train by RP, participants requested to tell their problem with rearing village desi chicken. Participants belong to near by villages 10 to 12 km radius from RC all of them are group leader having desi chicken at home. Problem first identified like,

1. High mortality in desi chicken
2. Low productivity lay 50 to 60 eggs in a year.
3. Chances of theft, accidents are more
4. Supply of vaccine regularly in Rural areas very negligible
5. Govt Veterinary dispensery fully not equipped to deal with poultry diseases
6. Lack of knowledge of feed ingredients locally available, managemental practices not know
7. Training programmed for poultry keeping under taken by livestock department once in a while without sufficient information and no follow up.
8. Eggs and chicken farms situated in rural areas are discouraging or depopulating desi chicken
9. None accessibility to purchase eggs and chicken from commercial farms in retail results more cost than urban areas.
10. Like cattle service worker or shepherds training centre in village livestock center one poultry health worker needed for 10 to 12 villages.

Desi birds rearing is an integrated component of village women and culturally accepted and at any cost she/he do not want to stop but need solution of above mention problem permenantly. Basic concept of training was "Participatory training". Solution of each problem was deliver suited to rural management. 50 day old male commercial chicks was kept in training programmed apart from all necessary equipment and each participants allow to learn about equipment, Vaccination procedure, Debarking when and how, merits and demerits feeding watering, Brooding procedure. 20 progressive, attentive, with little education was identify during the training and further trains by RC on vaccination, medication and feed manufacturing techniques.

Mini Modern Cross Breed Commercial Layer farming

1050 day old commercial layer chicks breed BV 300 Placed in resourced center and rear up to 16 week in RC idea behind rearing in RC

1. Management aspect.
2. Vaccination schedule
3. New Concept and rearing 50 birds individually women's was not fully equipped in terms of management practices.
4. To minimize the cost of production (Growing).

Brooding management, Lighting, Vaccination, Medication, Debarking, Deworming, Body weight control, Feeding schedule during growing period done by SHG in presence of RC. Initially for six weeks chicks mash feed purchase from market after that growing feed manufacture in RC as per formulation suggested by RP with locally available raw material. Growing mortality 1.8% with in standard body weight 92% uniformity at the end of 16 week After competition of 16 weeks 50 birds distributed each individual women selected by DCBC/NGO's. Total cost of growing period equally divided in 50 women's. Birds at the start of 17 weeks shifted to cages for laying. Each cage accommodates 5 birds standard cage size suggested by RP. Even 5,10,15 birds can be kept, keeping in view the local consumption demand that is main criteria for successful implementation

Women found rearing 50 birds in cages is easy job than deep litter, hardly 1 hour in a day they spend on 50 birds for feeding, Watering, Collection of Eggs and cleaning. For 50 birds keeping on deep litter required 100 sq ft constructed shed not possible with poor as they don't have place to live. Cages 10 can be kept outside the house under shelter with 4 to 5 feet space apart from this other advantages.

1. Easy to manage, Feed, Water and collection of eggs.
2. Clean eggs no breakage.
3. Litter born diseases almost negligible.
4. Deworming not require
5. Theft, accident incidences nil
6. Light requirement less than deep litter one bulb of 100 watts sufficient
7. Feed consumption less saving, on feed waste of feed
8. Cost of shed construction almost nil only a thatched shelter
9. Cull, sick birds easily identify
10. More eggs per hen compare to deep litter

MARKETING

Total eggs are sold in village shop directly to consumer thus village consumer save 50np as compare to earlier. Consumption habits of most nutritious balance food that is eggs increases to many fold in the 50 villages were these birds rear. Simultaneously egg consumption awareness programmed was initiated by PIA by arranging villages meeting, Posters in local language, Video film demonstration to highlight the eggs consumption advantages.

During laying period, Feed manufacture at RC in presence of 50 women weekly basis formula suggested by RP and weekly visit to each group that is 50 with help of NGO's is

done by RP to monitor health status, Feed Consumption, Feed Storage facilities, Egg production and regard maintain by individual group is monitor on regular basis. As one cycle of 72 weeks not yet complete birds are in laying old performance is as per the standard.

A.P. State contribute 30% in egg production and 25% in Broiler of country 150 million layer and 700 million Broiler, Commercial Poultry population of country and 60% of A.P egg production export to other India state, infrastructure for poultry laying is easily and economical available in state even though our experience show that rural people still getting egg and chicken at costlier rate than urban in A.P. This one model started with extensive base line survey of village population to maintain production and demand ratio.

Other Pilots NGO's we are working on even small number like 15 to 25 birds in each village depend on consumption and human population. Initially SHG were afraid of maintaining birds as they thought cages are meant for big commercial farms and they cannot afford. One cage for 5 birds costed them Rs.60 only with less space and management hassle free, one time investment with an average income of Rs 150/ bird per year. Apart from this villages are easily assets to 2 eggs at cheaper rate, providing secondary income were as other livestock activities like Ram, lamb, Calf, Cow rearing require affords land for grazing, fodder, generated income for period of year.

In this model women keeps money for daily feeds by selling eggs in retail and rest of the amount keeps in saving i.e. is on and average they are getting 43 to 45 eggs daily sold at Rs1.50 per egg means 45x1.5= Rs.67.50 income daily where as feed per day for 50 birds at 125 grms per bird per day @ Rs.6.50/Kg =81 N.P. Totally expenditure on feed Rs 40.6-67.5= net income Rs 26.90 on 50 birds were as if she works for a day in field gets double the amounts approx that to only in season.

Our experience working on this model show regular monitoring and evaluation after placements of chicks till now support groups to get good result if replicated in all Pilots require train workers all NGO's that is reason we working on poultry health workers training (Please see separated documents). All infrastructure right from chicks, feed, Medicine, Vaccine and cages made available can be replicated as a small holder poultry farming in developing countries for poverty eradication and malnutrition problems. This model is not yet completed a cycle that is the reason difficult to find out demerits.

CONCLUSION

In short we put the model implementation plants and has taken a lot of base work, affords to motivated, capacitatised group initially, input provision for small scale cross breeding rearing in remote places are the main constrains. We confidented after 2 or 3 flock rearing group can handle all operation right from brooding to feed making but should sell egg out side the villages. Any further information in detail on this model available with us. We also working on two other model

1. Preserving village desi chicken by cross breeding
2. Village poultry health worker

Contribution of the Newcastle disease vaccine

Emeritus Peter Spradbrow

May an unrepentant virologist join your discussions? It is now nearly 20 years since the Australian Centre for International Agricultural Research (ACIAR) accepted and argument put forward by Professor Latif Ibrahim and me, that rural Malaysia would not benefit fully from flocks of village chickens until Newcastle disease could be controlled. We had worked together with an Australian avirulent Newcastle disease vaccine; strain V4, in commercial chickens. We suggested this vaccine for use in flocks in villages remote form a cold chain. At about the same time the Bangladesh process was commencing, with an "intensive vaccination drive against Ranikhet disease" (Dr Ziauddin 21.May 2002, 20:48) Perhaps a little earlier the GTZ project on village livestock was underway in North East Thailand and the chicken flocks were vaccinated against Newcastle disease before other studies were undertaken.

I recall seeing extension material produced by FAO for use in Bangladesh. It included a coloured, illustrated booklet and projection slides that feature vaccination against Newcastle disease, but with conventional vaccines. Are these materials still in use, or still available? I could not locate them on my latest visit to FAO Rome.

Some of the Pacific Islands should have valuable contributions to make. Just what can be done with village chickens where there is no Newcastle disease? Are there other conditions that will eliminate entire flocks?

It will be difficult to transfer the current Bangladesh model to new locations. It will surely be a matter of sowing the seeds and allowing local evolution. From the little I have seen of Bangladesh, it will be difficult for other countries to replicate the source of day-old chicks or the infrastructure for their transport. The process of sustainable intensification will not be easy.

Many of the concepts displayed in this conference have been with us for the past 20 years, and probably much longer. Women and children will be the main beneficiaries, and sustainability of activities is very difficult. The role of "improved" stock remains a point of contention. It would be tragic to lose the genetic diversity present in village flocks. I heard Dr Hammond speak recently of the difficulties of overcoming genetic pollution when unwise decisions have been made. Perhaps uncontrolled Newcastle disease has benefits in some situations.

Concern about zoonotic infections derived from village poultry is a novel view. In some countries it is traditional of chickens to share the dwelling or the housing compound with their owners and I am not aware of problems except with bird lice. Some of the people; we try to help have such desperate hunger that they eat animals that have died of disease. We

must understand their hunger before expecting them to understand our concerns about transmission of disease.

Another recent innovation has been the recruitment of sociologists to our cause. This can only increase our ability to interact successfully with villagers. I hope some will devote attention to another question. Why do some administrations have the understanding and the will to produce appropriate poultry vaccines while others do not? What can we do to improve this situation?

Expérience Béninoise en matière d'aviculture villageoise intégrée

Falade Hippolyte

Dans le cadre du Programme d'Appui au Développement de l'Aviculture Villageoise (PADAV) financé par le Royaume de Danemark au Bénin, l'aviculture traditionnelle béninoise connaît aujourd'hui un nouvel essor avec un volet micro financement associé à l'appui technique sous l'initiative de deux ONG nationales: APTRETECTRA et GRAPAD. La première jouant le rôle d'Intermédiaire Technique apportant l'appui nécessaire sur l'itinéraire technique de l'aviculture et la seconde en tant qu'intermédiaire financier s'occupe du volet financement à la base (mise en place et recouvrement de crédits). Ce document donne un bref aperçu sur l'expérience telle qu'elle est conduite au Bénin avec un accent particulier sur l'aspect financement à la base.

CADRE DE DÉVELOPPEMENT DE L'EXPÉRIENCE

Démarrée en 1997 et pour une première phase de cinq (5) ans, DANIDA a financé un Programme d'Appui au Développement du Secteur agricole (PADSA) qui comporte deux composantes, l'une publique et l'autre privée. L'objectif global du programme étant l'amélioration des conditions de vie des populations rurales.

Les principales activités menées jusqu'ici par la composante privée qui utilise comme stratégie d'appui, l'intermédiation avec au centre les ONG (intermédiaires financier et technique) concernent:

- le financement de micro-projets générateurs de revenus dans le domaine post-récolte;
- le développement des cultures maraîchères;
- le développement des structures financières de proximité;
- la formation des bénéficiaires et des ONG suivant une démarche participative.

Globalement, les résultats obtenus sont satisfaisants et pour renforcer les acquis, la Réunion de Revue Annuelle (RRA) de novembre 1999 a recommandé de mettre l'accent sur les micro-crédits qui introduisent de nouvelles technologies et les micro-projets orientés vers les organisations paysannes. Et, c'est en accord avec cette stratégie que les ONG APRETECTRA et GRAPAD ont initié depuis l'an 2000 avec l'appui du "Réseau danois d'aviculture" et le PADSA, le Projet d'Appui au Développement de l'Aviculture Villageoise (PADAV).

LA MICROFINANCE COMME ÉLÉMENT STRATÉGIQUE D'APPUI AU PADAV

A travers le PADAV, il s'agit d'expérimenter un systÏème de développement de poulets villageois incluant une approche de micro-crédit appropriée aux plus démunis (développée par le GRAPAD comme intermédiaire financier) et des services techniques bien ciblés (dont la gestion est réservée réservée à APRETECTRA en qualité d'intermédiaire technique).

Le sous-secteur avicole étant très peu développé et trÏès exigeant en matiÏère de soins de santé, il est retenu dans les zones d'intervention une forme d'organisation favorisant le développement de la solidarité au niveau des producteurs comme base stratégique du Projet.

En conséquence, le crédit solidaire est identifié comme un atout pour le succès de ce dernier. Et le choix de ce mode de financement pour sous-tendre les activités du projet permettra de:

- de faciliter l'accès des populations pauvres, en particulier les femmes, aux moyens financiers pour développer de mini-entreprises avicoles;
- de créer une organisation solidaire locale pouvant développer des stratégies de défense de ses intérîêts et exercer des pressions pour faire prévaloir les règles d'hygiène indispensable à une bonne protection des cheptels avicoles;
- de renforcer la position ou le statut de la femme par son insertion dans un processus d'apprentissage continu et notamment d'amélioration de ses conditions d'existence;
- d'utiliser le crédit comme moyen devant préparer les bénéficiaires à procéder à des déstockages réguliers du cheptel.

ORGANISATION ET GESTION DES ACTIVITÉS À LA BASE

En attendant une extension du Programme sur l'étendue du territoire, vingt villages ont été identifiés dans quatre circonscriptions administratives du pays pour servir de site pilote. L'unité d'expérimentation dans ces villages est l'Association Villageoise pour la Promotion de l'Aviculture traditionnelle (AVPAT).

En effet, l'Association Villageoise pour la Promotion de l'Aviculture Traditionnelle (AVPAT) constitue l'unité de base dans les vingt villages d'intervention. Dans chaque village une AVPAT est crée et comprend huit groupes de solidarité (GS) d'environ cinq (5) personnes. Elle constitue la structure sur laquelle est basée le développement des activités du Projet en général et du crédit en particulier. C'est donc au sein des AVPAT que se développent les activités de crédit avec comme principaux bénéficiaires les éleveurs et les vaccinateurs.

L'aspect novateur et la complexité du domaine ont nécessité de la part du GRAPAD, une revue des outils de gestion existants pour une gestion efficace tenant compte de l'aspect intégré du Projet.

Étant entendu que GRAPAD est une ONG à volet micro-finance et en tant que telle développe déjà son système de crédit dans le cadre de l'exécution du Programme d'Appui au Développement de l'Agriculture (PADSA) au profit des populations défavorisées pour le développement de leurs activités génératrices de revenus.

FONCTIONNEMENT D'UNE AVPAT

La création des AVPAT qui met notamment au centre l'intermédiaire technique, (APRETECTRA) comprend deux grandes étapes: l'identification des groupes cibles et la constitution des groupes de solidarité.

En ce qui concerne l'identification, elle prend en compte les principaux acteurs à la base. Il s'agit des éleveurs qui exercent effectivement les activités avicoles, et les Vaccinateurs Villageois de Volailles qui interviennent dans la protection sanitaire du cheptel avicole.

Quant à la constitution des Groupes de Solidarité (GS), elle tient compte soit de la confiance qui existe entre les différents membres exerÇçant une mïême activité ou des affinités de toutes sortes quelles soient d'origine parentale ou amicale. Ces groupes comprennent en moyenne cinq membres.

L'AVPAT ainsi crée est structurée comme suit:

- L'Assemblée Générale (AG) qui est l'organe suprïême de décision.
- Le Conseil d'Administration (CA), composé d'un président, d'un trésorier d'un secrétaire et de deux VVV, est chargé de la gestion administrative et financiÏère de l'AVPAT.
- Le Comité de Contrôle (CC) composé de trois membres en moyenne et chargé de la vérification de la gestion financière de l'AVPAT.

L'ensemble des membres du CA et du CC constitue le Comité Communautaire de Crédit (CCC) étudient entre autres les dossiers de demande de crédit.

Crédits et conditions d'octroi au niveau d'une AVPAT

Pour bénéficier d'un crédit, les conditions générales à remplir se présentent comme suit:

1. Être membre actif d'une AVPAT
2. Respecter les statuts et règlements intérieurs de l'AVPAT
3. Accepter de constituer de l'épargne lors des remboursements à domicilier dans le compte de l'AVPAT
4. Être de bonne moralité
5. Accepter la caution solidaire
6. Résider dans le village
7. Avoir un passé en crédit sain
8. Accepter le suivi de ses activités
9. Accepter les conditions de remboursement des crédits
10. Respecter l'objet de crédit.

Caractéristiques du crédit

Les caractéristiques du crédit, comprennent le montant du crédit, les modalités de remboursement, les taux d'intérêt et d'épargne.

Le montant initial de crédit est de 25.000 Francs CFA (environ 38 euros) au maximum par éleveurs. L'échéancier de remboursement est de 6mois avec une période de grâce de 6 mois qui correspond à la durée minimale avant le déstockage uniquement valable pour le premier cycle. Le remboursement mensuel prend en compte la sixième partie du capital, de l'intérêt (12%) et de l'épargne (18%).

Étant entendu que les communautés de base ciblées sont constituées en majorité de populations pauvres dont les revenus sont si faibles que leur demander de constituer des ressources internes pour s'octroyer du crédit c'est les condemner demeurer dans la misère, la caution solidaire reste la seule garantie.

QUELQUES RÉSULTATS ET EFFETS

Un crédit d'un montant de Douze millions quatre cents vingt mille (12.420.000) FCFA (soit environ 18.933 euros) a été octroyé une vingtaine d'AVPAT (en moyenne 800 personnes dont 80% femmes.).

Les remboursements ont commencé depuis le mois de mars 2002. À ce jour les membres des AVPAT effectuent des remboursements à bonne date. Certains effectuent même des remboursements par anticipation. Le taux de remboursement estimé à la fin de mars 2002 est de 99,85%.

Il faut noter également que les bénéficiaires ont suivi plusieurs formations aussi bien sur les itinéraires techniques de l'aviculture que sur la gestion du crédit.

Les crédits ont permis aux bénéficiaires d'entreprendre mïême à, faible échelle ce qui les met à l'abri de l'oisiveté et des soucis. À travers les crédits, les femmes arrivent à faire face à un certain nombre de besoin. Ainsi, elles ont reconnu que depuis le début de leur collaboration avec le PADSA des changements interviennent dans leur vie. Au nombre de ceux-ci on retient:

- constitution du capital
- amélioration de leur revenu
- diversification de leurs activités génératrices de revenus
- constitution de l'épargne

Ces changements se traduisent au niveau de la femme par une certaine flexibilité, avec une acquisition d'une grande autonomie financière. Par ailleurs elles ont réussi à se soustraire de certains travaux pénibles en payant la main d'œuvre masculine.

Bien que des inégalités persistent au niveau du statut économique, social, et juridique des femmes, l'ouverture des perspectives dans le secteur traditionnel contribue à lever des barrières.

Elles assistent désormais aux réunions et participent activement aux dépenses du ménage. Elles ne tendent plus toujours la main à leur mari pour les petites dépenses (frais de scolarité des enfants, dépenses des soins de base de leurs enfants; etc.) du ménage. Toutes choses qui soulagent l'homme.

A research process and methodology focusing on indigenous Kenyan chickens

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SUMMARY

Indigenous chickens are among the local assets of poor people living mainly in rural areas and who make up between 65 - 80% of total population in sub-Saharan Africa. Over 90 % of rural households keep and rear chicken in small flocks of about 20 birds. Not until quite recently, there hardly had been any meaningful investment in harnessing this valuable resource as means to alleviate pervasive indigence.

Productivity of these birds has therefore been discouragingly very low. Bearing in mind that indigenous chickens comprise of close to 80% of total poultry population, ample investment in research and development in this sector then, is indeed a matter of great importance and for urgent consideration. The paper explores a research process and methodology carried out over a period of time as an attempt to mainstream indigenous chicken sector in the research and development agenda. There is also the stressing on its potential in contributing to development of sustainable livelihoods and poverty eradication among the poor, often marginalised section of the population, majority of who are rural women.

INTRODUCTION

In Kenya and elsewhere in the sub-Saharan Africa, between 65 – 80% of the population live in rural areas eking out a living from subsistence farming, often under very difficulty climatic and economic conditions (Gueye, 2000; Ndegwa, et. al., 1998). The main objective is to meet household food requirements. In most cases this is only a pipe dream and many of the rural folks are dependent on food handouts from their governments or non-governmental relief organisations. There is, therefore, a vicious cycle of dependency among millions of impoverished people in rural areas. They lack access to external inputs of production to improve output and their local resources are poorly managed and overexploited leading to environmental degradation and further impoverishment.

Improvement in the agricultural output in rural areas could be greatly enhanced by the proper harnessing and utilisation of local resources. Indigenous chickens are among the many local resources available in rural areas that, if well managed, could ease the burden of the people. Over 90% of rural households keep and rear indigenous chicken usually in small flocks of about 20` birds (Ndegwa ***et. al.***, 1999; Mbugua, 1990; MoLD, 1990; Stotz, 1983) and, according to Gueye (2000), more than 80% of the total poultry population in Africa is kept in rural areas. Chickens are usually regarded as a woman's domain and hence have a low status (Ndegwa and Kimani, 1996; Ndegwa *et. al.*, 1998).

Several factors contribute to low productivity often associated with indigenous chicken (Ndegwa and Kimani, 1996; Musharaf et. al., 1990) and manifested in terms of very high mortality, low growth rates and small mature weights and low egg production. But despite the low productivity, the birds play a very significant role in rural livelihoods in Kenya, and indeed in all other sub-Saharan African countries, (Gueye, 2000; Ndegwa *et al.*, 1998 MoLD, 1990; Ibe, 1990). In Kenya, indigenous chicken products (eggs and meat) are preferred and often fetch higher prices than those of exotic, mainly commercial-orientated poultry products. The contention then, is that, there is a potential for a local resource like indigenous chickens to, if properly harnessed, turn around the misery that is the lives in rural areas. This calls for a concerted effort by all stakeholders coupled with a change of attitude and policy focus. Infra-structural and institutional support, are hence required in research and development activities aimed at improving productivity at farm level.

Many people in sub-Saharan Africa have very precarious and vulnerable livelihoods. Any adverse change in situations surrounding them be they, environmental, socio-economic or political either at local or global level will almost certainly impact negatively on their lives. Their livelihoods are in no way sustainable. A comprehensive participatory approach is therefore necessary to develop a means of sustenance that guarantee the people a sustainable livelihood and freedom from being adversely effected by those conditions that have hitherto contributed to their perpetual indigence.

According to DFID (1999) andScoones (1998), a livelihood comprises the capabilities, assets and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base. Farrington *et al.*, (1999) have given a perspective on early experience in implementing sustainable livelihoods as a new approach in poverty alleviation. This approach draws on improved understanding of poverty not just in terms of income and consumption, but also in terms of absence of basic capabilities to meet physical needs (health, education, clean water and other services) The understanding is also highlighted by Chambers (1987).

On the other hand, the povertynet (2000), a World Bank website on poverty gives a simple but comprehensive description of what poverty entails. Poverty is hunger, lack of shelter, being sick and not being able to go to see a doctor. Poverty is not being able to go to school, not knowing how to read, not being able to speak properly, not having a job, is fear for the future and living one day at a time. Poverty is losing a child to illness brought about by unclean water.

Poverty is powerlessness, lack of representation andfreedom. Poverty has many faces, changing from place to place and across time. Most often, poverty is a situation people want to escape. So poverty is a call to action – for the poor and the wealthy alike – a call to change the world so that many more may have enough to eat, adequate shelter, access to education and health, protection from violence, and a voice in what happens to their communities. Proper harnessing of local resources of the poor people will help in the development of sustainable livelihoods for themselves and their generations and, contribute significantly in the fight on poverty eradication.

In the context of the above exposition, research on indigenous chicken has been underway in the recent past in Kenya under the Kenya Agricultural Research Institute's Poultry Research Programme. This has been an attempt to mainstream this sector at various domains and to realise its potential to contribute to poverty alleviation and development of sustainable livelihoods for the poor.

This study details a research process on indigenouschicken from on-station to on-farm that has been carried out in Kenya at the National Animal Husbandry Research centre of the Kenya Agricultural Research Institute. The aim was to evaluate growth and production characteristics of indigenous chicken and subsequentlyto improve their production performance at farm level. It is a process that encompasses the various participatory modes described by Biggs (1989) namely, contractual, consultative, collaborative and collegial.

The on-station research was basically of the contractual mode without any participation of farmers although they were the main clients. From on-station the research process moved into another phase of field survey in the consultative mode of participation. The third phase of the research process was the on-farm studies with a strong farmer and extension participation. This phase had a collaborative and collegial mode of participation.

This paper, therefore, is a description of an attempt to focus critically on, and to bring to the fore, a local resource readily and 'abundantly' available and, affordable in rural areas. It is a resource that the often marginalised and most vulnerable groups in the rural communities, who are mainly women, have complete access to, and control of. It is a resource with untapped potential that could be exploited to turn around the misery that is the life in rural areas. It may be of little significance to many people as exemplified by lack of any meaningful research and development investment in this sector over the years, but it holds the key to eradication of poverty among many rural communities and groups especially in marginal areas.

The paper also highlights the involvement of farmers in the on-farm research process where they (farmers), are left to choose interventions/technologies from a basket of options and either adopt and adapt them at their own pace and according to each individual's ability and capacity. It is therefore a description of two completely different research approaches. One being the conventional 'laboratory-type' controlled process and the other being a non-conventional on-farm research process in the hands of the farmers and wholly dependent on their participation. In-between, are different steps or processes undertaken to bring to the fore a better understanding of the role of indigenous chicken.

The research process involves a set of inter-related activities that followed one another. These steps are described in more details under methodology. However an outline of the importance of each step would be proper presently. The on-station research helped create the necessary impetus towards on-farm research by raising the interest of many stakeholders (Research and extension managers, policy makers, farmers, various categories of students and others) who had all along been sceptical about focusing on indigenous chicken.

Some useful insights into the potential performance of indigenous chicken were generated. Researchers started to have more confidence and to focus more on the need for an in-depth study on characteristic performance of indigenous chicken. As a result of the preliminary studies, the raising of awareness about the importance of indigenous chickens started in earnest. The on-station studies also helped bring about a change in orientation within the Kenya Agricultural Research Institute's management and more resources were hence sought and directed towards the sector. An approach for a more extensive study of indigenous chicken involving the stakeholders was then developed and is described in detail in the following sections. But generally, it was comprised of stakeholders' workshops and field visits to key informants.

These activities were meant to mainstream the indigenous poultry sector within the whole dimension of the livestock industry in general and the poultry industry in particular. They also offered fora for learning from other people with divergent views, experiences and knowledge and importantly, forging of strong linkages for collaboration. These were followed by farm-level field baseline surveys to establish farmer practices. Subsequently, on-farm studies were set up.

The experience from baseline surveys, like that of the on-station research, informed the subsequent on-farm research activities. They gave the researchers an insight as to the real situation at the farms and an understanding of how to interact and deal with farmers and extension personnel. The walls were beginning to fall. This is evident from the way the on-farm research proposal was formulated which was a big variation from the approach prior envisaged in the priority-setting workshops and in which farmers, the primary stakeholders, were grossly under-represented.

In our approach, we strongly felt it would be more prudent to involve farmers in the whole research process from selection through implementation to monitoring. Farmers' own resources were to be the main inputs. Placing the fate of the research process in the hands of the farmers was a radical change of attitude in the part of the research team. This change of 'heart' and 'style' in conducting research came about due to, more than any other thing, information gathered from the field visits and from the survey experience.

METHODOLOGY

According to Yin (1994), research can be generally categorised according to three purposes; explanatory, exploratory and descriptive. In social science, the research purposes are achieved through one or more research methods or strategies; experiments, surveys, histories, analysis of archival information and case study. Each strategy can be used for all three purposes - exploratory, descriptive and explanatory. There may be exploratory case study, descriptive case study or explanative case study (Yin 1981a, 1981b).

According to Sieber (1973), there are huge areas of overlap among various research methods or strategies. Mead and colleagues (1993), on the other hand, state that the purpose of experiments is to make inferences, as unambiguously as possible, about the effects of treatments applied to experimental unit. Sample surveys allow inferences to be made from a sample about the whole, but always finite, population from which it has been drawn. In this case, "there is no imposition of treatments". Sample surveys should describe certain properties of the population as they naturally exist. According to the same authors, in sample survey, stratification is related to blocking in experiments, both being ways of controlling unwanted sources of variation.

Sutherland (1998) has given a description of transformation in research processes from conventional research in the 1960s based in research stations that was mainly supply driven and often unrepresentative of farmers' conditions to Farming Systems Research (FSR) approach developed in the late 1970s. It placed importance on demand identification via the diagnosis of farming systems, rationalisation of research resources through priority setting, testing new technology under farmers' conditions and developing strong linkages with extension.

From mid 1980s, the FSR approach was criticised as being too linear and prescriptive and the generic approach of farmer participatory research (FPR) was developed. The FPR (Okali *et al.*, 1994) placed particular emphasis on farmer participation and incorporated ideas from related approaches such as participatory technology development (PTD), participatory rural appraisal (PRA) and low external input agriculture (LEIA). Farrington (1997) however, suggests that an FSR-type approach may work well for resource-endowed farmers in higher potential areas. FPR in contrast, would be more appropriate for resource poorer farmers in more marginal areas.

Research is useful only if it is taken up and applied by users of information and technology derived from it. This, according to Garforth (1998), is enhanced by dissemination to 'end users' (farmers, individuals, households, communities, companies, associations) engaged in productive activities, and 'intermediate users' (researchers in international agricultural research centres and national agricultural research systems, others concerned with research and development in non governmental organisations, private sector, extension, and donors)

THE RESEARCH PROCESS

In the next sections, the research process on indigenous chicken will be explained. A diagrammatic summary of the process is shown in figure 1 while figure 2 focuses more specifically on the on-farm research. Table 1 shows various activities of the research process and a description of each. In Table 2, a summary highlighting output generated from the activities is given.

FIGURE 1
The various stages of methodology used in the indigenous chickens study and their interactions

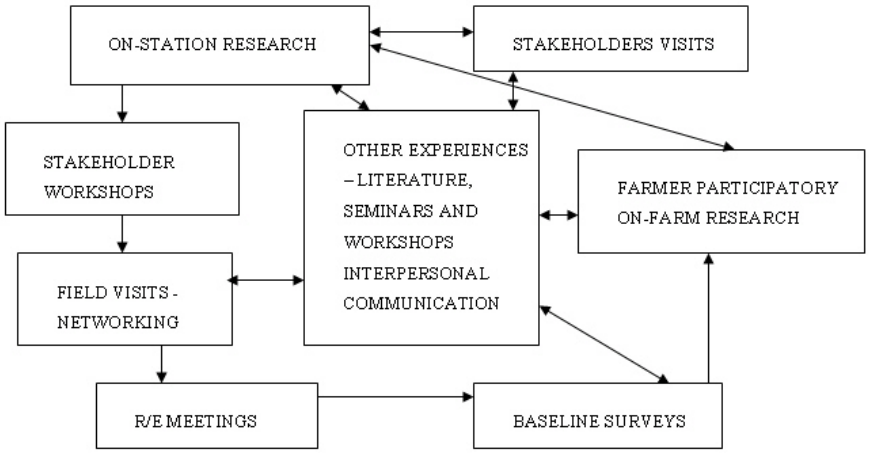

FIGURE 2
On-farm participatory research process methodology

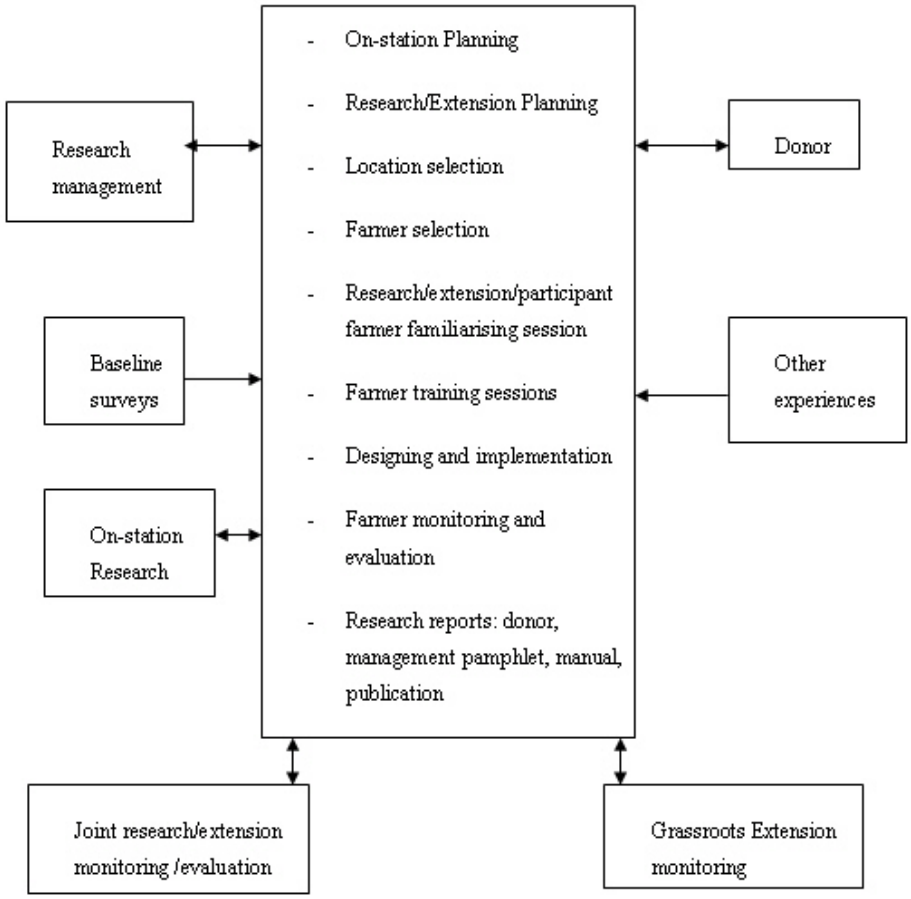

TABLE 1. DESCRIPTION OF ACTIVITIES UNDERTAKEN IN THE RESEARCH PROCESS

Activity	Description
1. On-station research	Main objectives to gain experience and an understanding about characteristics and nature of indigenous chickens and to generate information on potential performance under improved management
2. Stakeholder workshops (SHWs)	Held in 1994. Objective was the need to incorporate divergent views and experiences from a range of stakeholders. This is similar to suggestions by Grimble (1998) and ODA (1995). First workshop (Mbugua *et al.*, 1994), aimed at gathering available knowledge on: major production systems, production constraints, farmer solutions and researchable constraints. Second workshop aimed at: formulation of concrete research goals and project proposals to meet prioritised and achievable goals. SWOT methodology used (based on identification of Strong and Weak points and Opportunities and Threats of research) However, there was inadequate representation of primary stakeholders (the rural poor, subsistence farmer especially women)
3. Field visits – Networking	Undertaken in 1995 (Ndegwa *et al.*, 1998). Objectives were to establish state of the art in poultry industry, share experiences and forge close linkages with several individuals, organisations and institutions (extension, research programmes, universities, development projects, agri-business). Starky (1996) refer to this as 'Networking'.
4. Research and Extension mini-workshop and meetings	Objective was to have more focussed and detailed discussions about actual field work and to strengthen linkages with frontline extension personnel
5. Baseline field surveys	Done in 1996 in five agro-ecological regions (Naivasha, Njoro, Bahati, Ol Kalou and Ng'arua), (Ndegwa *et al.*, 1999). Sixty farmers covered per region divided into four farmer-clusters. A checklist used in semi-structured interviewing of farmers as in PRA. Information about household and poultry production recorded.
6. On-farm farmer participatory research	Study carried out between 1996 and 1999. Objective was to evaluate the effects of improved management practices on performance of indigenous chicken at farm level with a focus on farmer participation (J. M. Ndegwa – personal communication) Involved selection of location (5 regions and 4 farmer-clusters per region) and farmer on willingness basis (10 per cluster), training meetings (selected farmers plus many others and frontline extension personnel), intervention options and implementation by farmer, monitoring (farmer, extension, research), evaluation.
7. Dissemination of information	A continuos process and different modes- existing booklets and manuals, preparation of new materials from information gathered (pamphlets, manual, journal papers), conferences, seminars and workshops. Msc and PhD thesis.

TABLE 2. OUTPUT GENERATED FROM RESEARCH UNDERTAKEN

Activity	Description
1. On-station research	Experience gained helped build confidence to offer advice on management of indigenous chicken Creation of awareness, interest and enthusiasm among a variety of people Encouragement from valuable comments
2. Stakeholder workshops (SHWs)	Three poultry production systems identified: - subsistence mainly indigenous chickens - semi-commercial - small number, mainly exotic commercial chicken breeds and crosses with indigenous mixed with, geese, ducks, turkeys and pigeons - intensive, large scale exotic commercial breeds Constraints across systems: - socio-cultural factors (eggs and chicken meant for guests, low rating, associated with women mainly) - capital - market organisation - institutional support Specific production problems - high mortality, low production, feed shortage and low quality, inadequate technical knowledge
3. Field visits – Networking	Strong linkages formed - a major boon for on-farm participatory research (extension and farmers involved, hence less research time and personnel)Networking expanded scope of work outside research workplans - two Msc (Tuitoek *et al.*, 1999 and Okong'o *et al.*, 1998) and one PhD (on-going) research projects, co-operation with some development projects (GTZ, NPDP, and ASALs) Poultry found to be of much importance in rural livelihoods Recommendation for a survey at farm level to establish status in poultry production
4. Research and Extension mini-workshop and meetings	Mutual trust and a sense of ownership developed due to strengthening of linkages with frontline extension personnel
5. Baseline field surveys	Production characteristics of indigenous chicken under farm conditions established (Ndegwa *et al.*, 1999, Siamba *et al.*, 1998). Farmer management practices and knowledge established. Potential to develop rural poultry production demonstrated.

Activity	Description
6. On-farm farmer participatory research	Close to 500 farmers attended training sessions. Farmers allowed to choose from a variety of interventions to adapt and or adopt.
	Mutual trust created among all players.
	Cluster formation an important farmer organisation- allowed for acquisition of some external inputs (pooling)
	Farmers confidence and interests in their birds created.
	Project rated third best overall at sixth KARI scientific conference (KARI, 1999).
	Data and information collected currently being analysed in a PhD project thesis.
7. Dissemination of information conferences, seminars and workshops	Msc and PhD thesis, new materials from information gathered (pamphlets, manual, journal papers), photographs for gallery exhibition.

CONCLUSION

This comprehensive research process and methodology, is a clear testimony to the extent as to how far attitudes and interests have changed in favour of indigenous chicken as a very important resource available to majority of households with heavy loads of poverty on their shoulders. Proper harnessing of this resource through concerted efforts will enable millions of indigent households in Kenya and elsewhere in sub-Saharan Africa to improve their living standards and establish sustainable livelihoods.

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Participatory strategic approach to development of improved indigenous poultry systems in East Africa

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ABSTRACT

An on-farm farmer participatory research project was carried out in Kenya to improve the management of indigenous chicken and their productivity at farm level, in five different agro-ecological zones. This paper details the research methodology used and highlights some experiences and lessons learnt. The major objectives of the on-farm research were; to improve management and productivity of indigenous chicken at farm level, to change attitudes towards indigenous chicken, to improve farmers capacity and ability to carry out research (involve them in design, implementation and monitoring activities) using local resources and, to exploit the potential of indigenous chickens to contribute to poverty alleviation among rural landless people mainly women.

The research project was carried out in five different agro-ecological regions. In each region, four clusters (each cluster from a different village) were selected comprising of ten farmers each. This was followed by farmer training workshops that were held at cluster level. Implementation of a variety of improved management practices was done largely by use of local resources and farmers participation. Monitoring and evaluation were done continuously by farmers and on a regular basis by the research team.

Over five hundred farmers were trained on improved management practices for indigenous chicken production, a figure higher than 2-fold the anticipated target. An important achievement was made in the way of creation and enhancement of social capital by bringing together individual farmers and the research team to interact freely and share information, knowledge and experiences. Mutual trust, interest and enthusiasm were generated and were instrumental in the subsequent implementation of the project. Farmers were able to implement a variety of interventions from a basket of options, at their own pace and, with their own locally available resources. Formation of farmer groups (clusters) was a big boon in securing some limited external inputs such as roofing materials and vaccines through joint efforts (harambee).

This paper demonstrates and emphasises that involvement of beneficiaries in anti-poverty initiatives, is an imperative if the objectives are to be achieved.

Key words: Participation, Strategies, Indigenous poultry, improved management, Poverty alleviation.

Production, Management and Marketing Dynamics of the Rural Scavenging Poultry in Uganda

Byarugaba, D.K., Olsen J.E. and Katunguka-Rwakishaya, E.

ABSTRACT

A study was conducted in the districts of Kumi and Bushenyi to collect baseline information about the production, management and marketing dynamics of the rural scavenging poultry in order to design strategies for the improvement of the production and marketing of the rural scavenging poultry in Uganda. A questionnaire was administered to selected rural poultry farmers in the two districts by trained interviewers during the year 2000.

Most of the households were headed by males and all of them were engaged in farming besides other activities, and 97% of them kept chickens and 67% kept turkeys for many years. The numbers of poultry varies from 6-20 excluding the chicks and poults. These poultry are mainly kept under scavenging system (90%) with a few (10%) practicing semi-scavenging system and the daily management is done by women and children (90%).

Production also varies with seasons associated with outbreaks of Newcastle disease while the markets are variable ranging from 2,000- 3,000 Ugshs depending mainly on the weight of the birds. Turkeys go for a much higher price (5,000- 15,000 Ug shs) and have been observed to survive during Newcastle disease outbreaks. These farmers experience problems of disease (especially Newcastle disease and parasites). It was apparent that these farmers require support in extension services to advise them on improved management, and disease control with the available technologies.

Key words: Rural, village, scavenging, poultry, production, marketing, management

INTRODUCTION

Poultry provide an acceptable form of animal protein to most people through out the whole world with their perceived healthfulness of their meat in human diets and their competitive costs in most countries (Gueye, 1998). Despite the tremendous expansion of the commercial poultry sector in the last three decades, scavenging poultry have not undergone drastic improvement but still account for more than 80% of the total poultry production in developing countries in Africa, Asia, Latin America, and South Pacific (Sonaiya, 1990). They are kept in rural areas contributing substantially to annual egg and meat production. The total fowl population in Africa was estimated at 1,868 million in 1995 producing 1,695,620 metric tones of eggs and 2,096,000 metric tones of meat (FAO, 1996). In Uganda the poultry population was estimated at about 30 million of which rural

scavenging poultry were estimated to represent 26 million (about 90 % of the total) in 2000 and until recently very little attention has been paid to them (FAO, 1996).

While poverty reduction interventions that the rural poor especially women can profitably undertake are difficult to identify, there is high positive impact on women's and children's lives recorded in impact studies of the semi-scavenging poultry model developed and applied in projects in Bangladesh (Alam, 1997). Despite this enormous potential of scavenging poultry for alleviating poverty and improving the quality of life of the hardcore poor and their children, who account for about 45% in Uganda, little attention has been paid to it as judged by records of scarce funding and limited expertise, and less regard of smallholder poultry as an area of importance in terms of political aspects or scientific prestige.

This study was therefore designed to collect baseline data about production, management, marketing practices and diseases in scavenging poultry in order to be able formulate appropriate strategies to improve their production and health in order to improve the quality of life of the poor people through improved poultry production.

MATERIALS AND METHODS

Study area

A survey was carried out in the districts of Kumi and Bushenyi, which are, socio-economically, geographically and climatically distinct. A questionnaire was used to gather baseline data about the management, production and marketing dynamics of the rural scavenging poultry. The demographic data of the owners was also collected.

Selection of households

The two districts were considered as the target distinct populations on the basis of their differences mentioned above. The number of households to be included in the study per district was 100 households selected randomly from a list of households from two villages that were also selected randomly.

Data analysis

Data was coded and entered into a computer and analysed using the Statistical Programme for Social scientists (SPSS). Frequencies and means were compared.

RESULTS

Household demographic characteristics

The household were mainly headed by males (80%, n=203) aged between 21 to 50 years most of who were married (83%, n=203) with a few widowed (3%) and separated or divorced (1%). Most of the household heads had attained primary level education (41%), and other attended secondary education (27.6%) and 17 % had attended tertiary institutions, while a reasonable number (10% had not attended any formal schooling).

Household Activities

All the households were engaged in farming (100%) and almost all of them (97%) were keeping local scavenging chickens, while 67% of them also kept turkeys (with other livestock like cattle (55%). The households also kept crops which varied from millet, sorghum, bananas, cassava and several cereals. Others were engaged in formal employment such as civil service (13%).

Poultry Keeping

Over 75% of the households have been keeping the local poultry (97%) for more than five years. Eighty percent of the household keep 6-20 chickens (this excludes chicks) and only a few (1.5 %) keep over fifty chickens. The number of cocks in the flocks ranges from 1-5 (80%) with about 5-10 hens (75%). The chickens are kept by most households because of ease of management (96%), resistance to disease (20%), growth rate (10%) and several other reasons such as availability, ceremonials and religious reasons. The sources of chickens are usually from markets by purchase (75%) and a few as gifts or inherited. The number of turkeys kept ranged from 2-25, with an average of six.

Management

The chickens are managed almost entirely on free range system (90%) with only a few (10%) practicing semi-intensive management. The management is mainly done by children (60%), women (30%) and the husband only participates little (10%).

Housing

The chickens are not housed (96%), but the few who house the poultry do so in kitchens (55%), separate shelters (30%) or in the sleeping houses (15%).

Feeding

Fourty seven percent of the farmers provide supplementary feeds which are mainly leftovers from the house or cereal grain during bumper harvests. This is done any time of the day but more so in evenings as the chickens come back home. No water is provided to the chickens (90%) because most farmers (89%) think that the water is not necessary.

Problems encountered in management.

Eighty percent believed that disease was the biggest problem while predators also contribute significantly (49%). Others problems associated with management include quarrels with neighbours and thefts. These problems lead to low morale (60%) and eventually they resort to keeping a few birds.

Chick losses

All the farmers experience chick losses caused by diseases (95%), predators (95%), accidents (2%). Often more than 50% of the chicks are lost before they mature.

Disease control

Most of the farmers make no effort to control disease (60%) and the rest make attempts. Those who control diseases do so by use of indigenous knowledge (60%) such as herbs and application of paraffin to control external parasites, while 20% using modern medications while some use both. Many of them do not control predators. All the farmers required advice on how to control Newcastle disease.

Extension Services

The farmers (80%) rarely get advice from extension agents about poultry management as they are not regarded as an aspect that requires serious attention. It is only for a few of the farmers who are going into semi-intensive that go to seek for advice

Production.

The chickens begin laying at six to seven months, laying 11-20 eggs per clutch and no nests (97%) are provided for this. The chickens normally have three clutches per year. Most of the hens are left with 10-15 eggs for hatching of which 45-75% may hatch into chicks. The rest of the eggs are usually either eaten or sold. The eggs for hatching are usually (99%) from the household flocks. Often less than 50 of the hatched chicks survive to maturity and farmers never bother to sex the chicks and neither do they consider them as chickens until they are about ready for sale or laying, so quite often they are not even counted. Few farmers (41%) realise the change in production with season as such except in association with outbreaks of diseases that almost wipe out the flocks especially Newcastle disease which comes during certain seasons.

Marketing

The major products for sale in the rural chickens are mainly the chickens and eggs. Accordingly about 32%of the farmers sell eggs while the rest do not. The eggs are mainly sold at the trading centres at a cost of between 50 and 100 Ug Shs and 52% of the farmers think that the market for eggs is not reliable. The chickens are mainly sold off in large numbers at periods when they expect Newcastle disease outbreaks, that is, in January, and November. There are also higher sales around festival periods such as Christmas. The prices vary between Ug shs 2000 - 4000 for cocks and 2000 - 3000 Ug shs for hens depending on the size/weight of the chickens and the season. The turkeys fetch much higher prices vary from 5,000 to 15,000 Ug Shs. The majority (60%) believe that the marketing is not sufficiently organised and hence there are problems of low prices (80%) and the buyers are sometimes few also or not available when wanted.

Improvement of Production

Eighty one percent suggested that housing could tremendously improve production and many also indicated that besides housing, feeding and disease control also need to be improved to increase production especially control of Newcastle disease. Extension services were highly demanded (65%) to train the farmers how best to improve their production and marketing.

DISCUSSION

Domestic fowl are the most important type of poultry kept in Africa. Because of low productivity, indigenous fowl production in Africa has been neglected and is frequently considered by farmers as an insignificant occupation compared with other agricultural activities. Nevertheless, village fowl provide the population with a vital source of protein and income. In addition, they play an important role within the context of many social and /or religious ceremonies. Rural scavenging poultry contribute more than 90% of the total poultry population in Uganda and like in many other countries there is still little information available on these forms of poultry.

This study therefore collected baseline data about rural scavenging poultry, which would form a basis for prioritising research and intervention strategies to improve the production as well as marketing. The study revealed that the rural household have kept poultry for many years basically on scavenging system of management similar to other areas in Africa and in Asian countries (Gueye, 1998). The households keep flocks of between 6 and 20 chickens per household excluding chicks and growers, with very few who keep over 50 birds under semi-scavenging system of management. Similar numbers of turkeys are often kept along with chickens. Flock sizes over 100 chickens were reported in Tanzania (Kitalyi, 1996) which was attributed to vast empty land available as opposed to other countries. In this study, this was observed between Kumi and Bushenyi where the numbers were relatively more in Kumi (average 15 chickens) as compared to Bushenyi (average 7 chickens) due to the differences in the land availability and utilisation.

The numbers of poultry vary with occurrence of certain diseases such as Newcastle disease, which wipe out more than 60% of the chickens when it strikes. Farmers therefore sell many of the birds prior to such disease occurrence in order not to make losses from the outbreaks. This creates differences in the flock structures at different times of the year and thus the flock dynamics. At the time of this study the flock structure was on average 12.6 hens, 4.3 cocks, 14.2 growers and 20.3 chicks with an approximate ratio of hens to cocks of three to one cock. Due to the vulnerability of the chicks to several problems of disease and management the flock characteristics change the desired flock ratios. These are also influenced by egg production.

The study showed egg production to range from 11-20 per clutch, which is similar to what has been reported for other countries such as Tanzania. (Minga, et al, 1986) BurkinFaso (Bourzat and Sauders,1990). Some countries however have reported higher egg production of upto 50 eggs per clutch. This was attributed to management practices that discourage brooding and could be used to increase egg production. While egg production and chick survival are the major determinants of flock productivity, chick mortalities account for very high losses in most villages. Management practices that minimise chick losses therefore could be used to increase output from the scavenging chicken. Egg production is also a function of egg production per hen and the proportion of mature laying hens in the flock. The proportion of laying hens in this study was on average 24%. This factor can also be manipulated to increase the proportion of the laying hens and egg production and hence output.

The hatchability of the scavenging chicken has been considered to be low. This study showed hatchability of between 45-75% and this falls within the range reported by others

(Wilson, et al., 1987, Van Veluw, 1987). Some have even reported up-to 100% hatchability (Minga, et al., 1989). Improved management such as provision of nests for laying could help achieve optimal hatching potential of these birds.

The poultry are generally raised on a free-range system and they survive as scavengers. Women and children play a key role in their day today management (90%) with very little of men participation (10%). Supplementary feeding sometimes is given in form of leftovers from household surplus. There is very little information regarding feed resources in Africa. A few studies (Musharaf, 1990) that have reviewed feed resources for the rural poultry include data on crops such as cassava, millet, plantain which are considered unconventional energy feed resources which seem to be cheaper that the commercial rations with no significant differences in growth rate (Sonaiya,1993). Rudimentary coops or shelters may be provided to give some protection against bad weather and night predators. This is the typical low input low output system affordable even by the poorest social strata of the rural populations.

One of the major constraints to village poultry production in Africa is undoubtedly the existence of various diseases (Ojok, 1993, Minga and Nkini, 1986). The problem of diseases in village chickens is compounded by the interaction of different entities that are of significant importance to disease epidemiology. There are uncontrolled contacts in the villages between birds from different households as well as frequent introduction of birds from markets, gifts or other purchases. These and other wild birds may play a significant source of infection as they roam freely in villages.

Among the diseases most commonly recognised is Newcastle disease, which was ranked the most important. Besides Newcastle disease, there are also parasites both external and internal, which are well recognised by the farmers. Some of the parasites such as stick tight fleas are known to cause serious losses especially in the chicks. In these villages, local remedies are usually used to treat many of these diseases such as use of paraffin to clean off external parasites and many herbs for internal parasites. Because of virtually no extension services there is very little of modern medicine used in control of diseases. As a result Newcastle disease has continued to wipe out many of the chickens when it strikes although vaccines are available.

According to reports from the various countries including Uganda, the most prevalent diseases include Newcastle disease, respiratory disease complexes, fowl pox, diarrhoea, salmonellosis, collibacilosis, fowl cholera, parasites and several others (Thitisak, et al.,1988, Sirinivasa, et al., 1989, Ojok, 1993). Rearing losses are very severe, with high mortalities in the young being an important component. It is estimated that mortality of indigenous poultry under scavenging conditions is 70% and above in chicks up to 8 weeks of age (Sonaiya, 1999, Thitisak,et al.,1988). These high cumulative levels of mortality influence the structure of the flocks whereby 30-50% of flocks are normally chicks. Efforts to increase productivity through improvements in health, feeding, housing, genetics and management have been very minimal until recently (Scola, 1992; Kitalyi, 1996; Gueye, 1998).

While rural poultry do not rate highly in the mainstream national economies because of lack of measurerable indicators of its contribution to macroeconomic indices such as domestic gross domestic product, it has been recognised in national economies of developing countries regarding its role in improving the nutritional status and incomes of many rural poor families (FAO, 1982, Bembridge, 1988, Creevey, 1991, Mokotjo, 1990).

There is still paucity of quantitative data regarding the rural poultry systems and its importance. Sustainable production systems for rural poultry must be dealt with on a systems approach as they form part of an integrated farming system in most rural settings. The two highly ranking problems of the system as identified in this study were Newcastle disease control and management. The tools and technologies for tackling these problems are available and have been proved elsewhere and wait to be directly adopted with a few modifications while further baseline studies continue.

For the control of Newcastle disease, there are currently several vaccines available including the thermostable vaccines while management will involve all aspects including providing appropriate housing using local cheap materials, and proper use of all the available feed resources. The resistance and survival of turkeys during Newcastle outbreaks was an interesting observation that is being investigated. If the findings are favourable, turkeys will be another poultry species deserving promotion as it fetches higher prices and its meat is healthier. In conclusion, the strategy for improving production in rural poultry requires community participation through farmer training programmes by extension agents for increasing management skills and control of diseases.

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TABLE 1. DEMOGRAPHIC CHARACTERISTICS OF THE HOUSEHOLDS

Sex of the household:	Male 88% Female 12%
Education of household head:	Primary 55% Secondary + 45%
Age of head:	< 30 years 26% 31-50 years 50%
Marital status of head:	Married 83.7% Single 16.3%
Occupation of head:	Farming 75% Other 25%
Family size:	<5 35% 6-15 62.5%

TABLE 2. ACTIVITIES OF THE HOUSEHOLDS

Farming	100%
Keeping scavenging poultry	97%
Keeping turkeys	67%
Keeping cattle	55%
Crops	100%
Other activities	several

TABLE 3. FLOCK STRUCTURE

Number of eggs laid	11-20
Clutches per year	3 per year
Number of cocks	2-5
Number of hens	5-15
Number of growers	15-25
Number of Chicks	10-40
Number of turkeys	2-25

Some issues in family poultry development

Oluyinka A. Olukosi

There is no doubt that family poultry (FP) is an important tool in alleviating poverty among the "poorest of the poor" in developing economies. This is in view of its popularity in many places (about 90% of rural Africa population keep poultry) and its ease of operation. In order to use this tool effectively, there are some issues (health, nutrition, productivity and socio-economics) that have to be considered. These have been discussed in this conference, I only wish to elaborate on some other aspects of these issues, which may be relevant in the FP development.

Most of the past efforts in FP development have placed emphasized on a unilateral genetic improvement of the local chickens, but because of lack of a whole-system approach, they failed. Genetic improvement will not work, when it is not backed by the improvement of the whole scavenging system. Introduction of a superior breed of chickens to an unimproved scavenging system only exposes them to hazards of poor nutrition, poor health status, poor predator-avoidance ability, and inability to adapt to the precarious conditions associated with scavenging. Hence a holistic approach to FP development is necessary, and it should also be stepwise.

NUTRITION

Results of surveys carried out in various regions of Africa, Asia and South America have shown that FP depends very largely on scavenging. This is both an attraction and an advantage of the system. In my own work, I have found that many FP owners believe that their chickens will do very well on scavenging alone, and hence supplementation is a waste of resources. Some do practice feed supplementation, but this is irregular and meager. Obviously, FP has subsisted on supplementation for centuries, but if there is an expectation of improved performance, there should be a corresponding increased input of the flock owners.

Hence, there are the questions relating to supplementation such as, what to supplement, when to supplement, how to supplement, how much to supplement, and which category of chickens to supplement. Basically, there are two types of supplementation; the quantitative supplementation (nutrient supplemented) and the quantitative supplementation (quantity of feed supplemented). The supplementation that is practiced by most flock owners presently is the quantitative type. Hence, it may not address the whole issue of supplementation needs. While protein may be deficient in some situations, vitamins may be the limiting nutrient in some others. A careful study of what is available to chickens to the range will be a good indicator of what to supplement at various periods.

On the other hand, quantitative supplementation is important to augment what scavengable feed resource base (SFRB) there is. The pioneer work of Gunaratne et al (1993) is important in determining the quantity of SFRB. The implication of the scavenging system is that there is a finite supply of scavengable feed in any location at any time period. Besides, it is not all the SFRB that is available to the scavenging chickens; factors such as distance of homesteads to farms could limit availability of chickens to harvest gleanings, while local regulations could impose restrictions on the chickens' movement, hence there is the concept of available SFRB, rather than total SFRB.

The formulas of Gunaratne et al (1993) for estimating the SFRB raise some questions. How should the SFRB be expressed (g/chicken, g/flock, or kg/meter2)? Should household leftovers be used as a reference point for estimating the SFRB? Clearly, there is SFRB even in an open field where there are no houses. Sonaiya et al (2002a,b) suggested and describe the use of SFRB predictors (by direct measurement of number of insects, vegetation cover, household leftovers, etc) as well as bird unit in estimating the SFRB as well as expressing the quantity. These are not final solutions to the problems, but open the subject to more discussions.

HEALTH

The issues in health relate more to diseases and endo-parasites. Newcastle disease (ND) has been singled out as the greatest single threat to FP production. Efforts at combating ND in village flocks have yielded encouraging results. In two studies in southwestern Nigeria to assess the effectiveness of feed supplementation and vaccination against ND, the best performance of chickens was reported when there was intervention in both health and nutrition Sonaiya et al (2002b). However, as soon as ND is under control, other diseases become very important too. Thus, health intervention should be holistic, rather than being too fixated on the control of ND.

PRODUCTIVITY

The productivity of chickens in the scavenging system has been generally poor. The parameters for measuring productivity that have been discussed are mostly in terms of hen-day egg production, number of eggs/clutch, clutches/year, hatchability, and chick survival. Cumming (1992) and Sonaiya et al (2002) gave a graphic description of assessing FP productivity. It made use of an input-output relationship for estimating productivity of FP. Such analysis is needed in assessing the productivity of chickens, otherwise we may not be fair to them.

Energy (fuel or food) is an important input in any production, hence a consideration of the energetics of production is important in evaluating the productivity of FP system. In an on-farm study in southwestern Nigeria, factors such as multiple-hen incubation (one set of eggs incubated by more than one hen) and hens laying away from home were observed to contribute to low productivity. It will seem that the use of home-made kerosene incubator will improve the productivity, but the energy cost of running the incubator puts it at a serious disadvantage, the efficiency of the incubator is 23% of the efficiency of natural incubation. Further similar studies will be needed to ensure the relevance of FP development strategies.

SOCIO-CULTURAL

There is the socio-cultural aspect of FP development. The implication of the prevalent culture, or the use to which a product is deemed necessary could limit the effectiveness or relevance of any development strategy. No matter how relevant a model is in statistical or mathematical terms, unless it addresses peoples' perceived needs, it may not be acceptable.

CONCLUSION

It is important to consider the various issues that have a bearing on the FP development. The basic characteristic of any sustainable system should be its versatility.

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Improving Family Poultry Farming in Morocco: Constraints and Possibilities

Benabdeljelil K, Arfaoui T and E Karari

INTRODUCTION

Family poultry farming plays a major role in the economy of rural Morocco. It provides cash income,job opportunity and remains one of the most popular and economically rewarding mean of supplying animal proteins to local communities. Population growth, urbanization and successive years of drought have further led to increased reliance on such traditional low risk production sectors.

In addition to the aforementioned factors small holder family poultry (FP) constitutes an important contributor to food security in rural Morocco where 70% of the farms have less than 5 ha. This sector contributes over 22% of the poultry meat produced in the country and nearly one egg out of four is laid in FP farms. In recently conducted investigations, the ratio of village chicken to human populations was slightly over 1:1 (4) and almost doubles in favorable seasons. Current constraints to FP systems were poor management practices; lack of feed or unbalanced supplementary feeding, prevalence of diseases, lack of extension and health services. (2 and 4)

Previous improvement programs have essentially been based on introduction of new genotypes leading to heavier birds, higher productivity, but did not emphasis enough environmental adaptation. The new concept is rather the implementation of sustainable projects in harmony with natural resources and to alleviate somehow existing pressure on the environment. Lack of detailed appropriate data hinders however significant projections. It has not been possible to correlate existing statistical data with any major limiting environmental factor. These issues are briefly addressed in the present contribution along with few guidelines for improvement in the local conditions.

CHARACTERISTICS OF FAMILY POULTRY PRODUCTION SYSTEMS

Women play a major role in FP development through provision of labor, management practices and decision making concerning the use of resources. Most flocks were owned and managed by women (in 75% of the households) in these systems characterized by low investment and and practically no involvement of state services. At the opposite of other animal flocks, no association or share of any kind existed in these productions which were all privately owned and managed.

Flock composition in FP was essentially dominated by chickens (82% of the household surveyed raised chickens) as reported by 1 and 4. The birds raised in these extensive hus-

bandry systems had rather low productivity compared to others. Detailed descriptions of these systems have been reported by 3 and 4. The majority of the birds raised were hatched on the farms while a growing number of households used random crosses with commercial improved strains.

Socio economical status of the household affected flock structure and technical level of management as reported elsewhere (6,7). Very rarely and except when cooperatives were involved, some professional organizations were available lacking credit facilities. Most of the information circulated verbally. Women managing flocks aimed to maintain sustainability rather than stress productivity; thus several did not feed their children eggs to keep fertile eggs for setting. No taboo of any kind against eating any poultry product was observed.

Several technical possibilities are available to improve rural poultry production. Flock productivity is based on various husbandry parameters relating to reproduction, mortality and flock management. Any suggested mean for improvement should bear in mind the importance of traditional practices in maintaining the resource base while accessing to productive techniques and new markets.At the household level, we should continue to improve production efficiency, adopt new technologies. Poultry housing using local materials and properly designed for each region should reduce mortality and increase productivity.

The availability of year-round feed and water resources (in some areas) in appropriate quantity and quality constitute one of the major limiting factor to a sustainable production. Suitable watering and feeding systems are to be developed saving water and at the mean time improving its quality. Training and education will help understand feeding needs of birds at various ages and species. Scavenging might be a good source of free nutrients but with a little imput,particularly in unfavourable times.

RESEARCH AND DEVELOPMENTS

Research in this area has a key role to achieve in order to not only avoid mistakes of the past (projects sustainability, introduction of unsuitable genotypes, copying of success stories from elsewhere.) but also to strengthen food security and increase income through original means, adapted to environmental needs, to alleviate poverty, to increase employment, to promote gender equality where it is the most needed.

To reach such goals and promote FP, regional approaches are needed where the local population remains the key player with sound,efficient,cost effective integrated programs. Developing specific tools or appropriate research methodology in this area remains an important challenge. Commitments of more resources to successful programs will then become a prority. Multidisciplinary approaches in coordination and complementary to existing or on going programs must be the angular stones of new research projects. Coordination of research goals to extension and training programs is an achievable goal.

Genetic improvements

Improved chicken genotypes have been introduced in previous programs (5). The successes and failures of these operations remains a topic of controversy. Their longterm impact on FP systems productivity has been rather limited. In a time where bio diversity and preservation of genetic resources is a world priority, these introductions of new genetic pools are of great concern.

Improvement of local flock performance can be attained however through planned and controlled selection and crossbreeding. Previous studies conducted on rustic breeds in local conditions have demonstrated that crossbred performed better than local chickens and had specific advantages compared to commercial lines. (5) To improve biological productivity of FP genetic resources, continuing on-farm performance monitoring is required to quantify efficiency and genotype-environment interactions.

Disease control

Inadequate housing facilities, low quality and insufficient feed supply, lack of awareness and above all unavailability of environmentally suited chicks all contribute to high mortality and reduced productivity which can be substantially improved through appropriate disease control strategies. Major diseases and constraints conditions limiting FP should be evaluated in relation to the investigated areas rather than copying stereotyped models developed elsewhere. Sound surveillance services, regional epidemiological networks,simple evaluation and monitoring systems and a stable supply of the strictly needed products to remote areas are key factors to long-term success.

Practical bio-safety measures, specifically designed control programs and availability of products suitable for FP are all prerequisites to efficient control programs. Sensitizing veterinary services to develop effective, adapted control methods for the main diseases encountered is only a part of sustainable projects. These realistic strategies and others will increase prevention and control of major poultry diseases encountered.

Numerous possibilities for improvements of FP can be tried such as training, products diversification,extension and credit availability services. The main priorities are to be selected for each region according to its particular needs.

Products marketing

FP farming should be oriented more toward quality in a broad sense including product quality, environment preservation instead of quantity oriented mass production. Development of niche markets to increase added value products, creation of "Appellation d'origine contrôlée" and "label products" in addition to diversification are few of the possibilities. Poultry products obtained from these systems have a good image; their acceptability is not hindered by any of the usual stimuli of consumer environment. Local policy makers currently placing a growing emphasis on developing traceability systems for intensive animal productions should extend their concerns to FP products.

Governmental support

A three fold mission for government role can be assigned: - establishing clear standards and regulations which benefit all chain participants; - co-ordinating efforts of agencies, NGO's,state and international services, mass media operating in FP sector, - developing harmonious long-term collaboration, building partnership, mutual benefit relationships with the farmers. In the institutional process, better linkages should be established among FP farmers, government participants and markets. These combined efforts will promote FP and increase food security. Extension and information, training and continuing education are usually among state duties. Strengthening through education, training of human

resources in their respective functions and amplifying access and transfer of knowledge for FP managers are the priorities.

Appropriate teaching materials specifically designed for target populations should be developed using local languages. There is an increasing need for information and communication, effective extension materials and tested methodologies.

RECOMMENDATIONS

There is a tremendous potential for developing FP production in Morocco. It is sobering to remember that these systems are operating with environmentally friendly production methods which is an absolute prerequisite for their durability. By their integrated nature, FP systems are already quite sustainable and supply precious protein sources in periods of scarcity. In order to strengthen sustainability, preparedness to drought, introduction of appropriate low -cost available technologies, affordable measures can limit the impact of factors constraining production.

FP raising remains a low cost, important and efficient way to significantly reduce poverty and enhance food security particularly in poor areas and for low income populations. Food availability and poverty alleviation are goals that require full attention and co operation from all interested parties in this sector. Tested strategies for effective improvements means should be implemented. Outlining directions for future work in relation to other areas (of agricultural or non agricultural) development is also an urgent necessity. Recommendations focusing on projects implementation, past experiences and difficulties with the application of participatory approaches, development of agribusiness strategies should be thought of in advance to insure the success of FP projects and their sustainability.

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Commercializing rearing of village chicken in Kenya

Thomas Junne Kaudia and Aichi Kitalyi

SUMMARY

A field study on the status of village chicken was carried out in Nyando district in the Republic of Kenya to document flock characteristics, management methods, and identify constraints and opportunities in rearing village chicken in the area. Village chickens are reared under scavenging systems mainly as a source of income and food. Flock population per household was 24.2 chicken with 50% chicks and hen to cock ratio of 2.6 to 1.

Good productive hens lay an average of 15.4 eggs having 3.1 clutches per year and a hatchability of 87.5%. However, chick mortality at weaning after three months is high at 62.4%. Main causes of chick mortality are disease and predators. Chicks take 6 months to attain market weight of about 1.2 kg. Most of the farmers apply no specific techniques to boost production. Women own, manage, sell and receive money from chicken sales in most of the households. Constraints to rearing chicken are disease, predators, poor housing, poor management and lack of feed, low market prices and lack of markets.

It was concluded that the potential for village chicken as a source of wealth and development, promotion of gender equity and poverty alleviation is enormous and can be harnessed by training farmers, improving management and marketing systems.

Key words: indigenous chicken, mortality, scavenge, disease, gender equity.

INTRODUCTION

Indigenous chicken is dominant in developing countries (Mopate and Lonny, 1998) despite the introduction of exotic chicken in the 1920s and represent 74% of the number of chicken in Kenya (GOK, 2001).

According to Roberts (1992), village chicken can break the vicious cycle of poverty, malnutrition and disease. Chicken meat is rich nutritionally providing protein, fats, minerals and vitamins. Indigenous chicken can be a good source of cheap nutrition for resource poor households, the sick, malnourished and children under the age of five (Kitalyi, 2002: Personal communication).

But village chicken suffers very high mortality (Aini, 1990; Pandey, 1992) due to causes that are preventable (Wilson et al., 1987). Newcastle Disease (ND) is however believed to be the major cause of mortality in indigenous chicken in Africa and Asia (Bell, 1992).

To harness the potential of village chicken, Kitalyi (1998) suggests a new approach, aiming at increasing flock productivity through improved extension services, farmer training and preferential treatment of chicks.

The Objectives of the Survey

The objectives of the survey were: To document; productive characteristics of local chicken, management practices used by the community to rear village chicken, constraints and opportunities in rearing indigenous chicken and facilitate community members design action plans for the improvement of indigenous chicken in the area.

Field Work Approach

The fieldwork was carried out in five zones within Upper and Lower Nyakach divisions of Nyando district (Kusa) in Nyanza province of the Republic of Kenya. Focus Group Discussions (FGD) and person-to-person interviews were used to gather information. A one-day seminar was held at the end of the survey. To estimate quantitative levels of supplementation, each system used to scoop feed was calibrated by weighing. Data was analyzed using Statistical Package for Social Scientists (SPSS) computer program.

RESULTS AND DISCUSSIONS

General overview

Most of the households rear village chickens under scavenging system mainly as a source of income (39.4%) and food (36.2%). Women own and mange most of the flocks. But chicken meat is only consumed when important guests visit the family. Most farmers (62.5%) prefer chicken with brown plumage color mainly because it lays many eggs and sells faster at the market.

Average flock per household was 24.12 chickens with 50% chicks at a sex ratio of 2.9 hens for one cock. A core of breeding hens is kept to maintain the flock. Some (26%) households did not have a cock. Mopate and Lony (1998) observed a hen to cock ratio of 6:1 in Chad. In general the number of chicken per household was high.

Management Practices

Most of the farmers share their houses with chicken housing them either in the main house and/or in the chicken. The main bedding materials used where chickens are enclosed in the night are soil, sacks and mats with most farmers using soil. The bedding material is swept and/or removed every morning mostly by women. A woven basket locally known as Otete is used for covering chicken in the night to confine them in one part of the house. Few farmers have built poultry houses but are inappropriate.

Feeding

Ninety-eight percent of the farmers feed supplements to chicken. Most of the supplements are bought and fed to chicken in the morning mainly by women. Supplements are spread on the ground when feeding chicken The feed resource base (FRB) consist of maize, kitchen wastes, vegetables, sorghum, rice bran, ants, local fish meal, commercial feeds, flour and milling wastes lacking in vitamins and proteins. More than 75% of the farmers were supplementing with carbohydrates. Fishmeal, which is the main sources of protein, is only occasionally fed to chicken. The total quantitative supplementation is about 3.30 kg per week given mainly during harvest time.

Chickens are given water in all the households mainly by women. Water containers, except dishes are secured in a hole dug in the ground. These containers are seldom removed for cleaning and sanitation. Water is simply refilled when the level goes down.

Flock Health

The mortality is oftentimes more than 50% rising to 100% in most of the farms with an average of 89%. Forty six percent of the farmers had noted a mortality of 100%. Ninety-eight percent of the farmers treat sick chicken with diverse types of drugs including traditional concoctions. 56.7% used traditional methods, 26.9% used modern drugs including non veterinary drugss, 11.9% vaccinated chicks while 4.5% used pesticides to control external parasites.

The most worrying disease symptoms are swollen heads, white diarrhea, closed eyelids, mucus salivary exude from the nostrils and mouth and wheezing and coughing.

From the symptoms described by farmers, it was clear that Newcastle disease (ND), Infectious Bronchitis (IB), Infectious Coryza and Fowl Pox, Fowl Cholera (Common during cold weather), Infectious Bronchitis, Coccidiosis, Fowl Typhoid (Common during warm weather affecting both chicks and adult birds) and Pullorum Disease are common poultry diseases in Kusa. Most (95.7%) of the households bury dead birds while 4.3% throw dead birds, which are eventually picked up by scavengers.

Flock Production Characteristics

Hens lay an average of 15.4 eggs per clutch with 3.1 clutches per year. Few farmers wean off chicks at day old and reported 5 clutches per year. Households consume about 18.5% of the eggs laid. Selling of eggs is not common. The average hatchability was good at 87.6% with 62.9% chick mortality. Hens spend 270 days brooding chicks in a year.

The causes of mortality in chicks were predators (42%), disease (18.3%), a combination of disease and predators (36%) and drowning (3.1%).

Constraints to managing indigenous chicks

Main constraints to rearing chicks and adult birds are lack of feed, lack of proper housing, disease outbreaks, predators and poor management Figure 1.

The solutions to these constraints that could be pursued according to farmers' perspectives are constructing proper poultry houses, making feed at home, vaccination and treatment with modern drugs, training and forming poultry groups.

Marketing and Marketing Constraints

Households sold an average of 10.6 chickens earning a month income of US$ 1.575, which is below poverty level. Income can be increased through training to reduce mortality, increase number of clutches per year and improve rate of growth. Only three hens are required to earn above poverty level (Table 1). Main marketing constrains are low prices (56.9%), lack of market (25%), disease outbreak (12.5) and high cost of transport to other markets (5.6%). Feeding expenses worked out from 3.3-kg supplements fed per week.

FIGURE 1
Constraints to managing chicks and adult chicken

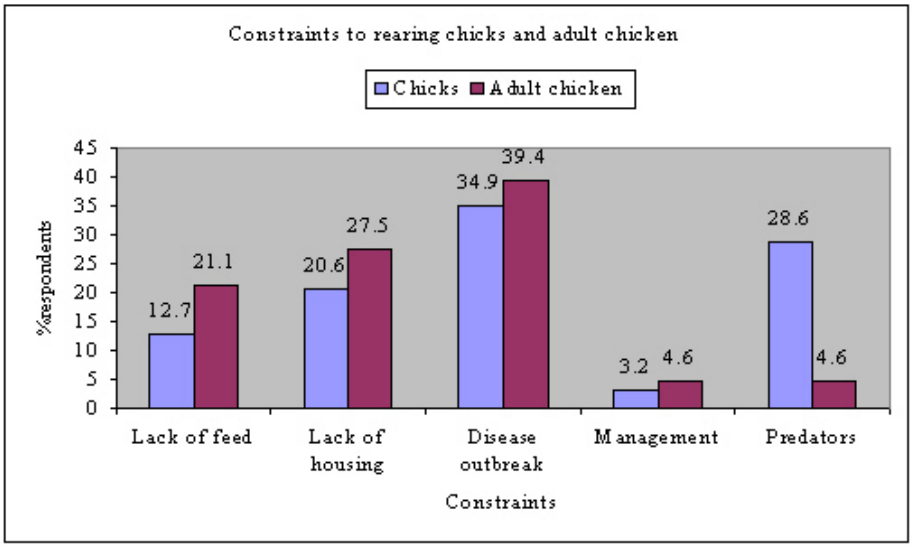

TABLE 1. INCOME PROJECTIONS FROM VILLAGE CHICKEN UNDER IMPROVED MANAGEMENT

With three hens a farmer is already above poverty line.

Farmers need training to be able to control disease, improve management and increase size of flock. Most of the farmers have not reared exotic breeds of chicken because they lack skills and capital.

The activities on the action plans were vaccination, training, building poultry houses, marketing and provision of market information, extension services, exchange tours and starting a community livestock resource centre.

CONCLUSIONS AND RECOMMENDATIONS

Rearing of village chicken in Kusa like in many parts of Africa is not developed like other agricultural sub-sectors. Village chickens are reared on traditional scavenging systems with minimal supplementation. The chickens are reared mainly as a source of income and for food. Unfortunately, chicken meat is consumed only when there is an important guest.

Productivity and hatchability are high despite poor housing, inadequate feed resource base and high mortality and general poor management. Women are playing crucial role in rearing of village chickens in the area. The potential of village chicken as a source of poverty alleviation, improvement of nutrition and promotion of gender equity is high and realizable. There is need to encourage villagers to consume more chicken meat and scientists to develop appropriate interventions to improve production of village chicken and also develop training materials in various local languages.

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Semi scavenging poultry model - the experience in Benin

Chrysostome Christophe, Riise Jens Christian and Anders Permin

INTRODUCTION

In Benin, with its 120.000 km^2 and close to 6 million inhabitants, approximately 80% of the population is presently involved in agriculture. Livestock production in Benin is mainly based on traditional smallholdings. As for poultry, 90% of the estimated 29 million poultry are kept in smallholder systems by almost all families, with 10-20 poultry per family. Activities are normally controlled by women.

As a traditional activity, the village based poultry production system provides meat and eggs of high nutritionous value for home consumption and for the complementary monetary income of women peasants, notably by the sale of these products.

Interventions to improve the small-scale production system, should assist the small-scale farmers, notably women, in improving the livelihoods. For this reason, DANIDA in the period 1997-2002 has financed a Agricultural Sector Support Programme (Programme d'Appui au Développement du Secteur Agricole, PADSA), with a specific component on village poultry (Programme d'Appui au Développement de l'Aviculture Villageoise au Benin, PADAV) with the aim of using small-scale poultry in the struggle against rural poverty and food insecurity in two provinces in Benin.

The overall strategy, involves creating a favourable enabling environment, with a suitable micro-credit system to reach the resource-poor, well targeted technical services (training and coordination of stakeholders) and a network of services to provide the veterinary services and other necessary inputs all the way to village level(GAHOU 2002).

The development of solidarity groups at village level, supporting the development of the interdependent micro-credit credit system with support and training giving by the NGOs are one of the main pillars of the Benin semi-scavenging model, just like in the Bangladesh and the Malawian models.

THE BENIN MODEL

The model is organised around tree pillars, the production, the service and the supply pillar. The institutional structure behind the model in the pilot phase of 18 months in the Mono province (districts Bopa and Houéyogbé) and the Donga province (districts Ouaké and Djougou), are two national NGOs, APRECTECTRA and GRAPAD. The first NGO, APRECTECTRA, is in charge of technical development of a viable chicken production system at village level, and the second NGO, GRAPAD, for the financing of the production inputs, group formation, credit training and follow-up.

However, for a good conduct of actions, the two NGOs are highly dependent on the collaboration of private veterinarians, of craftsmen supplying poultry keeping facilities in local materials, of the personnel of the "Direction d'élevage" for the technical support; and of scientists of Faculté des Sciences Agronomiques of Abomey Calavi University and the Network for Smallholder Poultry Development in Denmark for the specific supports in research and for the development of the system. The tree pillars of the model have specialized functions and tasks.

The pillar of production: It constitutes of smallholders, who each have a small farm with only 8 to 10 hens, mainly local breeds. The hens are kept under semi scavenging conditions and fed less than 40% by locally supplemented feed.

Supply pillar: This pillar is composed by Village Vaccinators (VVV), who are local poultry keepers trained specifically to vaccinate birds. Vaccine against Newcastle Disease is supplied by private veterinarians and the VVVs charge a vaccination fee. Another member of the supply pillar is the poultry seller. A poultry seller collects poultry and market them in the nearby towns. Poultry keepers may also sell their chickens themselves in the village. Some peasants are specialized themselves for the construction of poultry equipment, housing, perches, drinkers etc. for the poultry keepers. Due to the lack of a parent stock and subsequent sustainable delivery of Day-Old-Chicks (DOCs) in Benin, it was decided to use a simple supply model in Benin, focusing on local breed and the delivery of vaccines and medicals.

Service pillar: The pilot phase of the project presently covers 10 villages in the North (department Donga) and 10 villages in the South (department Mono). Each village has 40 members, i.e. total of approximately 800 farmers plus 40 VVV. The involved NGOs form small village groups with 5 members. The groups hold weekly meetings to discuss relevant subjects. New poultry keepers are allowed to join the village group (AVPAT: Association Villageoise de Producteurs d'Aviculture Traditionelle) only after receiving 2 to 3 days training programme held by the NGO for the poultry holder and by the university staff (FSA) for the VVV and extension workers of the involved NGOs.

Technical extension is provided by APRETECTRA and financial extension are provided by GRAPAD. Depending on the activities (poultry keeper, VVV, poultry seller) each member is provided with a small loan of 30,000 FCFA for producers and 25,000 F CFA for VVV and poultry sellers. The repayment period is 1 year for a poultry producer and 6 months for the others. The interest rate is 12% per semester while the rate of saving is 18% per semester and a rate of penalty of 2% the month on the capital remaining due.

For the pilot phase (2000-2002), the model will be developed further, based on the ongoing evaluation of gaps on the technical or financial side, the Network for Smallholder Poultry Development Copenhagen and scientists of Faculté des Sciences Agronomiques of Abomey Calavi University will develop training material, other documents and a scientific resource for semi scavenging poultry holdings.

Preliminary results

20 AVPATS are created and function for the promotion of the traditional poultry production.

40 VVVs, chosen on the basis of very definite selection criteria, are trained in vaccination and medication (APRETECTRA 2002). All are very active in the field and some have achieved substantial beneficiary profit margins.

Data from baseline studies enables a comparison of the mean poultry flock size and structure before and after the PADAV intervention with training and vaccination campaigns in the Northern department Donga (Ouake and Djougou). From table 1 it is clear that the effect on reducing the natural mortality of the chicks is pronounced (from 90 - 100% to an estimated 5 - 10% after vaccination campaigns)

The adoption of new simple technologies by the smallholders (troughs in terracotta, improved nests, utilisation of local feed stuffs, grouped marketing of products) is well established in most villages, giving a sustainable effect.

Preliminary results on the use of credit (table 2) shows two remarkable tendencies for the smallholders: 1) Very little (13%) of the initial loans are spend on feed, and 2) 25% are spend on poultry housing, not initially included in the budgeted expenditures. If smallholder's spending patterns are not well balanced, severe effects may be found on the repayment of the loans and the sustainability of the model.

CONCLUSION

From an organisational and training point of view, the relatively simple "Beninoise" poultry model is highly successful, even after only one year's intervention. However, running evaluation of the model performance is crucial to the long-term success on a larger scale.

See Tables 1 and 2.

TABLE 1: SIZE OF POULTRY FLOCKS IN DEPT. DONGA BEFORE AND AFTER PADAV INTERVENTION

Year	Cocks	Hens	Pullets	Chicks
2001	4	8	12	22
2000	2	6	11	0

TABLE 2: USE OF CREDIT-PRELIMINARY RESULT

Feed	13%
Vaccination	4%
Deworming	3%
Other medicine	20%
Poultry house	25%
Birds	19%
Other	16%

REFERENCES

APRETECTRA 2002: Rapport d'activités Avril 2002 pp 14

GAHOU Emmanuel 2002: Le crédit solidaire pour la promotion de l'aviculture villageoise au Bénin: le Projet d'Appui au Développement de l'Aviculture Villageoise (document interne).

La vaccination contre la maladie de Newcastle en aviculture villageoise

UN FACTEUR DE DÉVELOPPEMENT IMPLIQUANT TOUS LES ACTEURS DE LA FILIÈRE

Afrique Agriculture - No. 281 Mai 2000

Par le Dr Guillaume Rémond responsable export de Laprovet et le Dr Eric Fermet Quinet, responsable de Projet d'appui au secteur privé de l'Elevage au Mali.

Il fut une époque lointaine (il y a vingt ans déjà) où la simple évocation de l'aviculture villageoise, c'est-à-dire l'équivalent dans les pays en développement de notre basse- cour fermière européenne traditionnelle, suscitait au mieux un sourire agacé et méprisant, au pire une colère technocratique dans les cercles des experts en développement agricole (on ne disait pas encore «rural», ce qui était révélateur). Les choses ont bien changé depuis, le poulet de case étant devenu dans plusieurs pays, une réalité économique au même titre que l'aviculture intensive.

L'antienne connue était en gros que «*l'aviculture industrielle est le seul système de production qui pourra nourrir les villes dans l'avenir*». L'aviculture villageoise était considérée comme un anachronisme: sa disparition passait par une suite linéaire d'amélioration zootechniques et sanitaires qui transformerait inéluctablement, par une sélection génétique et professionnelle, des races locales de volailles en Leghorn et autres Dercko, et des paysans en aviculteurs industriels…

C'était faire fi de nombreuses réalités techniques, environnementales, économiques et sociales, tout en refusant une «***confrontation idéologique***» entre tenants du développement agricole industriel et militants du développement rural de base, à une analyse objective des deux systèmes de production et de leurs développements potentiels respectifs.

UNE ACTIVITÉ QUI CORRESPOND AUX RÉALITÉS DU TERRAIN.

Les volailles villageoises représentent souvent plus de 70% de l'effectif total dans les pays de la zone soudano- sahélienne (effectif estimé, par exemple, à plus de 20 millions au Mali). Ce système d'élevage est très différent de l'aviculture de type semi- industriel auquel il ne doit pas être comparé.

L'activité villageoise est avant tout familiale, en petits effectifs individuels, très dispersés, d'une productivité faible. Toutefois, elle est adaptée, avec des coûts d'intrants et d'investissements négligeables, aux conditions de vie des populations paysannes, donc à

leurs besoins alimentaires, sociaux et économiques. Elle est aussi devenue urbaine à deux points de vue. La plupart des familles urbaines possèdent une basse-cour pour les mêmes raisons que les familles rurales. Par ailleurs, les marchés de consommation urbains sont encore approvisionnés, en majoré, par la volaille locale (circuit vif avec garantie de fraîcheur en l'absence de chaîne du froid; transports sur de longs trajets en pleine chaleur; vente par un réseau capillaire informel de vendeurs; prix unitaire plus bas; mode de cuisson et alimentation familiale.

ESPOIRS ET CONTRAINTES DE LA FILIÈRE VILLAGEOISE

Depuis quelques années, notamment après la dévaluation du franc CFA en janvier 1994, l'aviculture villageoise en zone soudano-sahélienne est devenue exportatrice. Ce sont des camions entiers qui quittent chaque semaine les marchés du Burkina Faso et du Mali vers Bouaké, puis Abidjan en Côte d'Ivoire. Des cyclistes transportent parfois une centaine de poulets sur un vélo, du village vers le marché local. Des volailles vivantes sont aussi accrochées aux ridelles des camionnettes «bâchées» pendant des heures jusqu'au marché régional, et enfin entassées dans des cages vers le marché final. La fluidité du circuit, son faible coût logistique et la résistance de la race locale sont les atouts du système.

Le secteur industriel obéit lui à d'autres contraintes (circuit de production et de commercialisation) et répond à des besoins spécifiques de consommation: restauration collective, consommation individuelle et rapide dans les rues ou pendant la journée de travail pour les employés citadins.

Décidément, il faut bien le dire, un producteur n'évolue pas de manière linéaire de l'élevage traditionnel vers un élevage moderne; les deux systèmes sont ainsi différents et complémentaires.

La raison économique et sociale devrait finir par l'emporter. Mais les distorsions du marché sont encore nombreuses, comme notamment l'intervention de programmes plaqués et récurrents qui subventionnent l'installation artificielle de l'aviculture industrielle, ou bien appliquent à l'aviculture villageoise des «paquets techniques» éculés depuis 40 ans (coqs améliorateurs finissant dans la casserole, et poulaillers améliorés dont les tôles sont judicieusement utilisées… pour l'habitat humain). Cependant, depuis plus de deux décennies, de nombreux projets de développement ont permis d'améliorer ce système d'élevage, notamment par la formation et l'encadrement des éleveurs.

Le pionnier véritablement reconnu a été le Programme de développement des animaux villageois (PDAV) au Burkina Faso qui a débuté en 1978. Il a suscité l'émergence d'une véritable filière commerciale adaptée au marché intérieur et à l'exportation des volailles villageoises.

Par la suite, de très nombreux projets se sont développé, souvent grâce à l'intervention de Vétérinaires Sans Frontières au Nord Togo, au Niger, en Guinée, au Sénégal et au Mali, pour ne citer que ces pays.

Toutefois, il existe de nombreux facteurs limitants au développement de cet élevage traditionnel, dont la maladie de Newcastle qui occasionne de fortes mortalités. D'une façon générale, son impact est plus élevé chez les poussins et les jeunes que chez les adultes. La propagation de la maladie est très rapide du fait du contact permanent entre les volailles d'un même village et du transport entre villages des «*poulets bicyclettes*».

Cette mortalité systématique a d'ailleurs entraîné une démotivation et un désintérêt profond du paysan à l'égard de l'élevage de volailles tant qu'il n'a pas été informé de la possibilité de vacciner ses oiseaux.

PROPHYLAXIE MÉDICALE

Les programmes de vaccination préconisés dans les élevages industriels ne peuvent être applicables dans les élevages villageois. Le choix s'est porté, depuis de nombreuses années, sur les vaccins inactivés compte tenu de leur relative thermotolérance et de leur plus grande efficacité. La distribution dans l'eau de boisson ou dans l'aliment est trop aléatoire en élevage traditionnel compte tenu des conditions d'élevage, ce qui rend irréaliste l'utilisation de vaccins vivants qui, par ailleurs, confèrent une immunité plus courte.

En revanche, un vaccin inactivé injectable utilisé avec succès par l 'ensemble des projets avicoles cités précédemment, assure une protection durable de six mois à un an en primo-vaccination et d'un an en rappel. Son conditionnement en petites doses est particulièrement adapté aux effectifs villageois. Le taux de vaccination est remarquablement satisfaisant en pratique dans les zones suivies par les projets avicoles spécifiques; mais, ailleurs, ce taux reste malheureusement très réduit.

D'après une étude réalisée sur 1182 sérums prélevés sur des volailles vaccinées dans les régions de Kaolack et de Fatick au Sénégal (*), les résultats montrent une prise vaccinale correcte pour 73 à 98% des effectifs.

L'époque de vaccination doit s'adapter à la période d'apparition de la maladie (par exemple, entre septembre et mars au Burkina faso), à l'époque où la volaille est à son effectif maximal et avant que les villageois ne préparent leur récolte. Comme il s'agit d'élevages multi- espèces, il est souhaitable de vacciner également les pintades qui, sans être aussi sensibles que les poules au virus, sont quand même un maillon important dans le cycle épidémioloàgique de cette maladie.

EFFET POSITIF DU DÉPARASITAGE

Cette même étude a prouvé l'intérêt de déparasiter les volailles au moment de la vaccination. En effet, les lots déparasités et vaccinés ont présenté des titres d'anticorps IHA (inhibition de l'hémagglutination) plus élevés que les lots vaccinés sans avoir été déparasités, notamment avec un vermifuge à base de lévamisole et de niclosamide.

Le lévamisole stimule les défenses immunitaires non spécifiques en favorisant l'augmentation du nombre de lymphocytes T. D'autre part, le déparasitage, en améliorant l'état sanitaire des volailles, améliore la qualité de la prise vaccinale.

DES RETOMBÉES ÉCONOMIQUES SIGNIFICATIVES

Ces programmes offrent l'avantage remarquable d'être pérennisables et transférables en totalité dans le secteur privé: ils contribuent à renforcer les liens de clientèle entre les vétérinaires privés et les éleveutrs. Sur cet aspect, le Projet d'appui au secteur privé de

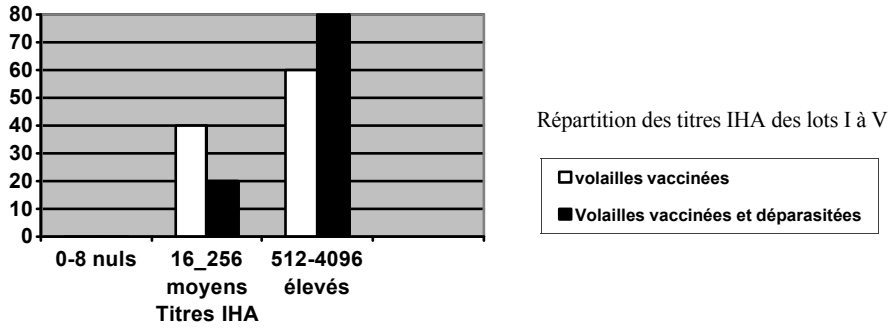
(*) Thèse du Dr Evali Djimi (Cameroun) sur la *Contribution à l'étude de l'évaluation de l'efficacité de la protection vaccinale et vérification de l'effet positif du déparasitage sur la réponse immunitaire en aviculture traditionnelle dans les régions de Kaolack et de Fatick au Sénégal*. Soutenue le 31 juillet 1996 devant la Faculté de médecine et de pharmacie de Dakar

l'élevage au Mali, financé par la coopération française, est sans doute le plus abouti, après trois années de campagne d'information d'environ 2500 éleveurs menée entre 1995 et 1997. Le chiffre de vaccinations contre la maladie de Newcastle est passé de moins de 100 000 à plus de 3,5 millions par an, et se maintient de puis lors en progression et sans aucune intervention extérieure.

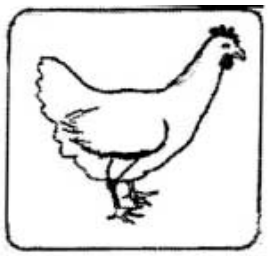
Ces programmes, s'ils sont conçus d'emblée comme une campagne d'information et de formation des populations, et intégrés dans un réseau d'approvisionnement vétérinaire privé sans siubventions d'intrants, sont appropriables et réplicables à coût dérisoire (quelques dizaines de millions de francs CFA) pour des bénéfices de production qui pourraient se chiffrer en centaines de milliards de francs CFA pour la sous-région. Bien sûr, en dehors de la vaccination et du déparasitage, restent à améliorer les soins aux poussins et l'hygiène des poulaillers. Certains préconiseront des compléments alimentaires… . Néanmoins, une dynamique de réussite a été lancée avec la vaccination contre la maladie de Newcastle en milieu villageois. Il en sera de même avec d'autres pathologies émergentes (variole, Gumboro,…) si les partenaires économiques y trouvent chacun leur intérêt.

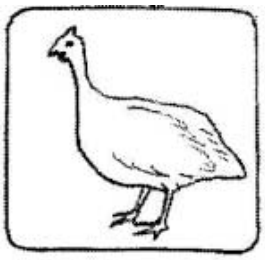
Gageons que les éleveurs, s'ils disposent d'une information adaptée délivrée dans une relation professionnelle de clientèle, sauront faire évoluer leur système de production et l'adapter au marché.

Il n'en reste pas moins qu'il est du ressort des Etats et des partenaires du développement de veiller à certains aspects ayant trait à la recherche, aux infrastructures de base et aux aspects législatifs. En particulier, la recherche sur des vaccins thermostables pour les pathologies émergentes, l'aménagement des marchés et des conditions de transport et la fluidification des échanges.



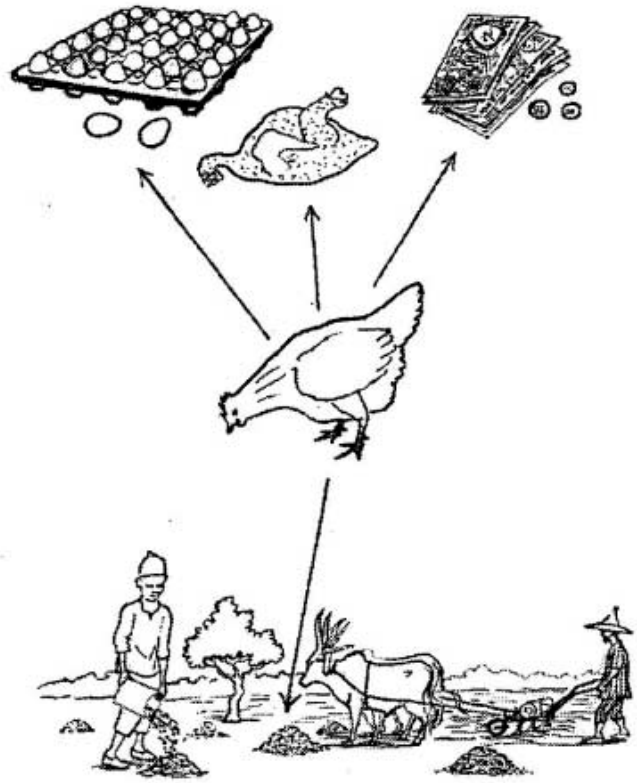
Répartition des titres IHA des lots I à V





Les volailles villageoises représentent la presque totalité des volailles en dehors des grandes villes où l'agriculture semi-industrielle se développe.

Ce type d'élevage traditionnel est apprécié car, sans beaucoup de moyens, il peut faire gagner de l'argent à l'éleveur



Mais malheureusement, souvent les volailles meurent dans les villages, et il ne reste pas grand chose à l'éleveur

Les volailles meurent à cause des maladies, mais aussi parce qu'elles n'ont presque rien à manger, ou parce qu'elles sont mal protégées (surtout les poussins).

Pourtant, un petit nombre d'interventions peut aider les éleveurs à ne plus laisser mourir les volailles, et donc à avoir beaucoup de volailles.

Qu'est-ce que la maladie ?

L'état de la maladie est très difficile à définir. C'est l'opposé de l'état de bonne santé. Tout le monde sait ce qu'est la maladie, car elle est fréquente et chacun de nous a été au moins une fois malade.

Ici, nous parlerons des maladies que l'on peut prévenir ou guérir.

Qu'est-ce que prévenir ?

C'est le fait de protéger l'animal contre une maladie. On le fait avant que la maladie n'arrive. On le fait sur un animal en bonne santé.

Qu'est-ce que guérir ?

C'est remettre l'animal malade en état de bonne santé en le soignant.

LES MALADIES SONT NOMBREUSES, MAIS ON PEUT CHERCHER A SE

BATTRE CONTRE LES PLUS DESTRUCTRICES ET LES PLUS CONNUES.

LES PRINCIPALES MALADIES

EN AVICULTURE VILLAGEOISE

LA MALADIE DE NEWCASTLE

Chaque année, elle tue au moins la moitié des volailles en Afrique sub-saharienne.

Si la maladie arrive dans un village, presque toutes les poules meurent.

Elle attaque beaucoup d' espèces, mais surtout les poules en saison froide et période de grands vents (harmattan).

COMMENT RECONNAIT-ON LA MALADIE DE NEWCASTLE ?

Beaucoup de poules tombent malades et elles meurent presque toutes en 1 à 4 jours.

Les cadavres de poulets sont nombreux.

LES SIGNES DE LA MALADIE :

L'œil est humide et elles ont des gouttes aux narines.

Elles secouent la tête.

Elles ne mangent plus et elles sont fatiguées.

Elles ont du mal à se tenir debout.

Le bec est ouvert et la respiration est difficile et bruyante.

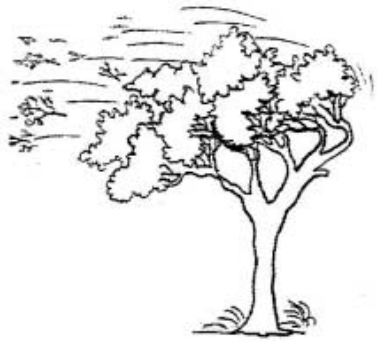
Le cou est tordu.

Les ailes tombantes.

La diarrhée verte ou noire

COMMENT LA MALADIE DE NEWCASTLE SE PROPAGE-T-ELLE ?

PAR LE VENT qui transporte
les microbes avec la poussière.



PAR LES COMMERCANTS DE VOLAILLES :
qui transportent des volailles malades au marché

Les volailles achetées ou reçues en cadeau.
Les volailles malades d'un élevage voisin.
Les oiseaux sauvages.

COMMENT LUTTER CONTRE LA MALADIE DE NEWCASTLE ?

IL N'Y A PAS DE TRAITEMENT

IL FAUT :

- Détruire les volailles mortes, en les enterrant profondément ou mieux, en les brûlant, de même que les plumes, le sang et tous les autres déchets des poules abattues

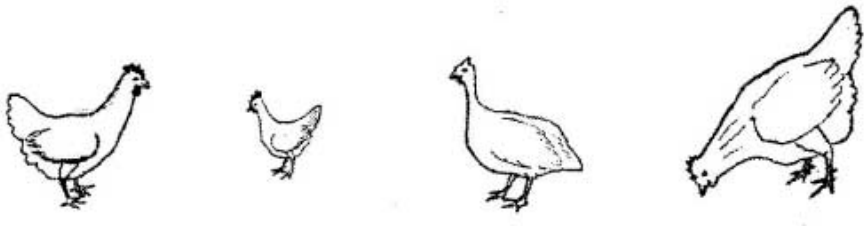
- Isoler une volaille reçue en cadeau ou achetée au marché pendant une semaine au moins

- Vacciner les volailles contre la maladie de Newcastle quand elles sont encore en bonne santé avec l'**ITA-NEW**, toujours avant la saison froide et la période des grands vents.
Injecter une dose (0,5 ml)) en intra musculaire dans les muscles du bréchet.
Injecter une demi-dose (0,25 ml) dans la cuisse chez les poussins.

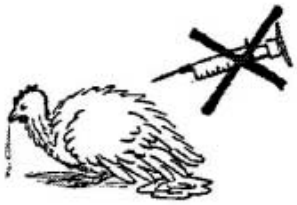
COMMENT VACCINER ?

IL FAUT :

-Vacciner les jeunes dès l'âge de deux mois, et les adultes à tout âge, chaque année, et vacciner toutes les volailles.



-Ne jamais vacciner les poules malades, ou dans un village où il y a déjà des poules malades.



-Vacciner avant que la maladie n'arrive.

Un vaccin, c'est comme le toit d'une case

Le toit protège contre la pluie

Il faut avoir fait le toit avant que la pluie n'arrive

Le vaccin protège contre la maladie

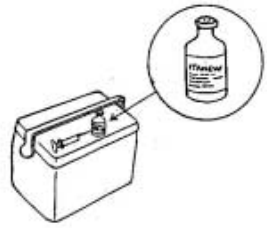
Il faut avoir vacciné avant que la maladie n'arrive

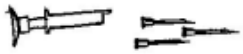
LA VACCINATION

Pour réaliser la vaccination, l'éleveur fera appel à un vétérinaire ou à un auxiliaire vaccinateur ayant suivi des formations pour effectuer ces tâches.

1- Matériel de vaccination

1. une boîte vide avec couvercle
2. une seringue
3. des aiguilles
4. un flacon de vaccin
5. un morceau de savon





Il faut sortir le vaccin **ITA-NEW** de la glacière au moins deux heures avant de vacciner les volailles

2- Comment remplir la seringue avec le vaccin ?

Avant de toucher le matériel, il faut se laver les mains avec du savon

- Sortir une seringue et une aiguille de la boîte
- Monter avec précaution l'aiguille sur la seringue. Pour cela il faut tenir l'aiguille par l'embase (ne pas toucher l'embout de l'aiguille) et la placer sur l'embout de la seringue.

Attention !

Si l'aiguille et la seringue tombaient ; elles sont sales et risquent de transmettre des microbes aux oiseaux.
- il ne faut plus les utiliser
- il faut les désinfecter à l'eau bouillante.

3- Lecture de la seringue

Il y a des graduations sur le corps de la seringue.

On peut lire les chiffres 1, 2, 3, 4, 5 pour les gros traits.

Entre deux gros traits, il y a un petit trait mince.

Ces traits sont des repères permettant de connaître le nombre de doses de vaccins contenues dans la seringue.

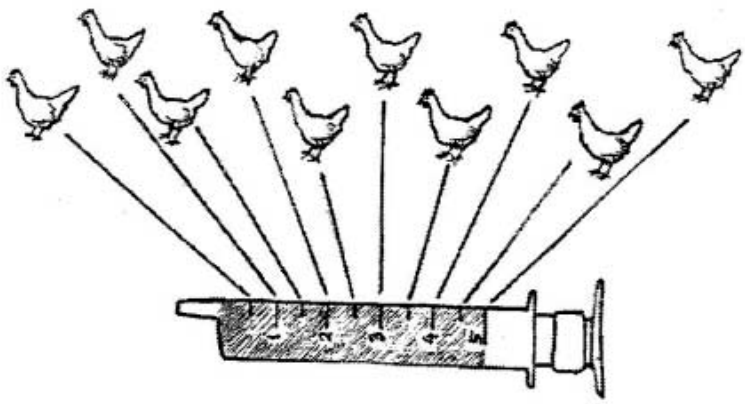
L'intervalle "gros trait - petit trait" ou "petit trait - gros trait" correspond à 0,5 ml : c'est la dose d'ITA-NEW pour les poules, les pintades, les pigeons.

Chaque flacon d'ITA-NEW contient 100 doses de vaccin.
L'intervalle "gros trait - gros trait" correspond à la dose de 1 ml pour les dindons.

Il faut respecter les doses :

- Il ne sert à rien d'en mettre plus, c'est du gaspillage.

- En mettre moins, le vaccin sera trop faible pour protéger l'animal.



Pour les poussins d'une semaine, il faut administrer la moitié de la dose.

4- Entretien du matériel de vaccination

Avant et après chaque séance de vaccination, il faut :

- laver très proprement le matériel
- placer les aiguilles et les seringues dans une casserole ou dans une petite marmite contenant de l'eau et les faire bouillir pendant quinze minutes.
- Les conserver à l'abri de la poussière

5- Comment organiser la vaccination au village ?

Tout d'abord il faut expliquer aux éleveurs l'importance de la vaccination, par des discussions, des réunions ou des affiches.

Ensuite il faut compter les volailles des éleveurs qui sont d'accord pour vacciner, et définir une date pour la vaccination. On doit vacciner le plus possible de volailles en même temps.

Un flacon de vaccin ITA-NEW contient 100 doses de 0,5 ml, donc on peut vacciner 100 poules ou pintades.

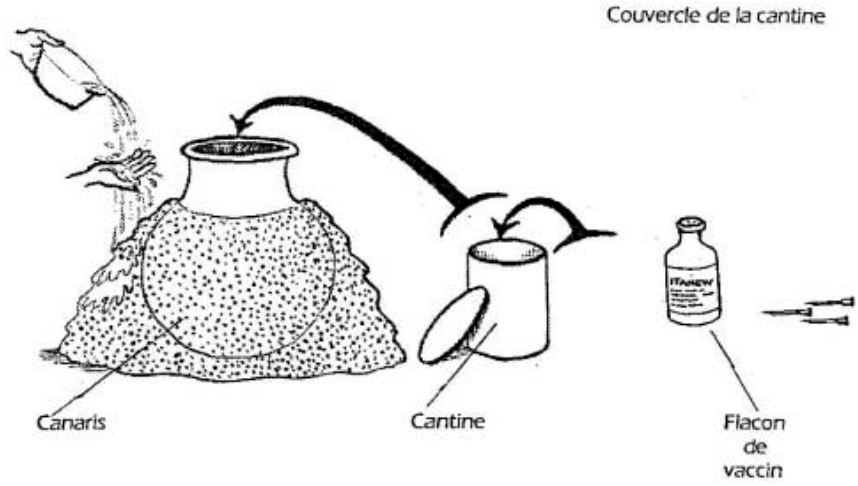
On doit utiliser le vaccin rapidement (quand il est entamé), sinon un vaccin trop vieux perdra sont effet protecteur.

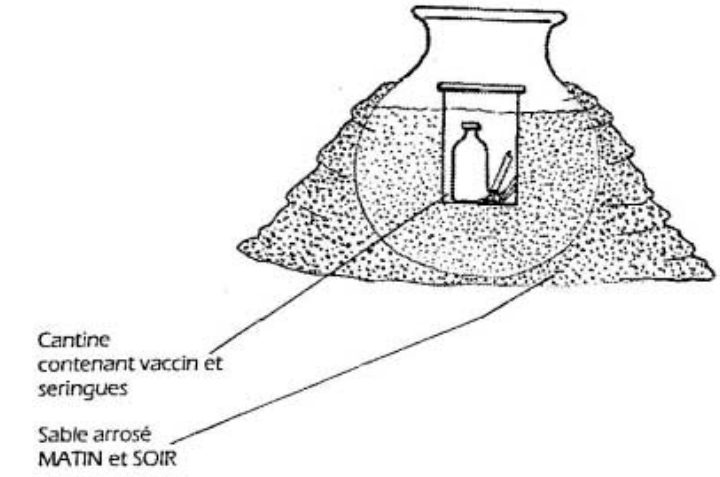
Il faut ensuite aller acheter le vaccin chez le vétérinaire, le ramener rapidement au village dans la boîte avec un chiffon humide pour le tenir au frais.

Nous allons vous montrer comment conserver le vaccin.

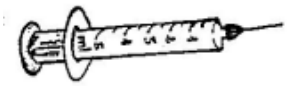
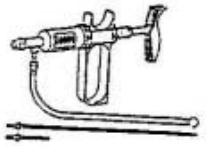
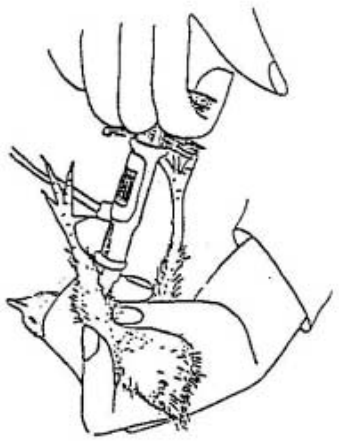
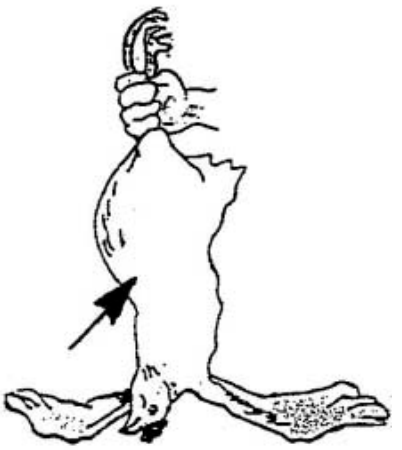
6- Comment conserver le vaccin au village ?

Le vaccin ITA-NEW est adapté pour être conservé au village pendant 15 jours à condition de placer la boîte contenant le flacon de vaccin dans un canaris rempli de sable humide et lui-même entouré de sable humide.
Le sable, à l'intérieur ou à l'extérieur du canaris, doit être arrosé avec de l'eau matin et soir.





7- Comment faire l'injection ?

<table>
<tr><td colspan="2">LES SERINGUES A UTILISER</td></tr>
<tr><td>Pour les petits lots : seringues normales (1 ou 5 cc)
  </td><td>Pour les grands lots : pistolet spécial
  </td></tr>
<tr><td colspan="2">LES LIEUX D'INJECTION</td></tr>
<tr><td>Chez les poussins : injection dans la cuisse
  </td><td>Chez les adultes : injection dans le bréchet
  </td></tr>
</table>

Modalités d'administration des vaccins inactivés

LES PARASITES INTERNES

Ce sont en général tous les vers que l'on trouve dans les intestins et qui font maigrir en mangeant eux-mêmes la nourriture que les volailles avalent.

QUE REMARQUE-T-ON ?

Les volailles maigrissent, perdent leurs plumes, cela dure longtemps, parfois elles meurent.

COMMENT SE TRANSMETTENT LES PARASITES INTERNES ?

Les volailles avalent les vers en mangeant les aliments ou l'eau ou la terre qui contient des vers qu'on ne voit pas.

QUE FAUT-IL FAIRE ?

On peut GUERIR les volailles trop maigres avec le médicament vermifuge (tueur de vers) VERMIFUGE POLYVALENT VOLAILLES (V.P.V).

On peut prévenir en donnant le médicament vermifuge, une ou deux fois par an. Un comprimé pour une volaille adulte. 1/2 comprimé pour une jeune volaille de plus de 2 mois.

Le mieux est de prévenir en donnant le médicament vermifuge, systématiquement et en même temps que l'on fait la vaccination contre la maladie de Newcastle.

LA TRICHOMONOSE DES PINTADES

La trichomonose apparaît avec la saison des pluies. Elle est la cause de la mort de beaucoup de pintades. Elle est surtout meurtrière en milieu et en fin d'hivernage.

QUE REMARQUE-T-ON ?

Une pintade malade a :

- une raideur et une paralysie des membres
- les pattes visiblement déshydratées et sèches
- le jabot gonflé, dur et rempli d'aliments pâteux
- une diarrhée jaunâtre et malodorante

COMMENT SE TRANSMET LA TRICHOMONOSE ?

Par les déjections des pintades sur l'aliment ou dans l'eau que boivent les autres pintades.

QUE FAUT-IL FAIRE ?

Il faut traiter les pintades malades avec le
VERMIFUGE SPECIAL PINTADES (V.S.P).

Quand les pintades sont malades, il faut traiter tout l'élevage de pintades, les malades et les non-malades.

Attention, le V.S.P. n'est pas préventif pour la trichomonose.

COMMENT DONNER LE V.S.P. ?

Donner :
- 1 comprimé pour une pintade adulte.
- 1/2 comprimé pour une jeune pintade de plus de deux mois.

Toujours donner beaucoup d'eau aux pintades.

Ne traiter que les pintades de plus de deux mois.

QUE REMARQUE-T-ON ?

Les ailes tombantes

La diarrhée

La paralysie

la peau des pattes sèche

COMMENT SE TRANSMET LA TRICHOMONOSE ?

La pintade en bonne santé boit l'eau :
Elle sera malade dans quelques jours

La pintade malade contamine l'eau
avec sa diarrhée.

QUE FAUT-IL FAIRE ?

Donner beaucoup d'eau

Pintadeau de plus de 2 mois
=
un demi (1/2) comprimé de V.S.P.

Pintade adulte
=
1 comprimé de V.S.P

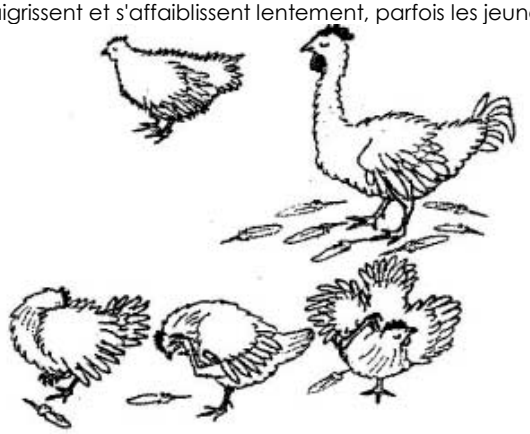
LES PARASITES EXTERNES

Ce sont les argas, les poux, les puces, les gales et les tiques qui vivent sous les plumes et sur la peau des oiseaux. Il piquent et sucent leur sang.

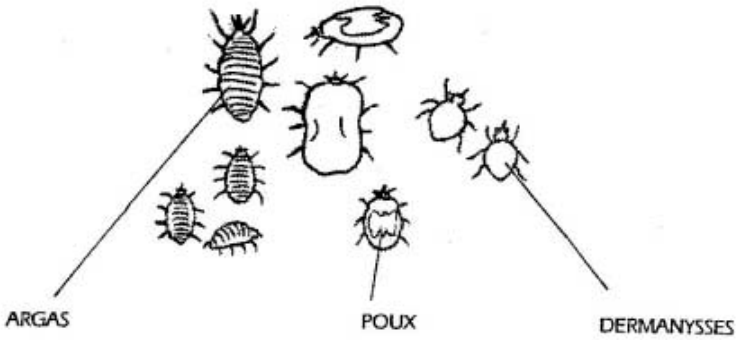
QUE REMARQUE-T-ON ?

- Les volailles se grattent et ont les plumes ébouriffés.

- Les volailles maigrissent et s'affaiblissent lentement, parfois les jeunes meurent.



Sous les plumes ou dans les fentes des murs ou des bois des poulaillers, les parasites externes sont visibles



QUE FAUT-IL FAIRE ?

- utiliser le poudrage de sable ou de cendre de bois avec un insecticide (poudrage manuel ou bac à poudre) sur les volailles :

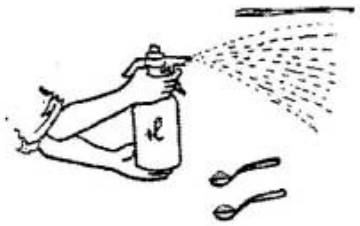
Mettre le mélange dans un bac et le placer là ou les poules se regroupent le plus souvent

1 mesure de CARBALAP pour 20 mesures de cendre de bois

- utiliser les solutions insecticides en bains (dans un seau) ou en pulvérisation (pulvérisateur) sur les volailles.
- Nettoyer et pulvériser les poulaillers avec des solutions d'insecticides.

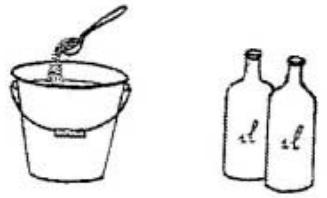
Pulvérisateur

2 cuillères à café de CARBALAP dans le pulvérisateur de 1 litre



Seau

1 cuillère à soupe de CARBALAP pour 2 litres



Rincer et laver au savon les cuillères et le seau après utilisation et se rincer les mains à cause de la toxicité du produit.

LES AUTRE MALADIES

Les autres maladies des volailles sont nombreuses, difficiles à diagnostiquer et à soigner.

En plus de la variole sèche (forme cutanée) qui se caractérise par des boutons et des croûtes sur les parties déplumées de la peau (crêtes, barbillons), il y a beaucoup d'autres maladies qui se manifestent par des signes respiratoires et digestifs (diarrhée).

Si vous rencontrez de tels cas, signalez-les au vétérinaire : n'essayez pas de traiter des maladies que vous ne connaissez pas. Le vétérinaire connaît le vaccin contre la variole, qui est difficile à manipuler, et les autres traitements.

Les poussins et les pintadeaux constituent un cas particulier. Ils sont sensibles au froid et doivent être protégés. Nous allons étudier ce problème à part.

LA PROTECTION DES POUSSINS ET DES PINTADEAUX

Les poussins et les pintadeaux sont très fragiles.
Les maladies et les prédateurs s'attaquent facilement à eux.
Ils ont aussi beaucoup de risques d'accident.

COMMENT LES PROTEGER ?

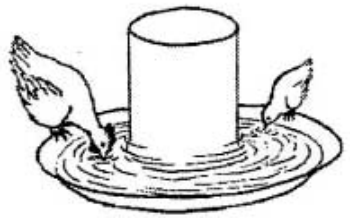
On peut les sauver en les protégeant sous un panier jusqu'à l'âge d'un mois.
Il faut placer le panier à l'ombre sur un sol sec et propre.

A partir d'un mois d'âge, on soulève le panier de manière à laisser les poussins entrer et sortir comme ils veulent, et s'abriter en cas de danger.
Le soir, rentrer les poussins en lieu sûr (dans la cuisine) toujours sous le panier.

A partir de deux mois, on les vaccine contre la maladie de newcastle et ils vont avec les poules.

DONNER A BOIRE ET A MANGER AUX POUSSINS

Ils doivent avoir en permanence de l'eau propre sous le panier. On utilisera un abreuvoir qui évite les noyades (voir le dessin)

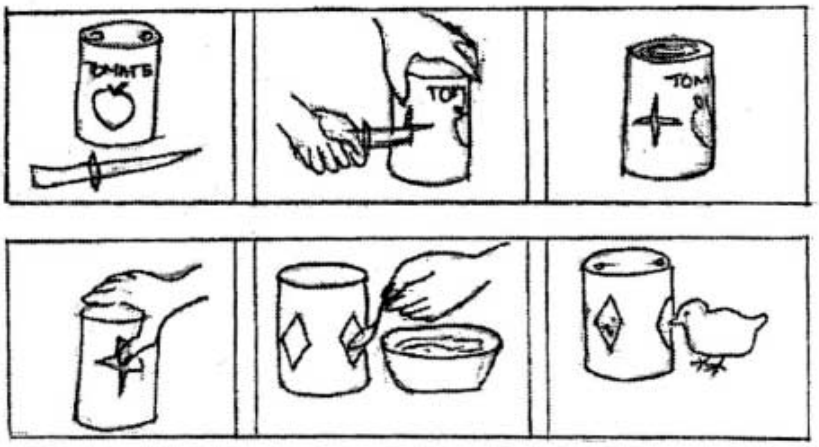


Pour la nourriture, on peut utiliser le mélange suivant :

2 mesures de boite de tomate, de son
1 mesure de boite de tomate, de céréales.

On peut y ajouter un peu de poudre d'os calciné, de poudre de poisson, du sel, de la verdure et quelques termites.
Donner ce mélange à volonté. Mais éviter le gaspillage.

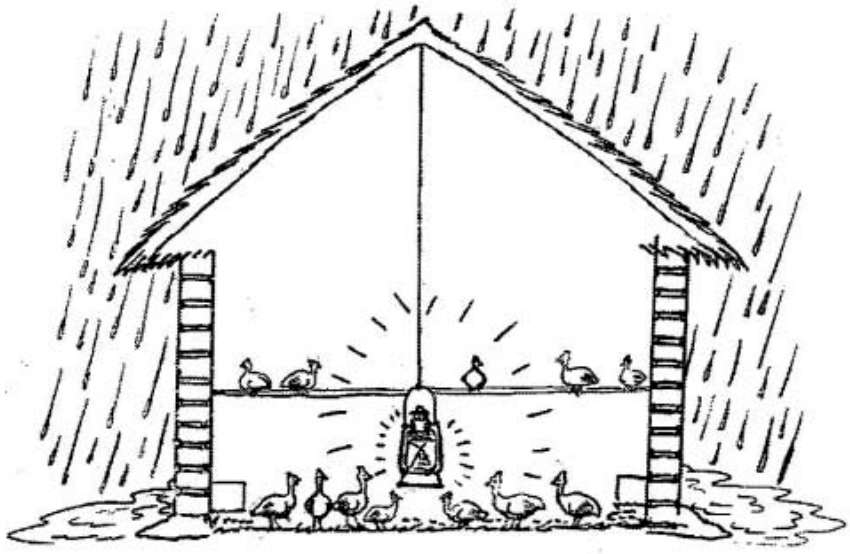
On utilisera des mangeoires faites à laide de vielles boîtes de conserve (voir le dessin).



UN CAS SENSIBLE : LES PINTADEAUX DE MOINS DE 2 MOIS

Ce sont des sujets fragiles et il n'est pas facile de les soigner. Leur plus grand ennemi est le refroidissement consécutif à une pluie ou à une nuit fraîche. Ce qui se traduit par une diarrhée et une forte mortalité.

Il est vraiment indispensable de bien abriter les pintadeaux et au besoin de les réchauffer en plaçant une lampe à pétrole dans leur abri.



Attention un vaccinateur villageois sait qu'il ne doit s'approvisionner en médicament qu'auprès des vétérinaires légalement installés.
Un promoteur d'élevage villageois qui achèterait des médicaments ailleurs (forain…) tromperait les autres éleveurs, car il sait que ces médicaments sont souvent des faux, inefficaces, mal conservés… Il peut être poursuivi et condamné pour cela.
Il doit toujours vérifier que la date de limite d'efficacité (date de péremption ou validité) n'est pas dépassée et, pour les vaccins qu'ils sont conservés au réfrigérateur chez le vétérinaire.

S'il ne respecte pas ces précautions, ses traitements et vaccins seront inefficaces et les animaux traités mourront : il perdra la confiance des éleveurs.

UN BON VACCINATEUR VILLAGEOIS

- Est volontaire
- Rend service à la communauté qui l'a choisi
- Ne pratique que les interventions pour lesquelles il est formé
- Explique aux éleveurs, les informe et les convainc, car il a leur confiance
- S'approvisionne en médicaments uniquement chez les vétérinaires légalement installés
- Collecte les informations, et demande l'aide du vétérinaire quand il y a un problème

UN MAUVAIS VACCINATEUR VILLAGEOIS

- n'a pas été choisi par sa communauté et s'est imposé
- essaie de vendre ses services à sa communauté
- dit aux éleveurs qu'il sait faire des choses qu'il ne connaît pas
- s'approvisionne auprès des ambulants
- essaie d'imposer des traitements ou des mesures aux éleveurs au lieu d'expliquer
- ne demande jamais d'explications au vétérinaire et ne renseigne jamais ce dernier sur les problèmes des éleveurs.

POUR REUSSIR SON ELEVAGE DE VOLAILLES VILLAGEOISES, IL FAUT

- vacciner contre la peste (maladie de Newcastle) en respectant les 5 règles suivantes :

    1- Vacciner au bon moment, avant la maladie

    2- Utiliser un bon vaccin, bien conservé

    3- Utiliser un bon matériel : propre

    4- Ne jamais vacciner des volailles malades ou dans un village où il y a des volailles malades

    5- Vacciner toute la basse-cour avec **ITA-NEW**, le seul vaccin en flacon de 100 doses utilisé avec succès depuis plus de dix ans en Afrique sub-saharienne.

- Traiter la trichomonose des pintades dès qu'on voit des pintades malades avec

  VERMIFUGE SPECIAL PINTADES.

- Traiter les volailles contre les parasites externes avec

  CARBALAP

  et les internes avec

  VERMIFUGE POLYVALENT VOLAILLES

- Protéger les jeunes de moins de deux mois sous un panier, leur donner à boire et à manger, et maintenir au chaud surtout le pintadeau.

- Quand il y a une maladie ou un problème qu'on ne connaît pas, demander conseil au vétérinaire.

Thermostable vaccine or inactived vaccine: the key to extensive poultry farming problem in Sub-Saharan Africa

Rene Bessin

INTRODUCTION

The Newcastle disease in extensive poultry farming, constitutes the main scourge in poultry farming in sub-Saharan Africa, especially for traditional breeding in indigenous poultry species.

In sub-Saharan Africa areas, with difficult conditions and access, practising extensive poultry farming in indigenous poultry species, the production of thermostable vaccine for collective distribution should enhance immunization on a wide scale.

Work leading to the production of such a vaccine has been carried out in many parts of the world especially in France, Malaysia, Australia and in sub-Saharan Africa.

In general, the strain used is a Newcastle disease V4 virus hypovirulent strain. The aim of this document is to provide some information on the immune reaction of poultry vaccinated with an inactivated vaccine (ITA-NEW) and a Newcastle disease V4 virus hypovirulent strain in Inter-tropical Africa.

The trial was carried out in Burkina Faso in August 1991 and covered a total of 104 indigenous poultry species, from poultry farms around Ouagadougou.

EQUIPMENT AND METHODS USED

The use of V4 vaccinal strain in Malawi proved a two-hour thermostability at 56°C. Studies in Malaysia have made it possible to develop a more thermostable strain known as V4 (UPM) (University Pertanian Malaysia). A vaccine was made from different abstracts (cereal grains coated with vaccine, food granular between 1987 and 1989).

V4 vaccine preservation tests (UPM) lactalbumin freeze-dried (2.5p.100) and saccharose (10p.100) have been produced in 1990 at the Veterinary Medicine and Livestock Institute for Tropical Countries (IEMVT - France).

The preservation of this type of vaccine in veterinary departments under cold temperature would enable future use in the field without a cooling facility at a room temperature of 45°C for more than two weeks.

HYPOTHESIS, PROTOCOL APPLIED

Poultry immunization leads to the production of inhibited haemagglutination antibodies; these antibodies do not provide protection but their titre gives an indication of their kinetic and eventually the level of animal protection.

As a result, this would enable the verification of the efficiency and the level of protection of this thermostable vaccine.

The vaccination was done orally with the V4 hypovirulent strain (live vaccine) on birds aged five (5) weeks; and the ITA-NEW vaccine (inactivated vaccine) was done by intramuscular injection. A sample of blood taken weekly made it possible to monitor the evolution of antibodies.

Studies focused on the titres in inhibited haemagglutination antibodies for Newcastle disease virus. Results obtained allowed us to study the antibody kinetic and be able to highlight the differences between the batches.

RESULTS

IHA tests show the following titres for samplings carried out. Jo represents the day of the first vaccination.

FIGURE 1

Titre in Inhibited Haemagglutination Antibodies of the subject batch (non vaccinated)

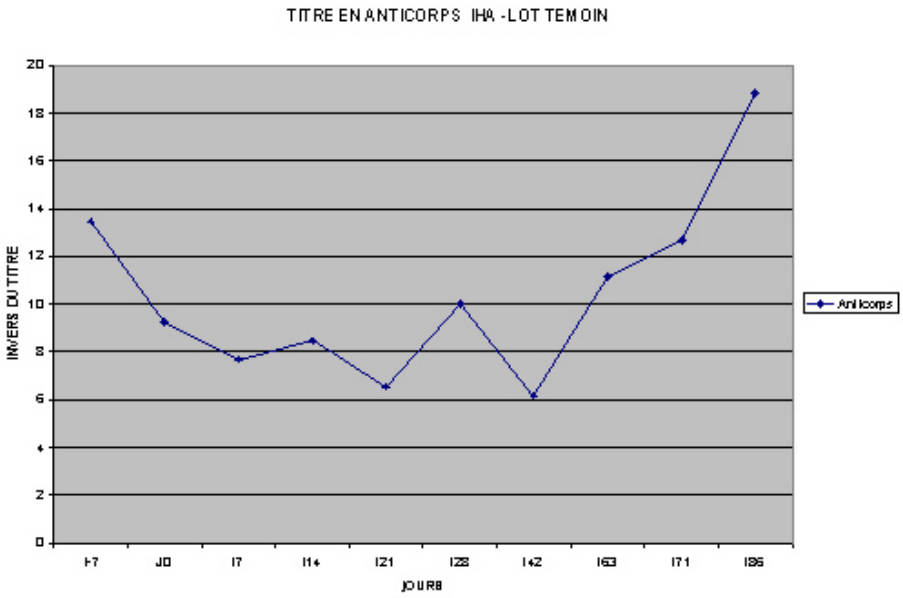


FIGURE 2
Titre in Inhibited Haemagglutination Antibodies of batch vaccinated with Ita-New (inactivated vaccine)

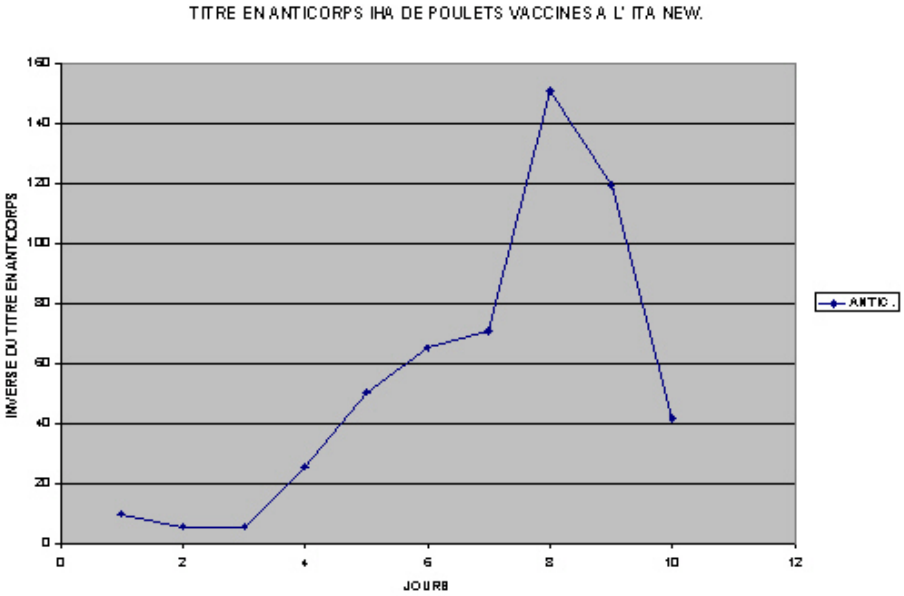
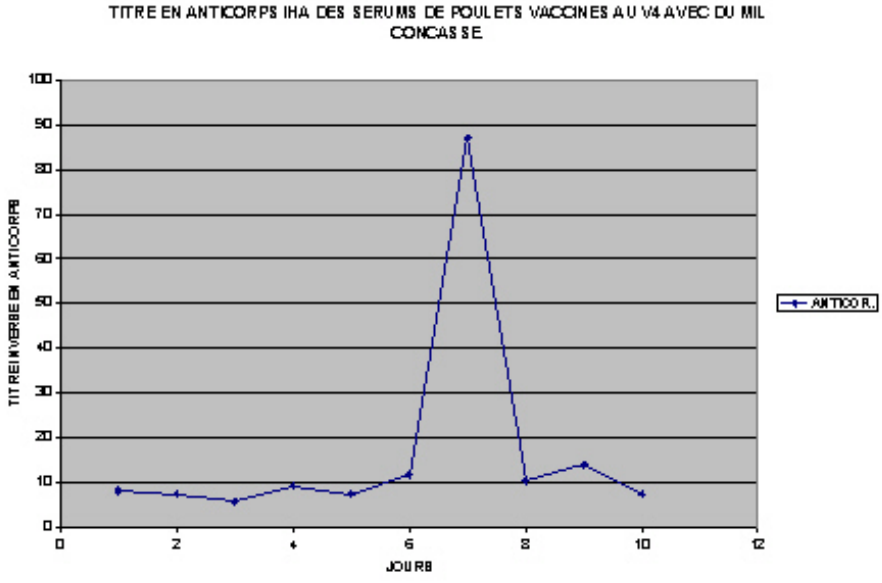


FIGURE 3
Titre in Inhibited Haemagglutination Antibodies of vaccinated batch with V4 vaccine (thermostable vaccine)



Birds vaccinated with ITA-NEW inactivated vaccine prove a significant growth of antibody titre after the immunization from the fourteenth day.

Animal vaccinated with the inactivated vaccine and animal vaccinated with V4 vaccine after twenty eight days, show a significant difference: the titre being higher in the animal with inactivated vaccine (ITA-NEW).

The exercise of virulent strain inoculation to different batches after twelve days have produced the following results:

TABLE I. MORTALITY RATES OBTAINED AFTER THE VIRUS INOCULATION IN TOULOUSE

Type of batch	Mortality%	Number of birds
Subject batch	50	8
Animal vaccinated with Ita-New	0	8
Animal vaccinated on V4 vaccine with crushed millet twice	10	10
Animal vaccinated thrice with crushed millet	20	10

Among the vaccinated chicken all animal having a titre higher than 2.32 survived.

CONCLUSION

The inactivated vaccine ITA-NEW gives titres in inhibited haemagglutination antibodies from the fourteenth day and guarantees a long-life protection.

Trials on V4 vaccine do not seem to be efficient and appropriate for V4 strain against the virus of the Newcastle disease.

A large-scale use deserves to be carried out.

The realization of a field trial on a realistic scale proves to be necessary. Furthermore, the choice of a substrate which would serve as a boost to oral vaccines requires in-depth study in order to make a proper selection of food vaccine.

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* Organization of African Unity - Inter-African Bureau for Animal Resources (OAU-IBAR), Coordinator for the Pan-African Programme for the Control of Epizootics (PACE)

La avicultura de traspatio en zonas campesinas de la provincia de Villa Clara

Alcides Pìrez Bello y Guillermo Polanco Expósito

RESUMEN

Con el fin de conocer las particularidades de la crianza de gallinas locales en el sistema de traspatio en zonas campesinas, se llevó a cabo un censo y un estudio del comportamiento reproductivo de las gallinas locales, resultados de la incubación natural y período de crianza natural de polluelos; en el municipio de Santo Domingo, Provincia Villa Clara. Se registró información acerca del número de aves de diferentes categorías y sexo, de diferentes indicadores bioproductivos, instalaciones, enfermedades y tipo de alimentación. Se obtuvo que el número promedio de gallinas por familia fue de 52,3.

Las aves con una edad entre 0 y 8 semanas constituyen el 49,7% de la población avícola; en la siguiente etapa de vida,que comprende desde 9 hasta 20 semanas de edad, las existencias representan el 27,4% y los adultos solo representan el 22,9%. La alimentación se basa en los desechos de cocina y el alimento que sean capaces de consumir en el campo; pero el 70% de los criadores suplementa y de ellos el 50% lo hace con maíz en grano.

Son empleadas pocas instalaciones y equipos en este sistema de crianza. Las principales enfermedades detectadas son las afecciones respiratorias (39,6%), el cólera aviar (18,9%), enterobacteriosis (18,1%), helmintiasis intestinal (17,2%), coccidiosis (13,7%) y se observa que el estatus alimenticio influye significativamente en la aparición de estas enfermedades. Estas aves se incorporan a la producción después de los 6 meses de edad, producen 43,4 huevos al año. Se encontraron diferencias ($P<0.05$) en el número de huevos, días de puesta y pollitos nacidos por nidada. La incubabilidad natural fue del 87,2% y la etapa de cría de los pollitos por la gallina se extendió a los 58 días. Palabras Claves: Gallinas, Producción de Huevos

INTRODUCCIÓN

La producción animal de traspatio es una actividad importante en las comunidades rurales de la mayoría de los países en desarrollo. Dentro de las especies animales que se explotan bajo este sistema, son las gallinas las más importantes debido a su frecuencia, ya que sus productos se destinan principalmente al autoconsumo. Más del 90% de las familias rurales con animales de traspatio poseen gallinas. El promedio de gallinas por familia rural varía de 8 a 20 según la región y disponibilidad de recursos (Rodríguez *et al.*, 1996).

Son escasos los estudios sobre el comportamiento de producción y de las principales enfermedades que afectan a las gallinas locales en este sistema. Este estudio se propuso

como objetivos la descripción de la población de gallinas locales en zonas campesinas de un municipio de la provincia de Villa Clara (Santo Domingo), la determinación de algunos de sus indicadores bioproductivos y las principales causas de mortalidad de estas gallinas.

MATERIALES Y MÉTODOS

Para la realización del presente trabajo, se censaron 116 criadores de gallinas locales en sistema de crianza de traspatio; para obtener información acerca de diferentes características de este método de crianza tradicional en cuanto a:

- Estructura poblacional del rebaño; registrándose el número de aves por edad y sexo
- Edad en que alcanzan la madurez sexual hembras y machos
- Producción anual por gallina
- Relación hembras:macho
- Alimentación empleada
- Instalaciones
- Principales enfermedades que afectan las existencias de estas aves

En una segunda fase se estudió el comportamiento reproductivo de 30 gallinas recién incorporadas como ponedoras, en sus tres primeras nidadas. Se controló el número de huevos producidos por gallina en cada nidada, los días que duró cada ciclo de puesta, los pollitos nacidos en cada nidada después de la incubación natural y la duración del tiempo que transcurre en que la gallina cría a sus polluelos.

Se comparó el peso vivo entre ambos sexos dentro de la estructura de edades de la población, empleando el método de comparación de proporciones, para determinar si existían diferencias significativas entre ellos. A los indicadores bioproductivos: edad en que se alcanza la madurez sexual por sexo, producción anual por gallina, incubabilidad, período de cría promedio de cada nidada y la relación hembras: macho, se les determinaron los valores promedio, máximo y mínimo, desviación estándar y coeficiente de variación.

Mediante una prueba de Chi-cuadrada se determinó si existía dependencia entre la suplementación alimenticia y la aparición de enfermedades infecciosas y parasitarias. Los promedios de los indicadores bioproductivos: huevos por gallina, duración de la puesta, pollitos nacidos en cada nidada, fueron comparados mediante un análisis de varianza de clasificación simple y determinada la significación estadística de las diferencias entre ellos mediante una Prueba de comparación múltiple (Duncan, 1955).

RESULTADOS Y DISCUSIÓN

Al estudiar la estructura poblacional por edades y sexo de la gallina local en Sistema de Crianza de Traspatio (tabla 1), se observa que las aves con una edad entre 0 y 8 semanas constituyen el 49,7% de la población; en la siguiente etapa de vida, que comprende desde la 9. hasta la 20. semana de edad, el número de animales representa el 27,4%. Esta reducción en la cantidad de aves, se debe a las elevadas pérdidas que en este sistema de crianza ocurren durante la primera etapa de vida del pollito.

Durante las etapas de inicio y crecimiento no se observan diferencias ($P>0,05$) en las proporciones entre sexos. Los animales de más de 20 semanas de edad constituyen el 22,9% de la población y se aprecian diferencias ($P<0,05$) entre sexos, provocadas estas por el sacrificio de los machos, y a consecuencia de ello se observan también diferencias ($P<0,05$) en la proporción entre los sexos en la masa total.

TABLA 1. ESTRUCTURA POBLACIONAL DE LA GALLINA LOCAL EN SISTEMA DE CRIANZA DE TRASPATIO

Categorías	Machos		Hembras		Total	
	N	%	N	%	N	%
0-8 semanas	1 489	24,5 a	1 527	25,2 a	3 016	49,7
9-20 semanas	736	12,1 a	925	15,3 a	1 661	27,4
Adultos	144	2,4 b	1 245	20,5 a	1 389	22,9
Total	2 369	39,0 b	3 697	61,0 a	6 066	100

Resultados similares son reportados por Mopate *et al.* (1995) y Mopate & Lony (1999), quienes plantean que la estructura de las poblaciones de gallinas de traspatio se caracteriza, por tener un número mayor de polluelos que de adultos. Además, los polluelos experimentaron más pérdidas, como consecuencia de las enfermedades, las prácticas inadecuadas de manejo, la depredación y los accidentes.

La nutrición de la gallina es un factor que limita la producción de huevos. La base de la alimentación en la producción de las aves de corralpor los campesinos es el alimento que la misma ave se procura en el campo, los desechos de la casa (cualquier cosa comestible que se encuentre en el ambiente inmediato) y pequeñas cantidades de granos como suplemento. En el presente estudio cerca del 70% de los criadores suplementan a sus aves (tabla 2) y el 50% lo hace con maíz.

TABLA 2. EMPLEO DE SUPLEMENTACIÓN EN LA ALIMENTACIÓN DE GALLINAS LOCALES EN SISTEMA DE TRASPATIO

Suplementación	**N**	**%**
Criadores sin empleo de suplemento en la alimentación	35	30,17
Criadores con empleo de suplemento en la alimentación	81	69,83
Tipo de suplemento		
Maíz	58	50,00
Sorgo	3	2,59
Cabecilla de arroz	4	3,45
Maíz + Sorgo	2	1,72
Maíz + Girasol	3	2,59
Maíz + Girasol + Cabecilla de arroz	2	1,72
Maíz + Cabecilla de Arroz	8	6,90
Sorgo + Cabecilla de arroz	1	0,86

Dessie & Ogle (1996a; 1996b) han demostrado que los recursos alimenticios en el Sistema de Crianza de Traspatio no es constante. La proporción de alimento que proviene del ambiente y la suplementación de granos, depende de la disponibilidad del grano en la casa, la estación del año, los ciclos de cosechas, los ciclos vitales de insectos y otros invertebrados. En las aldeas las aves son mantenidas alrededor de la casa durante el día, alimentándose de los desperdicios de la casa. Algunas son suplementadas con maíz y en las noches son

recogidas y colocadas en pequeñas naves que garantizan su protección, donde están los nidales. Las enfermedades se controlan o se tratan raramente (Kabatange & Katule, 1990).

La alimentación en el Sistema de Crianza de Traspatio es deficiente en proteína, energía y calcio; esta afirmación es confirmada por Dessie & -Ogle (1996c), quienes observaron una elevado aumento en la producción de huevos, cuando las aves recibieron una suplementación rica en proteínas, energía y calcio.

La suplementación estratégica de las aves criadas en un Sistema de Producción de Traspatio según su edad y el estatus productivo, es recomendada como una solución conveniente por Roberts (1991), después de analizar la base de recursos alimentarios en diversos sistemas de producción de aves locales en Asia, la cual es definida por Cumming (1991) como variable, dependiente de la época del año y de las precipitaciones.

La fuente de alimentos es un importante factor que influye en la producción de las aves de corral de traspatio y se ha calculado que estas aves son capaces de encontrar la alimentación necesaria para su mantenimiento y producir alrededor de 40 huevos por año, pero para alcanzar niveles de producción más altos se requiere de alimentación suplementaria. Si se asume que el valor del alimento consumido por estas gallinas, es el reflejo de la composición bromatológica de la cosecha, se puede entonces afirmar que los resultados de 52,3 ± 12,5% en Materia Seca; 9,1% ± 2,3% en Proteína Bruta; 0.9 ± 0,4% en Calcio; 0.75 ± 0,3% en Fósforo y 11,9 ± 0,9 kJ/g de Energía Metabolizable obtenidos por Dessie & Ogle (1996b) están por debajo de los requerimientos para la producción de huevos e indican la importancia de la suplementación de estas aves. Como los alimentos balanceados no están disponibles, se hace necesario entonces la utilización de materias primas convencionales o no disponibles en la localidad.

Las instalaciones para la crianza de las aves son muy limitadas; sólo un 8% de los criadores emplean caseta para las aves y estas se emplean sólo para protegerlas por las noches. Son confeccionadas con materiales reciclados, piso de tierra, las paredes son de malla o de madera y para el techado se emplean las hojas de la Palma. Un 22% emplea un casillo donde se encierra la gallina durante el día, en las primeras 2 o 3 semanas de cría y del que pueden salir los pollitos. Esto lo hacen con el objetivo de limitar el movimiento de los polluelos y de suministrarles alimento suplementario.

La utilización de equipos avícolas también es limitada, sólo el 17% emplea comederos para suministrar el alimento. Como bebederos se emplean preferentemente neumáticos desechados que se colocan en lugares sombreados. Los nidales también son rústicos y se colocan en lugares tranquilos y sombríos; en el 26% de los criadores son las mismas gallinas las que los construyen.

Las principales enfermedades detectadas que afectan este Sistema de Crianza de Traspatio en las gallinas son mostradas en la tabla 3; donde también aparece la influencia que sobre la aparición de ellas tiene la suplementación alimenticia.

Existe una elevada dependencia ($P<0,001$) entre la aparición de procesos Respiratorios, Parasitarios, eventos de Cólera Aviar, Enterobacteriosis y Coccidiosis en el lote de aves y la suplementación del alimento. Según Matthewman (1977) y Permin (1996), la elevada tasa de mortalidad de los animales en este sistema se debe a que en el Sistema de Crianza de Traspatio la alimentación no es la más adecuada. Por otra parte, Ajuyah (1998), señala que la pobre nutrición, carencia de instalaciones que los protejan de los efectos perjudiciales

del medio ambiente y de un sistema eficaz de control de enfermedades, hacen que estas se extiendan con mucha facilidad por toda la explotación. Es muy frecuente que estén presentes eventos de Cólera Aviar, Viruela Aviar, Coriza Infecciosa, Coccidiosis, Parasitismo intestinal y ectoparásitos.

TABLA 3. INFLUENCIA DE LA SUPLEMENTACIÓN DE ALIMENTOS CON LA APARICIÓN DE ENFERMEDADES EN LA GALLINA LOCAL DE TRASPATIO

Enfermedad		Se suplementa				Total	Nivel de Significación
		Sí (70%)		No (30%)			
		N	%	N	%		
Afección respiratoria	Si	15	12,9	31	26,7	46	0,001
	No	66	56,9	4	3,5	70	
Helmintiasis Intestinal	Si	3	2,6	17	14,7	20	0,001
	No	78	67,2	18	15,5	96	
Cólera Aviar	Si	6	5,2	16	13,8	22	0,001
	No	75	64,7	19	16,4	94	
Viruela Aviar	Si	8	6,9	2	1,72	10	S
	No	73	62,9	33	28,5	106	
Enterobacteriosis	Si	5	4,3	16	13,8	21	0,001
	No	76	65,5	19	16,4	95	
Coccidiosis	Si	4	3,5	12	10,3	16	,001

Las características reproductivas de la gallina local bajo Sistema de Crianza de Traspatio, son mostradas en la tabla 4. Estas aves alcanzan la madurez sexual como promedio después de los 180 días de edad en ambos sexos. Este indicador depende de un gran número de factores como son las características propias del genotipo, el sistema de crianza al que estén sometidas las aves, la alimentación, el peso vivo y la época del año en que nacen si no reciben iluminación artificial, entre otros.

Los efectos del peso vivo y de la alimentación en reemplazos de reproductoras pesados sobre la morfología del ovario y los contenidos plasmáticos de las hormonas reproductivas, entre las 21 semanas y el momento de la madurez sexual fueron examinados por Renema *et al.* (1999), quienes dividieron el rebaño en tres grupos de aves con el peso estándar, aves livianas (20% inferior al estándar) y aves pesadas (20% superior al estándar) y posteriormente los sometieron a dos regímenes de alimentación diferentes (Restringido y ad libitum) hasta la madurez sexual. Las aves alimentadas ad libitum alcanzaron la madurez sexual con un promedio de 11 folículos amarillos grandes (diámetro mayor de 10 mm) y de 10,3 folículos pequeños (diámetro menor de 5 mm), mientras que las aves bajo restricción alcanzaban 7,1 y 32,3 respectivamente.

El elevado número de folículos pequeños encontrado en las aves restringidas lo asociaron a que estos animales presentaron un período más largo de maduración sexual. La concentración de 17 beta-estradiol en el plasma de las aves pesadas fue más elevado a las 21 semanas que en las aves de peso estándar y livianas, lo que sugiere un desarrollo más

TABLA 4. CARACTERÍSTICAS REPRODUCTIVAS DE LA GALLINA LOCAL EN SISTEMA DE CRIANZA DE TRASPATIO

Indicador	Promedio	Mínimo	Màximo	S	CV, %
Madurez sexual, meses					
Machos*	6,1	5	9	± 0,893	14,75
Hembras*	6,4	5	8	± 0,823	12,85
Relación Hembras: Macho*	9,2	2	21	± 3,524	38,45
Huevos por gallina					
1. nidada**	9,0 c	7	13	± 1,486	16,51
2. nidada**	12,5 a	9	15	± 1,592	12,74
3. nidada**	11,3 b	8	14	± 1,465	12.96
ES	± 0,277				
Huevos por gallina anual	43,4	34	56	± 5,068	11,67
Duración de la puesta, días					
1. nidada**	15,4 b	12	19	± 2,125	13,83
2. nidada**	18,0 a	13	22	± 2,606	14,45
3. nidada**	18,7 a	14	22	± 1.896	10,13
ES	± 0,407				
Pollitos nacidos					
1. nidada**	7,7 c	6	10	± 0,944	11,90
2. nidada**	10,9 a	9	13	± 1,217	11,16
3. nidada**	9.7 b	6	13	± 1,574	16,22
ES	± 0,622				
Incubabilidad, %	87,2	61,5	100	± 9,294	10,65
Período de cría, días	58,0	45	81	± 8,630	14,87

avanzado del ovario en estas aves. Después de la 21. semana de edad, las concentraciones de LH y FSH en el plasma de las aves alimentadas ad libitum se duplicaron en comparación con las aves restringidas. Se demostró que existe una modulación de las concentraciones de las hormonas reproductivas durante la maduración sexual por el nivel de alimentación.

El inicio de la puesta en 8 diferentes cruzamientos de gallinas explotadas en Sistema de Crianza de Traspatio realizados por Rahman et al. (1996), fue tardío en todas las combinaciones y no encontraron diferencias estadísticamente significativas y señalaron como causa de esto, las condiciones inferiores de alimentación que tienen las aves en este sistema de producción. También describieron la influencia de la estación del año en que se incuban los huevos sobre el inicio de la puesta. Las aves que nacieron en mayo produjeron el primer huevo a las 36 semanas de edad; sin embargo, las que nacieron en agosto y noviembre lo hicieron a las 30 y 28 semanas de edad respectivamente. Esta diferencia se debió a que las aves nacidas en mayo crecieron con un fotoperíodo cada vez menor y las que lo hicieron en noviembre y agosto fueron influenciadas por un fotoperíodo en aumento a partir de las 10 y 20 semanas de edad.

La producción anual por gallina entre los 34 y 56 huevos es similar a la reportada por Goudja (1994a; 1994b; 1994c; 1994d); Avante & del Fierro (1995a; 1995b); El-Zubeir (1995); Izquierdo (1995); Mansour (1995); Mian (1995a; 1995b); Tber (1995) y Zulu (1999) en diferentes razas locales de gallinas de África, Asia y América Latina.

Los resultados obtenidos en los indicadores huevos por gallina, duración de la puesta y pollitos nacidos en las tres primeras nidadas son similares a los reportados por Say (1987) en aves locales de Burkina Faso y por Aganga et al. (2000), en Botswana con aves de la raza local Tswana. Sin embargo, en el presente estudio, la incubabilidad fue del 90 % y el período de crianza de 58 días, que difieren del 62 % y los 90 días de crianza reportados respectivamente para estos indicadores por los autores anteriormente citados.

CONCLUSIONES

Existe una relación directa entre el estatus alimentario de la parvada y la aparición de enfermedades infecciosas y parasitarias.

El comportamiento productivo de la gallina local en Sistema de Crianza de Traspatio en la etapa de reproducción, se caracteriza por alcanzar la madurez sexual tardía y ser su producción anual de huevos baja, con períodos frecuentes de cloquez por incubar los huevos de forma natural y después criar los polluelos por 58 días como promedio.

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Discussions

Discussion on Bangladesh Model

CONDITIONS FOR THE BANGLADESH MODEL

The Bangladesh model is primarily based on the following two conditions for the integrated Family-Poultry production system.

1. The low cost of labour for producing artisanal inputs such as the poultry houses, or labour intensive production techniques such as in the mini-hatchery.
2. The high population density in rural areas. This facilitates interchange of inputs and outputs between the different enterprises of the system, as well as facilitating monitoring. In fact Bangladesh has the highest rural population density in the world.

STRENGTHS OF BANGLADESH MODEL

Jonathan Bell (Bangladesh) - To what extent are these conditions necessary for the model to work? Let me put this as an open question. I think the first one is certainly indispensable.

Incidentally, in response to an earlier comment, in the Southern districts of Bangladesh where we are working, industrialised intensive poultry production is virtually absent, so there is no market interference from this.

Thabani Maposha (Zimbabwe) - The destabilisation of prices from nearby battery systems is unlikely. My experience in Zimbabwe is that this has actually been positive for the CBOs we call them Chigs here, in the sense that it has helped the prices of village chickens to lag closely behind those of broilers without any additional input whilst the broilers have been facing shrinking profits because of feed costs which are in the margin of 70% plus of TVC.

Jonathan Bell (Bangladesh) - An important pre-condition for the success in Bangladesh is the presence of NGOs that can reach out to people. Almosst as rule - I repeat myself - government cannot reach out and we need other types of organisations than government livestock departments to reach people. It would be useful if this conference could contribute to the list of working alternative institutional arrangements to reach out to people - or for people to reach the technology(ies).

Peder Lund (Denmark) - The strength of the Poultry Model is that the main support to the beneficiaries is provided by NGOs. The majority of these NGOs have other activities that seek to improve the overall socio-economic development of their beneficiaries (health, education, etc.). This implies that in cases where there are problems like gambling and drinking the NGOs should be able to address these issues and assist the beneficiaries in drawing up satisfactory solutions.

In areas where the Poultry Model (in one form or other) cannot be introduced, due to lack of one or more of the vital elements, simpler technologies can be introduced as an intermediary step for alleviating poverty, while still using poultry as the tool for poverty alleviation.

Per A. Eklund (former Sr. Evaluation Officer IFAD) - I am convinced about advantages and replicability of Bangladesh model with specified preconditions.

Two queries: how to enhance its longer-term sustainability?

Query One: Should on normative grounds poultry activities be diffused and services by/through single purpose community based organisations (CBO) which then can/should federate? Or is there an advantage in seeking to broaden the platform.

I am asking this since for IFAD I have conducted a survey of women CBOs in two districts in Nepal. This study shows that community leaders consider that there is a primary question more important than even food insecurity that drives behaviour and community mobilisation. Leaders consider that their limited knowledge about their own nutrition - first are their children chronically malnourished or not, and if so, second, which are the location specific solutions - is a primary cause to malnutrition, a secondary concern is food insecurity.

On average in most South Asian countries each second child in rural areas remains chronically malnourished (stunted). Poultry generate cash income for mothers and animal protein, both are associated with reduced stunting levels. This implies that on a priori grounds, a multiple purpose CBO, i.e. one that is concerned with overall nutrition security or household well being could be a more effective driving force for poultry model uptake, compared to single purpose poultry CBOs.

Second, how do the CBOs deal with the eventual threat from nearby agribusiness that with battery production units may destabilise prices and markets?

Frands Dolberg (Denmark) - Working with this model can be used as a tool to identify the poor. We know of the housing index as used by many micro-credit programmes as a poverty indicator, but it is probably less well appreciated that most rural households who keep no other animals than local chicken or none at all are equally poor.

In whatever form the work is organised, it will be important that this original target group (the poor) is kept in focus - and this may imply a beginning with a single purpose (sub) organisation. However, as the group settles and gets on with its poultry vaccination and other related activities, it could be used as a focal point for other activities such as savings and credit etc. I feel that indicators of child malnutrition - and other indicators of human well-being like body mass index of adults - can very well be used as key indicators for baseline surveys and progress assessment - and using such indicators are likely to dig deeper into our understanding of the location specific causes of malnutrition, which in-turn - provided we are prepared to learn and adjust - are likely to lead to even more efficient interventions, not necessarily poultry or animal in any way to overcome malnutrition. We know from IFPRI's studies that the status of women and women's education are very important factors to overcome malnutrition and not only increased production in itself.

I do not take firms stands on any of the possibilities mentioned above as I am sure outcome will also depend on the type of interest and leadership that happens to exist in a given place. However, one thing is sure. It may sound simple to have 5 - 10 hens running in a homestead, but it is not if this has to happen on a larger scale and we are terribly short of people with appropriate skills to properly organise and technically guide such work. The work of the Danida sponsored Smallholder Poultry Network (www.poultry.kvl.dk) deserves mention in this context. We know that for the CGIAR system poultry is not a priority although the basic experience with the work so far, i.e. that it is a tool to entitle very poor

families, and not the least women and children with food, ought to interest the CGIAR system. In many countries I have visited there is a group of 20 - 25% of the households that suffer from lack of food, even if at the macro-level, we can calculate/claim that there is enough food in a country.

On the question of competition with large poultry units, I have no firm answers. However, interesting studies could be done - or comments invited - in India, where we see eggs from commercial farms being sold in villages. On the other hand, in many country eggs and meat of local birds command a premium price over the products of exotic birds. However, if anyone has studied this question it would be good to hear from them.

Hans Askov Jensen (Denmark) - I will try to answer the two questions:

1. The community-based organisation (CBO) is an essential element in the concept, but how these CBOs shall be organised or federated depend on the specific country. In Bangladesh takes the NGOs the responsibilities for maintaining the support and provide the required services and in other countries as Malawi is it a severe problem. I agree with you on the integrated approach in which the families' health and nutrition status has priority. However, the smallholder concept is based on viable activities for the individual enterprises and these enterprises can not directly finance the social aspect, but the CBOs already established in the model can be the entry point for other family related activities - if the organisation is there.

2. It is a common perception that the commercial sector is a threat. But as stated in Essential No. 2 in the introductory paper, the smallholder shall take the advantages of the natural conditions in the village in such a way they can produce an egg with lower cost that in the commercial sector.

J.M.Ndegwa (Kenya) - I agree with the community groups approach as a strategy in poverty alleviation but I would like to see people being the focus of development interventions rather than the family poultry per se. The community approach is an effort in this direction. From past experience of participatory research in Kenya, I see the major constraint to this strategy is being one of attitude and lack of motivation. Training and sensitising women groups would make them strategically harness the few birds each might have as exemplified by a case study placed below.

Role of family poultry (scavanger poultry) production in sustainable livelihoods and poverty eradication - the case of wanjiku

Wanjiku (not her real name) is a single mother of 3 in her 40s. I met her in the course of my field visits in an on-farm farmer participatory research project in 1997. Her story about indigenous chicken and poverty was first told to me by one of my project farmers in whose homestead, Wanjiku and her 3 children, had sort refuge (squatter). The story was just too good to believe. Too compelling indeed. This unassuming lady was determined to shake off her the chains of impoverishment. Landless and in terribly humiliating indigence, Wanjiku decided enough was enough. From her meagre earnings by selling her labour to neighbours, she would buy a hen now and a cock later.

Slowly by slowly, Wanjiku had a flock of her own however small in size. But then her eyes were firmly focussed beyond her small 'wealth'. She began to manage her flock of birds to make it a 'commercially' viable enterprise. Her strategy involved 'synchronised' hatching whereby two or more hens would be allowed to sit (incubate) on eggs at the

same time. This meant that Wanjiku was able to have about 50 or more chicks at the same time. She would then rear and sell them off as a single batch. She did this several times and soon she had enough money to purchase a small piece of land of her own.

Eventually Wanjiku managed to put up a modest house by the local standards where she moved in with her family. Firmly and happily in her new home of her own, Wanjiku continued with her chicken project but she now expanded the enterprise to include vegetable growing. Her children were very helpful in these endeavours. Soon she had bought and expanded her land. Other developments in her homestead include a separate house for her sons to keep with her community's traditions, and water storage tanks - very hardy for her vegetable growing. My observation of this lady has convinced me that the war to eradicate poverty and establishment of sustainable livelihoods can be worn and will be worn. This requires the right approaches - the Wanjiku method. To hasten the process resources should be harnessed and directed through the 'right' channels. Focusing on the poor and landless, their participation and use of local resources such as family poultry (scavenging/ indigenous poultry) is an imperative.

Yaglo M G S (Tanzania) - First I would like to commend the Bangladesh model for its role in poverty alleviation of the poorest people in Bangladesh. It's encouraging learning that the model has undergone through some metamorphosis to the way it is now. I think the brilliance and dedication of all the people who have been involved in it need to be emulated elsewhere by people interested in using poultry as a tool for family poverty alleviation. However, Jonathan Bell has mentioned two conditions i.e., low cost of labour and high population density necessary for the model to work.

Now if these conditions were absent could the model have worked as it is now? I think the conditions Jonathan mentions are necessary for the Bangladesh model as it is. We have a different environment in Tanzania that could influence a kind of model if we have to start one or if we want to adopt some experiences from the Bangladesh model.

1. The common things with Bangladesh are; (i) rural people are very poor, (ii) labour is cheap (iii) poultry can be owned by the poor of the poorest
2. The difference is that poor people in Tanzania (i) are not densely populated (ii) all families own land, but they only differ in the capacity to utilise it effectively. Each family thus produces its own staple food mainly maize (iii) the land tenure gives all the people access to the use of natural resources (iv) almost over 94% of rural families keep poultry.

Each family owns poultry and land and can produce their own food and is therefore not necessarily dependent on market crops (which might of course not be enough for the whole year). The combinations of these factors make the rural market for poultry products minimal or absent. The main market is the urban population. Whereas in Bangladesh there is both the combination of rural as well as urban markets for poultry products, consequently facilitating interchange of inputs and outputs between different enterprises at a rural and or local level.

Frands Dolberg (Denmark) - We very likely come to these questions from very different perspectives. My perspective is shaped by more than 30 years in rural development (adviser, researcher, consultant), mainly livestock and attachment to Aarhus University, which gives me an opportunity to read a book now and then, apart from the updating from students.

On this background, my pre-occupation is not models per se, but modes of organising the work that seems to achieve what we want. We now want to reach the poorest with our development efforts and poultry has proven - in what I have seen on the ground - to be a very useful tool, not much written about.

Asifo O. Ajuyah (Fiji) - In the Philippines small-holders of livestock in particular poultry play significant role in rural nutrition, economy and culture (gifts, marriages, settling strife etc). Based on experiences in the South Pacific Island countries general constraints encompass but not limited to the following:- feed (cost, availability, quantity and quality); capital; management; skills; land tenure; natural disasters, government policies, marketing, diseases, manure disposal (intensive), replacement stock, no herd sub-division, indiscriminate slaughter of potential breeder, water etc. I will presume that similar constraints exist in the Philippines as a result of which your model and the Bangladesh model with appropriate modification might be a novel panacea for small-holders of livestock in small Islands countries.

Krishna Kaphle / J.H. Lin (Nepal) - Taking lesson from the success of Bangladesh rural poultry scheme for poverty elimination, Nepalese government adopted it to experiment in remote rural Far Western part of the country. The mountainous areas, backward in all sphere of development and a hot bed of Maoist insurgency were chosen for this experiment. Selected personnel who would be involved at field level for implementing the programme were taken for a trip to Bangladesh where they got first hand experience. I was not included in the trip but I did visit those rural areas to monitor the preparation for the proposed programme assessing the strength and weakness of the preparation. I do not want to discuss in detail about the programme but just for recent information it is in its first phase and around 100,000 layer pullets have already been distributed among the selected farmers representing poorest of the poor. I gained some experience, which I feel is a right opportunity and forum to discuss:

Unlike Bangladesh, Nepal being a mountainous country, limited resources, market facility, technical supports will make-work little harder. At field level the programme is being considered as a bestowal from the government in an attempt to counter insurgency, monitory gains over long term adoption was sensed from almost all the areas where I travelled. The programme has emphasised in distributing hybrid breeds for obvious reasons and the management, nutrition they may receive is no doubt below their minimum requirement. The real test for breed supremacy prevails as different breeds from diverse sources were distributed and the results will speak by itself. Some villages where the programme was implemented lied close to wild life habitat and the ecological impact of disease transfer brought in by the birds, their density resulted disease harbouring and spread to native fowls, wild birds was never assessed. The involved participants of the programme hailing from backward class of the society will not hesitate eating a dead bird rather then carefully disposing it. The effect of such activities on human health, the improper disposal of the birds viscera and its wide scale contamination by crow, dog to the surrounding areas cannot be ruled out, what is the consequence?

Besides the continuity, successful follow up, utilising local genetic resources, drawing active participation by providing loans, and vast of other areas are intended in the second phase. We are waiting for the outcome of the first phase and till now it is promising, and

this interaction is bound to help us in future in our experiment with adopting Bangladeshi model.

Edward Mallorie (Denmark) - I wonder how the smallholder poultry model can be made more flexible. There is some evidence from the earlier project that some women took up poultry production primarily to get credit, and did not continue to with poultry production for very long. It also seems that poultry may not appeal to all very poor people, who may lack homestead space for chickens, may not be able to afford the time for a part time enterprise (they need a full time occupation away from the home to survive), and who may be unwilling to take the risk involved in taking credit for livestock investment (especially at an initial stage). Would it be possible to have a more demand driven approach, allowing group members to make a choice of what livestock and non-livestock enterprises they invest in? What implications does this have for the linked enterprises of the poultry model? The usual NGO practice in Bangladesh is to allow people a free choice of what income generating activity they take up.

WEAKNESSES OF BANGLADESH MODEL

Lylian Rodríguez (UTA Foundation www.utafoundation.org) - Which do you think are the weaknesses of the model?

Hans Askov Jensen (Denmark) - The main weakness of the model is in my opinion the complexity, it is in no way easy to adapt the model to a specific country in such a way that it is ready for wider dissemination. The main reasons for those are:

1. The target group: It require hard work and commitments to convince donors and local authorities that the target group shall be the poorest segment of the village population. Even though it is the policy of the donors and the local authorities to target the poor, they often neglect the very poor. The same goes for micro-credit providers, they exclude the poorest segment of the village population - not in Bangladesh. To get the poorest segment organised in a group is not a simple job, they are invisible, they are afraid of committing themselves to something they can't comprehend and they are used to that development aids are for the others. However, when you first get them organised and they are aware of the prospective, they become very powerful and eager to participate.
2. A small flock of hens is not a gold mine; on the contrary the income during the first year has to pay for establishing the flock and all the investment in housing facilities plus often a high interest rate for the loan. I still think, that it is the right policy not to involve subsidies at user level, but it is no room for additional expenses to other activities. These have to come later after the first loan is repaid.
3. To establish the enabling environment as a sustainable activity in the village is also complicated. The existing micro-credit providers are not interested, they feel it is too risky and too expensive to administrate the loans.

An importance element in this model is the simplification. The target group is the poorest segment of the village population and a small flock (5 hens) is used as the first income generating activity and is an important activity in order to organise the poor household in community groups. However, the concept has build in the opportunity for the households to take other loans when they have repaid the first. These loans can be used to other

income generating activities including expansion of the poultry activities. In this phase new technologies can be appropriated to reduce the feed costs or make added value to the by-products However, that is another project. The objective with the smallholder poultry concept is only to help the poorest to take their first step out of poverty and give them the opportunities to take the next step.

SELECTION OF BENEFICIARIES AND SUBSIDIES

Asifo O. Ajuyah (Fiji) - I have the following questions: -

(i) More information on criteria for selection of farmers into the LLIP team. (ii) How are the farmers motivated (usually in rural areas smallholding of livestock represent secondary activities), with the Bangladesh model I will presume that the farmers are motivated based on the availability of loan (capital). (iii) Definition of smallholder farmer within the mixed farming systems in the Philippines. (iv) More information on farmers literacy level since a major component of the project include continuous improvement in the creativity, decisions, processes, practices and performance of the farmer which means farmers must have potentials to acquire skills in pertinent aspects of pig and poultry production.

Christophe Chrysostome (Benin) - In starting up a model with a pilot programme with a view to extending it to the whole country, the choice of beneficiaries is of first importance. In a village where one wants to start, everyone will say that they are poor. How then can we distinguish those who are really poor? When we are choosing, should we use resource persons from outside the village or from within? In my opinion, when the choice is made by outside people, the advantage is that we work better on the selection criteria, but the disadvantage is that the hidden sociological mechanisms of the milieu are not understood, and one could make conceptual mistakes. If the choice is made by someone from the milieu, there is the risk of choosing people only wanting to benefit from the livestock credit for other activities. What are your experiences in this domain?

Hans Askov Jensen (Denmark) - Yes, the selection of beneficiaries is one of the most important elements, and in my opinion one of the essentials of the concept. However, it is in no way easy to develop a selection procedure and the poverty indicators vary from country to country. In Bangladesh the criteria are landless combined with piece work for others, in Malawi it is the length of period out of food and here in Vietnam it may end up to be length of period with no livestock (pigs and poultry) during the year. It is also important to involve the village authorities.

They shall understand and agree that this programme is targeting the poorest segment of the village population, and the entire village will benefit if the poorest segment contribute to the production of eggs and chickens (more purchasing power and cash inflow from outside the village). Moreover the enabling environment (availability of inputs and services) can be utilised by all the villagers. The identification of the beneficiaries can be done from an outsider but in cooperation with the village authorities or an insider such as persons connected to the extension system - in Malawi Livestock Field Assistants or Village Livestock Technicians - we will probably learn more of this during the African Hall. I agree this is not a clear answer, but the selection procedure has to be developed locally.

Mamadou Sangare (Mali) - It seems that in all the described models (Bangladesh, Vietnam, Malawi), the choice of beneficiaries looks for the extreme poor. But there are

always leaders in poor and in rich groups, and their presence in a project will commit better the groups of beneficiaries. It is possible that in countries where the model succeeded it isn't the case. Would it be possible to consider that in some cases such leaders are taken into account even if there are not the typical profile of the beneficiaries, mainly to help the project starting?

Hans Askov Jensen (Denmark) - Dr. Ajuyah Asifo request a more user friendly concept than that developed in Bangladesh. It is important to be aware of; that the model in Bangladesh has been developed over two decades and it is still developing. The latter is clearly illustrated by Dr. Ziauddin (21.05.02-12:57) in showing the improvement of the model from the SLDP 1, commenced in 1993 to PLDP commenced in 1998. However, the model in Bangladesh was much simpler in the beginning as it is today.

In all countries, that I am aware of, in which the Bangladesh concept is replicated or adapted, use a much simpler model as the starting point. Jens Peter Tang Dalsgaard from Vietnam shortly described a model only comprising only a breeder component and a smallholder component with 5 HYV-hens and 2-3 local hens. In Cambodia is a model being tested with only a smallholder component using local breeds and the same set up is planned to be tested in remote rainforest areas in Indonesia. However, even a simplified model is rather complicated to develop and to implement.

It is, however, important that the 5 essentials of the Bangladesh concept described in the introductory paper are maintained. The target group is the poorest segment of the village population because, the scavenging feed resource base set a limit on the flock size. The proportion of scavenging feed shall keep the operational cost on a level where the cost per egg produced is lower than that in the intensive production systems. This limited the flock size to 5-10 hens, depending on the scavenging conditions and the scavenging area, and the income from such a small flock of hens will only have a substantial influence on the livelihood of a poor family. The enabling environments, all inputs and services shall be timely available in the village, is of equal importance in order to minimise the risks of investing in a small poultry enterprise.

DRAWBACKS OF INVESTING IN GOVERNMENT FARMS

Comments of **Frands Dolberg (Denmark)** to question of **Christophe Chrysostome (Benin)** on resources.

How in a given place, we will organise it, I dare not predict here. It will depend on the circumstances in each location. I am no longer (was at a point in time) so concerned about our theoretical calculations on resources (nitrogen or other), because, we have generally been very poor in any case, to have the poor benefit from these calculations. And I think that is very wasteful or disgraceful or whatever words we can use. For instance is our calculation complete, when - as in your example - we limit our calculation to the feed resources, but do not include the waste of human talent and the misery that goes into being ill-fed? Is it enough to limit such calculations to soil, water, plants and animals? Should they not also include people? There are overlaps in the model. No doubt and please consider that when/if you apply it. If I had my way, I would not include government farms as they almost as a rule are poorly managed.

I do find it undesirable to put money into government farms. In the case of loans, it is a way to run countries further into debts, so it should be avoided as poor management leads to low production and income and not create the profit required to repay the loan.

Asifo O. Ajuyah (Fiji) - I totally agree with you as a former county (Local Govt. Area) Senior Agricultural Officer in Nigeria (1980-1985) agricultural activities at all levels are usually significantly influenced by government policies which are formulated by arm-chair bureaucrats. Thus some funding agencies prefer liaison with rural communities through NGOs and Universities. Consequent to your comment the bumps of the 'model' are therefore dependent on the performances of the government farm, which might impact on its economic sustainability in the long run.

The 'model' in Fiji does not use government farm or government extension services and has been quite successful over the years based on increase in per capita consumption of poultry meat (12.5 kg) and eggs (65). The nerve centre or hub of the wheel is a commercial poultry industry that is vertically integrated to a feed mill, hatchery, breeder farms, broiler farms, broiler meat processing plant, extension and marketing division, with 80 spokes from the hub forming a rim of contract broiler growers located in rural areas. Currently the carrying capacity of the contract growers range from 1000-8000 meat birds.

We have designed research to look at input and output viability between contract farm based on pre-determined broiler performance indicators (note: input are the same but different output in terms of growth rate, mortality, feed conversion, slaughter weight and age etc). This model I will presume is based on concept from our developed Pacific neighbours BUT it is viable, functional and working well in Fiji. However, for other Island countries like Samoa, Tonga, Solomon Island and Vanuatu etc a different approach is required, especially with large number of village chickens and supermarket shelves stuffed with turkey tails and mutton flaps, both of which are now linked to high incidences of diabetes, obesity and high blood pressure in the population.

GENDER BIAS AND SOCIAL ASPECTS

Thabani Maposha (Zimbabwe) - responding to Frands Dolberg's comments in Annex B.

I was very fascinated when you discussed the gender dimension of egg consumption, who gets what proportion? In Zimbabwe it is the other way round unless if it changed after I left the village; adults eat eggs, the excuse or taboo given is that if children eat eggs they will be thieves. In urban areas they are mainly bought for the father and children rarely do eat eggs unless they are from well up families.

Krishna Kaphle - Increase in income need not necessarily mean improved lifestyle, gambling and drinking being a notorious social evil in those regions may get a boost with the income if not guided in proper way. I know I will draw criticism for this but I have this experience from some other projects for poor.

Peder Lund (Denmark) - Dr Krishna Kaphle raised an important issue, which nobody apparently has commented upon. In Nepal there have been several cases, where increased household income has resulted in an increase in cases of gambling and drunkenness. This is one of the unfortunate aspects of development, which should not be overlooked. In some villages in Nepal the women have tackled the issue by forcing the local authorities to ban production and intake of alcohol

Discussion on Mozambique Model

CONDITIONS FOR THE MOZAMBIQUE MODEL

Filomena dos Anjos and Robyn Alders (Mozambique) - Family poultry plays a key role in rural Mozambique where two thirds of the population lives in absolute poverty. Examples are given of three programmes that promote poverty alleviation and food security through improved production of family poultry:

1. The control of Newcastle disease in village chickens
2. The cooperative production of broilers in peri-urban areas of Maputo
3. Characterization of local chicken ecotypes.

Most of the rural population is involved with agriculture. Mixed farming (crop production and livestock raising) is most common. Rural households grow food and cash crops and generally have a small surplus for sale. Approximately 70% of the 3 million rural families in Mozambique raise chickens, around 30% raise goats, 20% ducks and pigs, and only 4% are cattle owners, and rabbit owners comprise 3% (GRM International 2001). Of all the livestock species, chickens are most likely to be cared for and owned by women.

Chickens are possibly the major livestock contributors to the diet in the family sector. They also play a major role in poverty alleviation and food security at the household level. There are no barriers to chicken meat consumption (religious or otherwise; although in some areas the consumption of eggs by women and children is prohibited) and so they are the most common source of protein of animal origin. They constitute an income source, are used for rituals, assist with pest control and supply manure.

Research has revealed that Newcastle disease (ND) is the major constraint to chicken production in rural areas, causing moralities of 50 to 100% of birds annually (Mavale 1995).

GENDER BIAS AND SOCIAL ASPECTS

Aichi Kitalyi (Kenya) - I would also want to add that there is need for more concerted efforts on improving family poultry production (egg and chickens) through addressing the major constraints namely, predators, diseases and preferential treatment for chicks, because to some households these products may be the only accessible source and very crucial in improving nutrition/health status of HIV/AIDs victims as well as those who are on TB treatment.

STRENGTHS OF MOZAMBIQUE MODEL

Family poultry development in Mozambique currently focuses on the control of ND in rural areas, the distribution of crossbred chickens and the production of broilers in peri-urban areas of the capital city, Maputo.

The implementation of an effective ND control program in Mozambique has resulted in increased chicken numbers, increased household purchasing power, increased home consumption of chicken products and increased decision-making power for women (Bagnol 2001). Despite the need to control ND in village chickens, it has been difficult to achieve a sustainable control program. Experience has shown that a sustainable ND control program is composed of four essential components: an appropriate vaccine and vaccine technology; effective extension materials and methodologies that target NGO, veterinary and extension staff as well as community vaccinators and farmers; simple evaluation and monitoring systems of both technical and socio-economic indicators; and economic sustainability based on the commercialisation of the vaccine and vaccination services and the marketing of surplus chickens and eggs.

PERI-URBAN PRODUCTION OF BROILERS

The General Union of Cooperatives in Maputo (UGC) has a total of 5,500 members, 95% of whom are women (UGC 2001). It has been assisting members in the production of broilers in peri-urban areas. In 2001, over 2,000,000 broilers were produced. Groups wishing to produce broilers initially receive a loan to enable the construction of a poultry house, provision of a water source and equipment (feeders, drinkers, etc). The loan is granted without any collateral and its repayment, including interest, usually takes 6 to 7 years.

After beneficiaries receive basic training in poultry raising techniques and elementary rules of business management, the UGC provides credit in the form of the necessary production inputs (day old chicks, feed, poultry extension and veterinary assistance). At the end of the production cycle (6 weeks), the "commercialisation brigades" collect the broilers and send them to the abattoir or to the live bird market.

All details are recorded and once the birds are sold, the accounts are done. The credit provided for the chicks, etc is repaid and of the gross profit (the difference between sales revenues and production costs), 50% is used to repay the initial loan and the remaining 50% is handed to the producers. In the case of a producer experiencing a loss, UGC will reschedule the loan provided that adequate justification is given.

THE CHARACTERISATION OF LOCAL CHICKEN ECOTYPES

The characterisation of local chicken ecotypes is underway as is the development of a breed of laying hens suitable for egg production in peri-urban areas. The Italian Government, through the FAO, is financing a project entitled "Establishment of long term support to the rural village family poultry sector." The project was developed to support rural families who suffered losses during the floods in 2000. With the assistance of the Veterinary Medicine Faculty and NGOs, the project will distribute village-adapted chickens imported from South Africa (Ovambo, Venda, Naked Neck and Koekoek breeds).

WEAKNESSES OF MOZAMBIQUE MODEL

K Benabdeljelil (Morocco) - I personally believe that this approach to specific development issues e.g., Bangladesh model with its apparent numerous successes, in one part of the world should not be a stereotype to be copied elsewhere. It has to be tested adapted, adjusted modified to fit the needs of the local populations involved.

I am sorry if my participation takes us back to some previously cited issues reported by other participants. We should be able to define regional objectives, development priorities focusing on local needs rather than copying all the components and findings of models developed elsewhere. I agree with many colleagues who found the model was rather complicated to develop and to implement, even when simplified.

Selection of participants is one of the first obstacles, defining the base line is another etc. Population participation in small animals production is another in some regions. It is also true that a package of appropriate practical technologies has not been reported for the presented model.

We should also bear in mind that the primary objective of Family Poultry systems is to produce animal proteins. In the case of several areas we are still far away from the effects of raising few chicken on health and environment. A lengthy discussion concerned health hazards, which are certainly very important but not the main focus of the conference.

I will appreciate on another hand sharing experiences in the area of feeds and feeding (strategies, evaluation programs, research methodologies to assess supplies and needs in these systems).

Frands Dolberg - I read you comments with a lot of agreement. However, I think that a primary condition for the success in Bangladesh is a political/administrative climate, which - after all - allowed the presence of NGOs. Otherwise people would not be reached.

I would say the same to Mamadou Sangare, while - of course - it is very helpful to also have committed people at village level.

Discussion on the Cuban Model

STRENGTHS OF CUBAN MODEL

Manuel P Balado (Cuba) - The Cuban model of familiar production of poultry eggs and meat has extended to the whole country and has contributed to the programs of Nicaragua and Haiti.

1. The program includes breeding farms and incubation plants for the production of chicks, which are sold to breeders vaccinated against Avianpox and Newcastle disease.
2. Genotypes of semirustic hens of high rusticity conditions, able to produce 180-190 eggs per year, are developed, being to sex at one day of age by the color of the plume.
3. The Cuban Peking duck is incorporated into the program, which reaches 187,5 eggs yearly, and meat chickens may weigh up to 1,4 kg.
4. An epizootiological monitoring and surveillance program has been established which guarantees the detection and control of diseases.
5. The feeding of backyard poultry is carried out with foods, which go from corn and soy beans up to harvest crops and sugar-industry byproducts.
6. Recommendations were made for poultry raising and the development of rustic equipment.
7. With all the results, a training and preparation program of breeders, of which there are more than 700 thousand in this country, where there are 6,7 million birds, which productions contribute to the food security and to raise the family incomes, improving their living conditions. The new genotypes created have increased the biodiversity of birds, with higher productive yields in poultry eggs and meat.

Jurgen E Lohr (Germany) - Referring to "Experiencia cubana..." I have the following questions:

1. Could you give details of the "Epizootiologal monitoring and surveillance program"?
2. Do you have a special program for the Peking laying ducks. Do you have details?

Jurgen E Lohr (Germany) - I would like to comment on de Vries' contribution:

1. The common practice to distribute pullets at about 10-12 weeks should help to vastly reduce "early chick mortality" and ensure the supply of properly vaccinated birds. This may well be one of the keys to successful village chicken production.
2. Replacement of hybrids is a problem where chicken raising is considered as one of the means of alleviating poverty. Apparently, hybrids with local hens had no problems with hatching eggs in Nicaragua. Loss of hybrid vigour may not be a problem at the level of 150-180 eggs/year, but lack of broodiness may well be.
3. Calcium supplementation is a very important factor in preventing bone problems ("osteomalacia") in the high production hen and in improving eggshell quality. However, its influence on the NUMBER of eggs produced is small at this production level.

Poultry Health and Zoonoses

VACCINATION AND PREVENTION

M M H Mondal (Bangladesh) - The small poultry farming in Bangladesh is facing a major set back towards sustainability due to various diseases/ailments. On an average 30 - 40 % poultry birds die annually due to various diseases and predators.

Various biological, cultural, social and economic factors greatly influence healthy flock management in the villages. High chick mortality has always been found associated with poor feeding, housing and health control practices. A closer look at the small poultry farming showed that in spite of training and motivation farmer's attitude towards healthy poultry management was still hazy. Most of the farmers vaccinated their flocks without maintaining cool chain and indiscriminately. The principles of bio-safety are yet difficult to implement by small poultry growers because of various socio-economic barriers.

Tran Dinh Tu (Vietnam) - Poultry diseases are considered the largest threat to traditional poultry production in Vietnam. Newcastle disease is the main fatal disease of chicken occurring throughout the year, Fowl cholera and fowl pox are also common diseases in village chicken. The Vietnamese government has encouraged the farmers to actively participate in vaccination campaigns against Newcastle disease. Thanks to frequent vaccination campaigns, the incidence of Newcastle disease decreased sharply and chicken population increased rapidly in many villages.

Filomena dos Anjos (Mozambique) addressed to Prof. Tu (Vietnam) - I would like to have more details about your programs on vaccination campaign against Newcastle disease (ND) [the main problems in carrying it out, organization, etc].

Robyn Alders (Mozambique) by his experience of working with the ND control programme in Vietnam (Prof. Tu) gave a response to the above question. The I-2 ND vaccine (a live, thermostable, avirulent vaccine usually administered via eye drop) was introduced to NAVETCO (a parastatal company that produces veterinary pharmaceutical products in Ho Chi Minh City) with assistance from the Australian Centre for International Agricultural Research (ACIAR). The I-2 ND vaccine is sold as a freeze-dried vaccine with the smallest vial containing 25 doses. In village chickens, the vaccine is administered via eye drop (every 4 months) or via cooked white rice (given twice, two weeks apart initially and then every 2 months). NAVETCO has an extensive distribution network within the south of Vietnam and so the vaccine is available for purchase in many centres.

These centres and the extension services in general function well for large to medium scale farmers. However, in a study conducted by Ms Brigitte Bagnol (a sociologist) it was found that small-scale farmers (and women in particular) were not benefiting from the same level of service and that the extension material was not appropriate for this target group.

This study was done as part of a project entitled "Improving capacity to control Newcastle disease and duck plague in village poultry" that was financed by the Australian

Agency for International Development (AusAID) and implemented in collaboration with NAVETCO. In response to this situation a new range of extension material and methods were developed to ensure that poorer farmers (both men and women) have access to the technology and that they are able to use it with success. ACIAR has been assisting with the development of appropriate technology for the control of Newcastle disease since 1984. It is able to provide a range of material to those working developing countries free of charge.

The following items can be ordered or downloaded from the ACIAR website (www.aciar.gov.au):

- SADC Planning Workshop on Newcastle Disease Control in Village Chickens, ACIAR Proceedings No. 103.
- Controlling Newcastle Disease in Village Chickens: A Field Manual. ACIAR Monograph No. 82.
- Controlling Newcastle Disease in Village Chickens: A Training Manual. ACIAR Monograph No. 86.

A French version of the ND field manual is available for download from the INFPD website. (www.fao.org/ag/aga/agap/lpa/fampo1.fampo.htm).

Much of this extension material is also available in Portuguese thanks to a project on ND control implemented in Mozambique by the National Veterinary Research Institute and ACIAR. This project will be described in more detail later in this e-conference.

Further information may be obtained from the ACIAR/UQ Village Poultry Website (www.vsap.uq.edu.au/ruralpoultry).

Asifo O. Ajuyah (Fiji) addressed to Murray Maclean (Vietnam) - You said in your paper that in Cambodia as in other countries in the region, village poultry raising is characterised by regular occurrence of Newcastle disease that kills a large percentage of chickens. This fact dominates the pattern of flock structure throughout the year. Frequent outbreaks of disease also have a large effect on profitability.

My question is, has the situation changed since your paper is pre 2000? However, based on figure 33 and table 43 the economical impact of disease on the village poultry in Cambodia is quite serious and strategies must be developed to ensure the long-term viability of the industry. Depletion of stock from disease might explain the low poultry number per head of population (1.2) and the trends observed in figure 30 viz. a viz. the theoretical flock structure. Finally, I must say that figures 31-33 are very informative and provide a good synopsis of a typical Cambodia village hen, which may not be atypical to hens in other developing countries.

Murray Maclean (Vietnam) - I have not been in Cambodia for 18 months, but I suspect that except for limited areas that have received assistance, the situation of regular such disease outbreaks (i.e. Newcastle Disease) continues. Activities to improve village chicken raising in Cambodia have been few and far between (although there have been some success), often because priorities have been in securing and improving cattle, buffalo, and pig production. A lot of work has been done on developing basic animal health services to farmers, through village animal health workers.

In such a system it is easy for chickens to be neglected because the incentive is not readily there for such private workers to organise chicken vaccinations, when the main income is coming from pig, cattle treatments, with some preventive thrown in. Improvement of

chicken raising (as shown by the Bangladesh model) would, I suspect, require specific attention with a long-term, targeted commitment, which as far as I am aware has not yet occurred to date. Some of the conditions similar so such a project, I would think would have a good chance of success.

ADVANTAGES OF NEWCASTLE DISEASE VACCINATION

Khieu Borin (Cambodia) - The intervention to the village poultry must look into the needs of existing practices of village poultry. As an example, in the villages of Cambodia where the Special Programme for Food Security (SPFS) was implemented, the main problem raised by local community was high mortality due to the outbreak of diseases such as Newcastle disease, fowl cholera, etc.

The first intervention therefore was focused on vaccination campaign through the trained farmers in each village. With this intervention SPFS gained farmers participation in the programme. There is no good or bad model. The successful model is one, which is supported by beneficiaries (farmers/producers). Therefore, I think the first foot print that you leave in the village must be appreciated by villagers. Through Telefood funding, SPFS provides assistant on vaccination against common diseases and housing for chickens, the survival rate has improved 15%. Presently, feed and feeding systems are also tackled.

Nitya Ghotge (India) - ANTHRA is an organisation working in India on issues on live-stock development and health. A considerable part of our work is with poor rural women and many of the concerns raised such as high mortality and losses to Newcastle disease and predators have been major problems in the areas we work in. We have tried to tackle these problems mainly by using locally available low cost options, including ethnoveterinary medicine along with a successful vaccination programme against Newcastle disease and Fowl pox. Mortality rates have gone down significantly.

Yongolo M.G.S (Tanzania) - The Newcastle disease (ND) is possible to control by using thermostable as well as conventional ND vaccines, if it is well planned and synchronised. The results are so remarkable that it encourages poor farmers first to be interested and enthusiastic in keeping chickens as they get more surplus chickens for sale. That can lead in investing on poultry activities.

However I would like to ask if others in Bangladesh or elsewhere have experienced any post vaccination complications as we have in free ranged rural chickens. The main complication is occurrence of infectious coryza, pox, colibacillosis and sometimes ND itself.

Peder Lund (Denmark) - During my time in Noakhali, Bangladesh (1987 - 89) we interviewed a number of women concerning their poultry. The conclusion was that mortality of chicks was around 80%. The major losses occurred during the chicks first two months. Fifty percent of the losses were due to predators and the other fifty due to diseases (Ranikhet Disease [=Newcastle disease] getting the main blame). It was also interesting to note that the offspring from hybrid birds were the first to succumb to predators. This was mainly due to their colour (poor camouflage).

As a consequence the project trained female vaccinators (illiterate and semi-literate women) and advised the villagers to protect the young chicks during the first two months. The method of protecting the chicks was the same as the one recommended by the Poultry Model. In the villages where vaccination was provided and the chicks protected, mortality

fell to around 20%. An interesting aspect was that there was no substantial increase in the poultry population. However, the households had an increase in sales and consumption of birds and eggs.

Similar results have been seen on projects in Orissa, Chattissgarh and Tamil Nadu in India. One villager in Tamil Nadu reported "before we started vaccinating our birds and protecting our chicks, our village used to import hens for our festivals, now we have become self-sufficient".

Tran Dinh Tu (Vietnam) - Newcastle disease is the main fatal disease of chicken occurring throughout the year in village chicken in Vietnam. Frequent vaccination campaigns using thermostable and conventional vaccines have helped in sharply decreasing the incidence of Newcastle disease and chicken population increased rapidly in many villages.

Chrysostome Christohe (Benin) I read the Introduction paper on Mozambique, which is included. Coming to the paper I want to ask some questions to Filomena dos Anjos and Robyn Alders

1. at the beginning of the program of the control of Newcastle disease which disease occur in your case? Because in my country the implementation of ND control program has really resulted in increasing of chicken numbers but CRD fowl pox appeared.
2. apart of these three programmes, do you have a program in the field of nutrition.

Robyn Alders (Mozambique) -

1. Initially we did some baseline studies and ND was always identified as the major constraint. We started with ND control, as it is easier for farmers to see the benefit of an intervention if they are introduced one by one. Once ND is controlled, other diseases and other constraints do become more apparent and sometimes will become major problems. Fowl pox is one disease that can become more prevalent. Our recommendation is that the community vaccinators and the extension workers (i.e. people on the front line) need to be alert and watching out for new problems. As the new problems appear, the ones that are priorities to the farmers need to be included into extension activities. With fowl pox, in the first instance, we suggest that farmers use improved husbandry techniques to try and control the disease. Where ever possible vaccination can be introduced. An introduction to the control of other diseases is given in the last appendix in our ND training manual. Improving village chicken production really is a good example of continuous improvement.
2. The ND vaccine is not free; farmers are generally expected to pay for the vaccine and its administration (USD 0.02 per bird). Some projects have given the vaccine free of charge in the past but the control activities always came to a halt when the project ended.

Chrysostome Christohe (Benin) - By your comment I notice that the price of the vaccine and its administration in your country (USD 0.02 per bird) is cheaper than in Benin (0.05-0.07).

Jürgen Lohr (Germany) -From my experience in Uganda and Malawi on behalf of GTZ I would like to confirm and also extend the experiences by Anjos and Alders in Mozambique and by Kitalyi in Kenya. Newcastle Disease (ND) is certainly the most important chicken disease in African and also Asian countries, followed by avian pox.

In a GTZ project in the Mzuzu district of Malawi in 1992 the following vaccination schedule was recommended for COMMERCIAL egg-layers (Lohr, 1993):

Marek's Dis. Day 1
1st ND (V4) Day 1 (eye-drop) OR day 4-5 (drinking water)
1st Gumboro Day 14
2nd ND - V 4 3-4 weeks, drinking water
1st Fowl Pox 4 weeks
2nd Gumboro 5 weeks
3rd ND -V4 10 weeks, drinking water
2nd Fowl Pox 14-16 weeks (optional)
4th ND - V4 18-19 weeks (eye-drop or drinking water)
Repeat ND-V4 every 6 months, drinking water [this may have to be done more often]

In principle, such a vaccination recommendation should also be applied to family chickens, but may be more difficult to implement. It is generally accepted that the I2 vaccine strain from Dr. Spradbrow, Brisbane University, is equivalent to the commercialised and more expensive V4 vaccine. Experience from Ethiopia (Nasser et al., 2000) has confirmed the efficacy of the I2 vaccine via the drinking water, by eye-drop, or via parboiled feed. However, feed application has a number of organisational disadvantages.

There are still many other factors limiting production, particularly in scavenging-type poultry production, such as lack of regular feed supply, inadequate feed quality, inadequate water supply and quality, endo- and ectoparasites, predation and theft by humans. The latter can be a serious limitation.

Anjos and Alders also mentioned peri-urban production of broilers. Similar projects existed in Malawi in the early 90ies and may have been extended in later years. It was found (Lohr, 1993) that BROILER PRODUCTION was impossible without at least two ND and 2 IBDV (Gumboro) vaccinations. Our recommendation was:

1st ND-V4 Day 1 (eye-drop) OR day 5-10 (drinking water)
1st IBDV Day 14
2nd ND-V4 3 weeks, drinking water
2nd IBDV 5 weeks, drinking water
3rd ND (?) in case of extended growth period

Fowl pox, IB, ILT did not appear to play a major, if any, role in broilers, but CRD did in some cases.

Surely, conditions will vary from country to country within the African continent, requiring some adjustment to the vaccination schedule. Efficient and affordable vaccines are available but the organisation of regular vaccination campaigns, supply and application of the vaccines and a general system of disease surveillance appears to be a major task on which the success or failure of family chicken production may depend in many African countries.

May I also point to the benefits of small-scale pigeon raising to improve the nutrition of villagers. Pigeons can find their own feed within a much larger area than chickens and they are usually not vaccinated. However, certain housing standards are required to prevent endo- and ectoparasitism.

Literature

Lohr, J.E. (1993). Survey on management problems and Diseases affecting Poultry Production in the Mzuzu District of Malawi. Xth WVPA Meeting, 16-19 Aug. 1993, Sydney, Australia.

Nasser, M. *et al.* (2000). Oral Newcastle Disease Vaccination in Ethiopia. Avian Pathology 29, 27-34.

ZOONOSES

Concerns have been raised about health hazards from poultry residues.

First comment on residue and health from **Horst W. Doelle (Austria)** - I was surprised to read that no care has been taken in this model for the residues from the poultry. Poultry manure as well as chicken residues are excellent resources for anaerobic digestion, which would give the poor free cooking gas. Bangladesh is one of the developing countries, which has adopted readily anaerobic digestion and I am surprised to see that the model has not been thought through properly. If you organise and construct such communities, one should not only look at the food and economics or money, but also on the health of the people, because poultry manure contains one of the most vicious pathogens and thus health hazard.

What is being done with the poultry residues?

Hans Askov Jensen (Denmark) - The poultry residues are mainly being used as fertilizer.

Peder Lund (Denmark) - Though I agree health is an important issue, I do not believe that investments on these aspects should precede income to provide two to three solid meals a day. Interviews with the beneficiaries of the poultry model in Bangladesh reveal that education and health are important issues and often the first investments made, once the beneficiary has satisfied the nutritional requirement within the household and stabilised income.

Horst W. Doelle (Austria) - I am sorry, but health goes before food in my opinion. I cannot agree that a family with 10 hens cannot use a small 6 m3 anaerobic plastic digester. What is the use of more food if the enormous health dangers from hens and/or chicken manure in general cause sickness and death? I am sorry, but I am very frustrated to see recommendations, which do not look after the health of people, as we still have 80% of the world population without any basic sanitation. It is in these areas where we have the 11 million children dying each year. To alleviate poverty and starvation, we must think and incorporate basic sanitation.

What is the good of trying to get people out of poverty and starvation when you dramatically increase the health hazard and risk? To put chicken manure raw onto the field is a severe health hazard. Try it in our countries and you will get a very severe reaction from the authorities. In removing poverty and starvation we need integrated biosystems, which not only provide food but also provide eliminating health hazards. One cannot go without the other.

Krishna Kaphle and J. H. Lin (Nepal) - Taking lesson from the success of Bangladesh rural poultry scheme for poverty elimination, Nepalese government adopted it to experiment in remote rural Far Western part of the country. Some villages where the programme was implemented lied close to wild life habitat and the ecological impact of disease trans-

fer brought in by the birds, their density resulted disease harbouring and spread to native fowls, wild birds was never assessed. The involved participants of the programme hailing from backward class of the society will not hesitate eating a dead bird rather then carefully disposing it. The effect of such activities on human health, the improper disposal of the birds viscera and its wide scale contamination by crow, dog to the surrounding areas cannot be ruled out, what is the consequence?

The incidences of parasitic diseases take an example of tapeworm littered environment resulted in the poultry droppings finding its way in the body of the toddler or adult member of the family or neighbour cannot be ruled out. I was interested in knowing the human health vis a vis this model, disease prevention in this model, and areas of improvement if implemented in other countries e.g Nepal.

Intervention from **Jonathan Bell (Danida Bangladesh)** - I feel that the concerns that have been raised about health hazards from village poultry are exaggerated. The risk to health from having no protein in the diet is much greater that any risk involved in having ten hens in the homestead.

Horst W. Doelle (Austria) - I would like to see some statistics on the suggestion stated by Jonathan Bell. We certainly have the statistics on chicken and poultry as well as other animals on health hazard if there is no sanitation. I suggest to Jonathan to look up the statistics in the latest UNDP and WHO reports. How do you control 5-10 hens in a homestead? They will soon become 20 or more according to my experience. He also forgets that a family requires sanitation for its own excreta. I am just amazed that we do so obviously neglect health standards and requirements, maybe because we in the developed world take it as granted

Response from **Jonathan Bell (Danida, Bangladesh)**

1. I feel the onus is on those who are suggesting that poultry are a health hazard to produce the statistics.
2. Actually chickens offer benefits to human health. For one thing, they eat mosquito eggs. In Bangladesh mosquitoes carry the deadly Dengue Fever, for which there is no cure. Without the village chickens life would be worse for the villagers.
3. In the Bangladesh poultry model the "key rearers", which constitute 95% of all the entrepreneurs have 9 hens, but no cocks. So there is not so much danger of huge flocks of rampaging chickens threatening people. Not to mention the classic restraints of chicken diseases [not human diseases - these are not zoonoses], predators and lack of food to growth of village chicken populations.
4. Human sanitation is a separate question. Actually, Danida, which supports the Smallholder Livestock Development Project in Five Southern Districts of Bangladesh, also supports a human sanitation programme in the same area.

Horst W. Doelle (Austria) - I just wrote an article on 'Biotechnology and Human Development' and cited all the relevant recent literature I mentioned and you requested. Please look at http://www.ejb.org/content/vol4/issue3/index.html

The statistics of 2001 say,

- 826 million people are starving
- 1.2 billion people are living on US$ 1/day
- 2.4 billion people have no basic sanitation

- 11 million children under the age of 10 are dying each year mainly on infectious disease.

Surely your veterinarian expert should be aware of the Salmonella problem in chicken and that this is an almost deadly disease for children. I like Lylian's comment, that anaerobic digestion can overcome all this even in small digester of less than 2 m3. Why do we do only half of the job and not consider all the aspects of the poor people. My simple question is: why do we only look at food to live, when life can be shortened through increased pollution and danger of infectious disease. What a choice: starve and die or live, get sick and die. We can do better than that as all the technology is available and cheap.

Intervention from **D. Hadrill** - I agree with Jonathan Bell, that Dr Kaphle's concerns regarding human health risks from family poultry may be exaggerated. In particular, tapeworms of chickens are not a risk for humans. The dung of a chicken infested with tapeworms would contain tapeworm eggs that are ingested by and develop in that worm's preferred intermediate host, that is, earthworms or insects. Another chicken consuming the insect or earthworm may get the tapeworm.

Regarding protecting small flocks against diseases such as ND, I feel sure that other contributors, such as Dr Robyn Alder, will have more to say about appropriate vaccination.

R. Branckaert (France) -Certainly some possibilities exist of disease transmission between Poultry and Humans. Until now, poultry tapeworms have never been mentioned as a possible source of infestation for humans. The most important problem is certainly salmonellosis. It seems difficult to eradicate it as it is spread as well by domestic than by wild birds. Therefore, it could easily be spread in scavenging conditions. Until now, most efforts have been concentrated on Newcastle's disease prevention with some success. I am afraid, that, in the near future, - with the progressive eradication of ND - research should be conducted on the possibility to develop cheap polyvalent vaccines, combining ND, Salmonellosis (pullorosis) and Variolo-diphteria

Anders Permin (Denmark) -Yes it was nice to have a discussion on the zoonotic aspects of keeping poultry in the backyard. One of the beauties of the smallholder poultry model is certainly that there is almost no risk of transmitting diseases from the chickens to the humans. This is completely different when discussing for example pig production where we see high rates of Taenia solium (which can establish in humans either in the gut or in the brain causing epilepsy).

Trevor Bagust & Juergen Lohr (Australia) - We all perhaps can benefit from noting these veterinary facts for public health aspects of the recognised zoonotic i.e., animal-human spread infections of chooks (in Australian = chickens!)

Paratyphoid - the zoonotic disease role of motile (paratyphoid) salmonella in semi-intensive production units is not well documented but seems to being exaggerated by some commentators who are not fully conversant with the scientific facts. In laying stock transmission is predominantly by the trans-ovarian route. Therefore, control must be and can be achieved at the breeder/hatchery level (Lohr et al, 1998) [Salmonella Control in Layer Parent Stock and End Products]. In Germany all commercial pullets are required by law to be vaccinated. Both attenuated and live vaccines are available. In broilers transmission from bird to bird (horizontal spread) is more important.

According to Humphrey et al, 1989 (Epidemiol. Inf. 103, 415-423), only 1% of naturally infected hens shed salmonellae. Usually the number of organisms that is shed is well below the infectious dose. Environmental factors, such as long storage at high ambient temperatures, poor storage hygiene, insufficient cooking, use of raw eggs, will be needed for small numbers of salmonellae to multiply within the infected egg until infectious dose levels are reached. The salmonella risk, if at all present, can also be minimised by producer/consumer education. This includes short storage (maybe in a community cooler or by fast turn-over), separation of chicken and human accommodation, instructions about basic hygienic measures such as washing the hands before entering the house and eating, and of course, adequate cooking of food.

Chicken parasites and human health: There is no evidence so far that any of the common chicken endoparasites (e.g. coccidia, capillaria, ascaridia, syngamus, tape worms) are transmissible to man. Tapeworms usually require intermediate hosts before reaching the chicken as final host. The situation with ectoparasites is different. Mites, the chicken soft tick and the chicken flea can all attack humans and lead to unpleasant bites. Strict separation of human and chicken houses is therefore also necessary. A useful review of the parasitic diseases in Indonesian poultry was carried in the Jan 2001 issue of Poultry International, pp44-49 and summarises sensible control measures for parasites in caged poultry, and especially the periodical removal of droppings.

The application of NDV vaccine can be another (minor) risk because the vaccine virus can cause transitory conjunctivitis in humans, however, leaving no permanent damage. Staff and farmers handling the vaccine must be instructed accordingly.

The role of campylobacter from chickens in cases of severe human campylobacter enteritis is an area of considerable dispute between human and veterinary medicine. Campylobacter organisms are not uncommon in chicken intestines but they are not found in the egg. Rather, infection of the meat occurs after slaughter and campylobacteriosis is a problem of slaughter and processing hygiene.

Avian chlamydophilosis (formerly chlamydiosis) is a serious zoonosis, but is an infectious problem in ducks and turkeys, rather than in chickens.

General Comment: Being alive carries daily risks for any human being, risks and almost no food item - be it of animal or plant origin-will be sterile i.e., free of bacteria in its original state. Nonetheless, the content of a normal egg is usually sterile, thanks to various bactericidal substances in the egg white. But to eat, cook them!

Contrary to the undernourished individual, a well-fed body with fully functional primary and secondary defence mechanisms can usually cope with this situation. Furthermore, an adequately fed child will have a much better chance to develop its physical and intellectual capacity, and to find a way out of poverty than an undernourished child will have had. The benefits of better nutrition for people living in impoverished circumstances will therefore, by far outweigh the risks of sporadic food-borne infections which might (and in almost all cases are not!) being spread by migratory chickens in villages.

Mamadou Sangare (Mali) - Comments are clear about the low hazard with chicken manure, how is it with ducks manure? Excuse my ignorance, but we have an old saying in Mali "Duck farms prosper on the tombs of children in the household."

Krishna Kaphle and J. H. Lin (Nepal) - I would like to see some comments on sanitation, as it is a neglected area in small-scale poultry raising. As we are aware about the alarming scale of arsenic content in drinking water source of Bangladesh, the available safe sources of drinking water have to be preserved. Besides the outbreak of diseases like IBD, ND finding their way into such farms and ways and means to protect the investment of these poor farms need to be highlighted.

ETHNOVETERINARY PRACTICES

Krishna Kaphle - Ethnoveterinary is and plays a crucial part in backyard poultry raising. I personally feel that it should also be given a permanent place whenever we discuss about small-scale poultry/livestock farming. I would be interested if fellow participants could shed some light from their experiences to help other audiences like me. I would also like to know the strategy that the designer of such a model has regarding the continuity of ethnoveterinary medicines incorporated with judicious use of synthetic medicines for better and sustainable results.

Oluyinka Olukosi (Nigeria) - The discussions about the impact of poultry on human health have opened up my eyes into an area I have not considered very seriously before. I only wish to add, in this regard, that simple ethnoveterinary practice may reduce the impact of cross infestation of ectoparasites from chickens to man if it is combined with strict hygiene codes which are, of course, the tenets of any sound system.

Krishna Kaphle (Nepal) - I would again like to draw the attention of the participants to ethnoveterinary medicines and like recently developed medicinal egg rich in monoclonal antibodies, we may work out to enhance the medical and nutritive value of the traditional products with out risking complication of non-acceptance. I feel we should think of every option available and judge how best it can fit to the model for its improvement.

Inputs for sustainable family poultry production

FEED AND OTHER RESOURCES

Lylian Rodríguez (UTA Foundation www.utafoundation.org) - Which are the feed ingredients and where are they coming from? Which are the main sources of protein in the system?

Hans Askov Jensen (Denmark) - In the first phase, interalia, field trails and full-scale village test, we use normally balanced commercial feed. After that we use what is locally available or we encourage the farmer to grow protein crops like soya. However, the main part of the feed consumed has to be scavenging feed. I know that University of Tropical Agriculture (UTA) do a great work to develop methods to produce animal feed from waste such as worms, larvae, and duck weeds, but I have not seen a possibility to integrate these methods into the first phase of the model development.

T R Preston (Cambodia) - The Bangladesh model is a sociological and organizational success but has few novel features from the technological viewpoint. This is very clear from Han's reply regarding the feed inputs. Hans proposes encouraging the families to grow "soya" which is somewhat at odds with the concept of local resource use. Out of interest I quote recent (2000-2001) yields from inter-cropping immature rubber trees on the best soils in Cambodia. Two crops of soybeans and one of mung beans totalled 2.4 tonnes/ha of seed in 13 months growth period, containing about 500 kg of protein. The comparison crop was cassava grown for forage which produced 56 tonnes/ha fresh foliage containing close to 2500 kg of protein - five times as much.

Of course you cannot feed cassava foliage to chickens, which is of course the big constraint in the Bangladesh model in its present form. Bangladesh has large water surfaces, not very good for cassava (and less so for soya) but ideal for duckweed and water spinach (Ipomoea acuatica), with yields equivalent to 4 to 5 tonnes of protein/ha. Both these feed resources are consumed by chickens, but with 90 to 94% moisture they present major constraints to ncorporation into "balanced" conventional feeds. This highlights the inflexibility of the model as it functions at present, and casts doubt on its long-term sustainability. It also emphasises the need for research into alternative feeding and management systems, which make efficient use of the natural tropical resources.

Harm de Vries (Venezuela) - On other places the type of supplementation (still restricted, making use of the comparative advantages of scavenging) could be the most important factor. It will be quite a challenge a find an optimal system.

Oluyinka Olukosi (Nigeria) - The greatest attraction of scavenging chickens enterprise is it's making good use of the scavengable feed. As Roberts (2000) pointed in the Tune workshop, it is essential to know the capacity of the feed resource base in an environment before embarking on scavenging chickens developmental work. It is a good sight seeing

that scavenging chickens are improving the living standards of impoverished people. I am just afraid that if one does not take care of the feed resource base, the population might soon overgrow the carrying capacity of the feed resource base. The supplemetal feed requirement of the chickens will experience a hike in such a situation. Maybe, it is an unjustified or premature fear, those with experience in the field might wish to enlighten me.

Frands Dolberg (Denmark) - A visit a couple of years ago to Papua New Guinea as member of an IFAD mission left me with questions. You find plenty of local feed resources and there is - at least in FAO - plenty of knowledge about these feed resources. Yet, feed, even for village level poultry production was imported from Australia.

Asifo O. Ajuyah (Fiji) - My point is that for sustainable utilisation of feed and non-feed resources, product output must be quantitative (higher yield per unit) and not numerical. Based on the classical concept of double conversion being more efficient in resource utilisation than triple conversion; i.e., soil nitrogen to plant nitrogen (double) versus soil nitrogen to plant nitrogen to animal protein (meat, egg and milk) [triple], the livestock industry in developing countries must encompass efficiency of production per unit.

Some overlapping activities in the model, which are duplicated within Enterprises for example, Government farms and Enterprise-3 (in supply of stock), also Enterprise-4 with Enterprise-5 (procure table eggs) may be considered.

Thabani Maposa (Zimbabwe) - The Philippines paper says that the farmers have noted how mortality reduces the viability of their enterprises and have taken on confinement as the solution. I have found or always thought that it was the solution to mortality reduction. But alas farmers kill chicks due to starvation and will more often give supplement that are far from nutritious for instance in Zimbabwe they would give mealie meal and besides this being too fine it is not nutritive.

Tran Dinh Tu (Vietnam) - The village chickens obtain feed mostly from their natural environment by scavenging. Recently the nutrition of village chicken has been improved considerably by introducing a new technology to successfully raise earthworms at the household level-using ruminant and pig manure mixed with decayed rice straw.

Filomina dos Anjos (Mozambique) - I am interested in raising earthworms. Please send for me the technology.

Tran Dinh Tu (Vietnam) -The simple technology used to raise earthworms in Vietnam is as follows:

- The earthworm species raised is Perionyx excavatus
- The best feed for earthworms is a mixture of bovine manure and decayed rice strain with ratio 1:1
- Earthworms may be raised in brick blocks, or wooden cases or woven bags with the sizes varying according to the production scale. At family level we often recommend the farmers to make simple small size wooden cases (50x50cm) or to use animal feed bags.
- Earth worms are fed every two days with the amount of mixture varying according to the quantity of earthworms raised and their hunger.
- The cases or bags are put under thatch houses and their surfaces are covered by carton or old cloths to be protected from sunlight and watered once a day to ensure the humidity of mixture to be 60 - 70%.

- The biomass of earthworm would double after four weeks raised according to such technology and can be harvested every week to feed chickens.

Rene Benackaert (France) - cautioned about raising earthworms based on the following facts;

- Certain earthworm species (Eistenia fetida and Dendrobaena sp.) contain an anti-nutritional component anti-thiamine factor) which seems to be destroyed if the worms are sun dried.
- Worms represent intermediate hosts of several parasites
- Worms can accumulate important amounts of heavy metals

Robyn Alders (Mozambique) - The extension material on Newcastle Disease (ND) control also includes recommendations on improved housing and supplementary feeding with locally available feedstuffs, especially for chicks. There is still much work to be done in the field of supplementary feeding. The work will need to cover both technical and social issues as we need to ensure that the recommendations are formulated in such a way that farmers are likely to adopt them and that they are cost-effective. Introducing interventions in addition to ND control usually requires a little more effort and a little more time. (ND control is lovely to work with because all you need is one outbreak to clearly demonstrate the effectiveness of vaccination). When dealing with village chicken owners, who are also mixed farmers, we must also accept that not all of them will want to adopt every new intervention. Each new intervention requires more time and more investment and some farmers will prefer to put their efforts into other activities.

In my work on the village chicken production systems of Africa in the FAO Animal Health and Production Paper No. 42 of 1998, I emphasised on the importance of step by step poultry improvement in rural areas; an idea first brought up by Dr. W. Bessei. Four years later and after having an opportunity to look into the rural poultry sector of more African countries I would still say emphasis should first be on use of the local resources (breed + feed) and improve on management first if we want to reach the poor of the poor. Then let the rural community move into improved breeds on their own initiatives.

M.G.S. Yongolo (TANZANIA) - This has a reference to the communication of Thomas Kaudia and Aichi Kitalyi on village Poultry Production in Kenya.

My first observation refers to the table entitled "Productive characteristics of a good hen", which is missing. The one referred to as Table 1 is about Income projection from village chickens under improved management.

I would like to know whether the data on the number of eggs and clutches were obtained: through interviews only or by physical counting? If by interview, how reliable was the memory of farmers? In most rural households, farmers do not keep records. What was the level of literacy of the selected farmers interviewed? This could reflect the reliability and accuracy of the data. If physical counting was made, could similar results be found?

Secondly, in Tanzania the average number of chickens per household depends of the time of the year when the data are recorded and whether the farmers consider chicks as chickens when responding to question like, "how many chickens do you have"? The flock structure also changes with time. What is your experience on that from your study?

Referring to Characteristics and parameters of family poultry production in Africa: Results of a FAO/IAEA Co-ordinated Research Programme, my third comment is on the

age stratification. It looked like you had only two groups (Adult and chicks), what about growers? What was the age limit for chicks? This information if available would help us to compare your results and what some of us are experiencing here in Tanzania and probably elsewhere.

I am delighted to see the high level of supplementation in your study area. Taking a quick calculation they are supplementing about 137.5 gms of carbohydrates and fishmeal per bird per week. This to me is very high compared to where you have no supplementation at all. What I do not understand is why with such a supplementation level the productive parameters on flock size and number of clutches are the same with what we are observing in our flock where no supplementation is practised! Does that mean that the scavengable feed resource base (SFRB) is very low or do the management practices deliberately restrict scavenging in the area? Or there are other environmental factors and diseases, which influence feed intake from SFRB and the supplements.

Marco Cisneros (Ecuador) - We can profit a lot by the experience from Asia and Africa. Each project has its reality, in each territory, Our Ecuadorian case is similar in the general aspects, but it's different for the particular topics: such as feed, genetics, cultural approaches, economy, and others. Biosecurity and criteria from poultry industry are important to develop a family poultry project. In this way the industry agrees part of the financial support for this kind of project.

I have two questions:

1. I would like to know if the poultry industry is somewhere giving support to develop this kind of project? How are they working?
2. What about the poultry genetics banks? Are there regional Banks, or World banks?

Keith Hammond (FAO) - I am appreciating the many informative contributions to the Conference to date, and looking forward to reading future contributions.

Have been stimulated by today's informative paper by the Moroccan team to make a special request of all participants: without moving away from the important theme of course.

We are in process of developing a decision support system for use in-country to assist in the planning and implementation of more sustainable genetic improvement activity WITHIN the livestock development effort as a whole; with the system de-emphasising genetic theory and focus almost exclusively on application! The system will address all areas of programme development, the policy (local community to national), operational and technical elements of planning, getting started and further development, in the context of the development of the livestock as a whole (i.e. highlighting the need to also consider other elements of improved husbandry, feeds and feeding, disease management, marketing, etc; and at particular points in time some of these other elements being more important to address). The importance of involving local communities and structures and also of further developing capacity will certainly be included.

NOW: To best configure all areas of the decision support guidelines are useful, we need as many experiences (the good and the bad! such as mentioned by Drs Benabdeljelil and colleagues) as possible, and indeed also more detailed documentation for background. So we would greatly appreciate receiving from all participants both short and longer documentation covering (both the good and bad experiences of participants with planning,

getting started and further developing genetic improvement activity AS AN ELEMENT OF chicken + development. By way of definition, by 'genetic improvement', we mean breeding systems which cover ALL types of genetic manipulation of local and introduced livestock populations - straight-breeding, crossing and replacement.

INDIGENOUS BREEDS

Christophe Chrysostome (Benin) - What are your opinions on the use of local chickens in a smallholder development model?

Hans Askov Jensen (Denmark) - The use of local chickens is an essential element of the concept (comparative advantages) and I know that in Cambodia and in Indonesia there is a smallholder poultry program in the development phase and based only on local breeds. A local hen can in best case produce 30 saleable pullets and cockerels per year and often to a price between one and two US$ per chicken. However, the chickens have to be protected against predators, vaccinated against prevailing diseases and provided with supplementary feed especially during the first 6 weeks of life.

Asifo O Ajuyah (Fiji) - The sustainable utilisation of feed and non-feed resources, product output must be quantitative (higher yield per unit) and not numerical. For example hybrid chickens should grow better and produce more eggs using less feed compared to the unimproved. I will therefore presume that the driving force for using improved breeds (RIR, SCWL, F) in the model is for improved production, also in future local breeds with good performance traits might be used in the model to benefit from their indigenous traits. The future of livestock industry in developing countries must encompass efficiency of production per unit. For example there is no use to have improved breeds in model without benefiting from their genetic potentials.

HATCHING / BROODING AND PREDATORS

Thabani Maphosa (Zimbabwe) - What is synchronised hatching, tell us how this is achieved? It is a good thing that would reduce management huddles but could also create bottlenecks in terms of food provision.

There has be no response to the above question.

Thabani Maphosa (Zimbabwe) - The Philippines paper mentioned the use of basket system for brooding with the hen. My comment is if your brooder is properly designed there is no need to keep the bird with the chicks and literature says the parental link is not immediately established after hatching for a maximum of three days (Sharp et al. 1979). It may be wise to remove the bird during this period then.

Peder Lund (Denmark) - I do not think the idea is fully appropriate under village conditions. The hen is to play a dual purpose that cannot be replaced by human or simple technologies. First of all the mother hen has to teach the chicks the skills of scavenging. If they do not learn to scavenge the cost of rearing them becomes too high. Secondly the hen is still required to protect the chicks against predators. Though the chicks may have the ability to flee, the mother hen will often be prepared to battle with or distract the predator to save her chicks.

Krishna Kaphle (Nepal) - I would like to draw attention of participants concerning the fear of predators that may be attracted by the presence of free scavenging birds. The

predators ranging from mongoose, jackals, fox, jungle cats and others beside domestic cats do present a potent threat, especially to chicks in their free range. What are the currently employed techniques to minimise the loss and what is the success?

Frands Dolberg (Denmark) - There is often an age aspect in the bird's capacity to survive predators. This is one of the reasons why the young ones are confined the first 6 - 8 weeks in the Bangladesh model.

Predators are a serious problem especially for small chickens. However, in Sri Lanka they have developed a creep feeding system, also known as the 'basket system'. This has proven to be very effective in decreasing the mortality rate. You can find a guideline on using the basket system on www.poultry-development.dk

Anders Permin (Denmark) - The beauty of the small holder model is the improved management including taking care of the chicks the first two months avoiding predators of taking the animals.

LOAN FOR STARTING FAMILY POULTRY

Please also see the Contribution from DANIDA/social-economic case study from Bangladesh

Hans Askov (Denmark) - In the concept is it compulsory to use the first loan to a poultry activity?

I have mentioned earlier, that the small flock of hens shall in the first year have a positive cash flow in order to repay the loan and all investment in stock and production facilities. Especially, in the first phase of adapting the Bangladeshi model to the prevailing conditions in another country.

Is it important to simplify all the components and to secure, as far as possible, a positive cash flow?

It is both more secure and simpler to use commercial feed in the first development phase. If a simple technology is available and gives the same security for a positive cash flow the first year of operation, then it should be applied from the very beginning. I know at University of Tropical Agriculture and others are involved in developing such technologies, but is not easy to incorporate them in the model from the very beginning. However, I see these technologies as an option for the second and following loans, but then the farmers have a free choice to select the income generating activities and our obligations are to make viable technologies available and attractive for the smallholders.

Edward Mallorie (Denmark) - There is some evidence from an earlier project that some women took up poultry production primarily to get credit, and did not continue to with poultry production for very long. It also seems that poultry may not appeal to all very poor people. They need a full time occupation away from the home to survive and may be unwilling to take the risk involved in taking credit for livestock investment (especially at the initial stage).

Outputs of family poultry production

EGG PRODUCTION UNDER SEMI-SCAVENGING SYSTEM

Harm de Vries (Venezuela) - Some comments and a few questions on the Semi-scavenging poultry flock model.

Although I have heard before of the programme I am so happy to hear again about this concept. It has never been my direct job description, but sideways I always have been working with improved birds in the scavenging system. I have been confronted with a lot of scepticism, so it is good to hear from the success of the project.

I am convinced the system of scavenging has comparative advantages. The model can be a base to work with at many other places. However, many times there might not be a need to copy the complete model. In several countries, the purchase of day old chicks from a commercial farm can be a good alternative. In Guyana pullets were available on the market, and in Bhutan pullets were made available by the government. My experience in Zambia was, that chick raising executed by government officers was more sustainable. Sometimes they do have more possibilities to cope with the organisational difficulties involved in purchase and marketing.

I expect that this could be the same in some other African countries. And instead of credit also systems of exchange with local poultry could be applied. But for sure, I think that the scavenging system with improved birds implies economic benefits for the poorest of the poor. The most persistent problem with the scavenging system is that the extension service in many countries advises farmers to build nice sheds an keep the chickens confined. If Bill Gates had to pay the salary of all these people, even he would get poor. The mission of this network should be that extension departments get aware of the comparative advantages of improved birds on free range, and that the advantages get lost as soon the birds are confined. Finally, I have a question:

- Are there data available of the egg production of improved layers on free range?

Frands Dolberg (Denmark) - To Harm de Vries question, whether there are data available of the egg production of improved layers on free range? Please have a look at http://www.cipav.org.co/lrrd/lrrd9/3/bang931.htm where you will find the results of a trial comparing 6 exotic lines under semi-scavenging conditions in Bangladesh.

Abdul Jalil Ambar (Bangladesh) - The findings of an applied research in Bangladesh on the performance of different breed combinations under semi-scavenging system (receiving about 30% of feeds from the homestead compound) the egg production of improved layers SONALI (a crossbred between RIR male with Fayoumi female) is 156 eggs in 12 months as against a hybrid layer Lohman Brown that produced 140 eggs only.

Rearing of improved birds on free range was practised in Bangladesh a few years ago. The objective of free range rearing was that the birds would collect feeds available in the

homestead compound or backyard. But with the increased number of rural households, the opportunity of poultry birds to collect feeds from the surroundings have decreased and the birds were emaciated due to malnutrition and the egg production was poor.

In the circumstances free range system of rearing of improved birds was discontinued and semi-scavenging (model) system in being practised with the main objective of economic profit through minimising feed cost as compared to confinement. It is to be noted that semi-scavenging system of rearing involves the following conditions:

- Use of appropriate breed because of genetic x environment interaction.
- Involvement of poorest to the poor class people who have no facilities to rear the hybrid stock in confinement.
- Use of low cost accommodation and minimising feed cost with cafeteria system of feeding is advocated.
- Age of the birds should be more than 2 months onwards.

Hans Askov Jensen (Denmark) - When we are talking about the egg yield and improved breeds in the semi-scavenging system we have to reverse our mind. Normally, we measure the efficiency in productive parameters, especially the egg yield. However, in the semi-scavenging system the efficiency is measured in the cost of supplementary feed to produce an egg. It is relatively easy to obtain a high egg yield by providing supplementary feed ad libitum, but often it will not be viable. The efficiency has to be measured as the supplementary feed cost per egg produced, which implies traits related to both the egg yield and scavenging abilities.

A comprehensive trial has been carried out in Bangladesh and, as informed by Jalil Amber, the SONALI hens were superior to e.g. the Lohman hybrids. A similar trial conducted in Malawi, even smaller in size, revealed that the Hy-line breeds (Another hybrid) were superior to both Black Australorps and the local breed. Unfortunately, very little attention has been give to scavenging ability in describing different breeds, even that this may be the most important trait in scavenging and semi-scavenging systems.

Ziauddin Ahmed (Bangladesh) - The word semi-scavenging is used for small poultry flocks under partly controlled management conditions and where the scavenged feed accounts for a substantial part of feed consumed. Under this semi-scavenging system the poultry model production chain (PMPC) has been developed for the target beneficiaries, particularly women in rural areas for their higher income and self- sustained employment.

The poultry model concept was started with a joint effort of DLS and BRAC at field level from early part of 1983 with some support from world food programme (WFP). At the initial stage, intensive vaccination drive against Ranikhet disease and day old chick rearing was introduced through the women beneficiaries. With the growing demand, other support services were gradually introduced as Key rearer, Feed seller, Model rearer and Mini hatchery to transform into poultry model production chain.

Tran Dinh Tu (Vietnam) - Approximately 75% of poultry population is kept in small households with local breeds. The size of chicken herd is about 10-20 chicken per family that consumes mainly locally available feed. The local laying hens produce 70-80 eggs per year. More than 10 indigenous and native poultry breeds have been raised in different parts of Vietnam.

The most popular breed is the Ri, raised in the North and South provinces. They are dual-purpose breeds, slow growing but adapted to scavenging and hot climate. They have high resistance to diseases and parasites. The village chickens obtain feed mostly from their natural environment by scavenging. They also receive supplementary feed usually paddy rice or some commercial concentrate at the end of the day. Supplementary feed varies from 10 - 30% of total daily feed intake depending on the family's economic situation, age of poultry and production stage as well as current market price.

Murray Maclean (Vietnam) - In Cambodia the farmers commonly recognise two types of local chickens, the 'jai' and the 'kok'. The breeds are well adapted to minimal input village scavenging conditions, where nutrition is poor, and parasitic and infectious diseases are common. Cambodian village chickens begin producing eggs at around 6-7 months of age. They begin by going through a laying period of 15-20 days, during which they lay about 11-13 eggs. Village chicken are free range scavengers that are fed supplements, which are primarily energy supplements of white rice or paddy which is usually cast over the ground in the yard of the house. Young chicks may be given a supplement of white rice equivalent to 250 grams/day/10 chicks and that an adult hen with her chicks may be given from 50-250 grams paddy/day. Some farmers give nothing to the chicken from November to April, considering that there is sufficient rice in the rice fields.

MARKETING OF FAMILY POULTRY PRODUCTS

Asifo O. Ajuyah (Fiji) - An attraction yet to be exploited by rural farmers is the production of organic poultry meat and eggs which has niche markets in the cities and export potentials to developed countries who will pay premium prices.

In Cambodia, traditional village-level chicken raising is carried out by nearly all-farming families. The emphasis is on meat production for sale and home consumption but eggs are sometimes collected and sold instead being hatched. Very few traditional raising units at village level have been elevated to semi-intensive level.

Based on the paper from Vietnam, apart from providing animal protein, the village chicken seems to have other novel uses i.e., spiritual (yellow feathers), sports (cock fighting) and medicinal (production of tonics). My questions are two fold:

1. for each type are there same or different breeders and relative importance in terms of commerce.
2. major traits or characteristics of the Ac or "tonic breed" and is the efficacy or benefits historical?

Tran Dinh Tu (Vietnam) - To your questions I try to answer as follows:

- Each type of chicken was often produced by the same breeders. Vietnamese farmers were relatively conservative. They wanted to keep their traditions and habits and often lived in isolated community. So in their region there was their own type of chickens. But recently the situation has been changed due to the impact of the market economy. The different breeders can produce the same type of chickens if this type can be sold easily at higher prices.
- Ac chicken is a specific breed raised not only in Vietnam but also in Southern provinces of China. They have white feathers, but black skin and bones and dark meat. They grow slowly, and 6 month old one may be weighted only 300 - 400 gm. Vietnamese

people often cook Ac chicken with lotus seeds and some herbs to feed sick or old people as a tonic. Its efficacy is only based on the long time traditional experience and has not been evaluated scientifically.

- There is a less feathered type of chickens in Vietnam (but not featherless as developed in Israel). They grow faster than full feather type, but in general most of Vietnamese people prefer nice yellow-feathered chickens.

Manuel D Sanchez (FAO) - Recognising the invaluable contribution of the poultry model in Bangladesh and its potential applications, with necessary adaptations, to other countries, I would like to recall that there is a great opportunity, yet untapped, in many developing countries to produce local, or "criollo type", eggs and chicken meat.

If I understand correctly, the Bangladesh model is an "industrial type" model structured to involve many stakeholders, including above all small producers, in various steps in the production chain. At the end, the final product can not be physically different from the one coming from industrial production unless it is accompanied by a certification label.

The unique opportunity is to access the unsatisfied growing market of livestock products by offering a different product, the traditional product, still very appreciated (e.g. consumers willing to pay substantially more for it) in a lot of societies due to flavour, appearance, cultural value, etc. but in most places rather absent in modern market outlets.

I was in Kuala Lumpur, Malaysia, a couple of weeks ago, and I was very pleased to see in one of the largest supermarkets the "ayam kampung" or traditional chicken, nicely packed side by side with the industrial chicken. It looked somehow smaller but much more appealing, with a price about 50% higher than the commercial modern type. I have been trying to get information, yet unsuccessful, on how this traditional product has made through the modern market structure. If any of the conference participants knows something or have any contacts, I would like to hear about it. If we go for this approach, then small producers will not be competing with industrial producers but rather diversifying the offer, with a superior quality product as perceived by many consumers.

In the conference we are discussing the possible application of the Bangladesh model to other situations, however the real issue is, how can we make small producers participants of the local, regional and global market with poultry (and other animal) products. Certainly the proposed model is one option, but only one, there are many other alternatives even with other types or species of poultry (criollo chickens, Muscovy ducks, common ducks, guinea fowl, turkeys, etc.). For me one of the key issues is how to organised market chain, all the way from the producer to the market outlets or large consumers (e.g. restaurants) and for this, the Bangladesh experience and others are very valuable.

Edward Mallorie (Denmark) - Manuel Sanchez of FAO has suggested that producing a traditional product that can be sold at premium prices can help small producers compete with industrial-type commercial production.

In Bangladesh the classic poultry model is based on improved breeds (such as the Sonali). The eggs produced are, as far as I know, considered to be the same as those produced in commercial battery farms and fetch no price premium. However there is a premium for eggs from local (desi) breeds of chicken. Unlike in Britain, there is no premium for the method of production - free range / backyard rather than battery cage. I wonder how the economics of producing fewer, but higher value, eggs from desi hens compares with the improved backyard system.

The growing poultry commercial sector in Bangladesh is putting downward pressure on poultry meat and egg prices. In some areas, especially near markets, back-yard poultry producers are interested in moving up to small commercial units. Although they realise that, compared to the semi-scavenging, the feed cost per hen is higher, more hens mean more profit per day. However it is more than likely that, over time, the commercial poultry sector will concentrate into the hands of a few very large integrated operations. CP of Thailand, the world's fifth largest poultry producer, has recently arrived in Bangladesh. This may ultimately squeeze out the smaller commercial producers. Although the backyard semi-scavenging system is less sensitive to adverse movement in the feed-output price ratio, lower egg and meat prices will mean that backyard production is less effective in generating an income for poor people.

Given this scenario, the future for such small-scale producers may well be in producing traditional products to be sold at premium prices. These producers will need links with premium market sectors and production systems to efficiently produce the right products for this market.

Elwin Turnbull (Australia) - The market in Nepal gives a premium price for village poultry as you have described in Malaysia. It is especially noticeable at festival times and when families have special events such as weddings. There is no government intervention to give this premium. I agree with Manuel Sanchez of FAO and Edward Mallorie that a very useful direction for government and NGO involvement is to provide facilitation for improving marketing and efficient production in the villages. An advantage of working in the villages to find improved market channels and efficiencies is that the small funds that people have for purchasing meat remains in the local area to boost the local economies. That is, it is not attracted out to purchase inputs and pay for company profits off shore. This is very important in cases where some wealth is being generated (either from agriculture or from another sector) because the wealthier one becomes the more meat that is taken into the diet so strengthening the local economy.

This principal of involving local stakeholders to design better ways at the village and district level is being applied in the Third Livestock Development Project by the Department of Livestock Services in Nepal. One of the challenges of the approach is that we as scientists have to develop new skills in working with stakeholders and we have to learn new ways of recognising and integrating the capacities of the community members in villages and districts. This is not an easy journey when we are often more comfortable seeking out and designing technically optimum production system but the Nepal experience is showing that the benefits are there.

Krishna Kaphle (Nepal) - In line with Edward Mallorie, yes the free trade and globalization will have its impact on the small producers, it is just a matter of time. The other question to be asked is what shall be the extent of modification that this model can be stretched to keep its unique identity and at the same time fit to the changing demand of time. I feel a need to create niche market for these traditional products and a marketing channel would be the solution. Psychological advantage of traditional products and the low external input involved are a boon in disguise while at the same time vulnerability to domination by commercialised sector is a challenge. Unless ways are found out to safeguard these traditional products make them competitive or protect their opportunities, wide scale

replication of the model and its continuity remains a big question.

Khieu Borin - The premium prices for the traditional product or from local production systems with local breeds exist in Cambodia, Laos and Vietnam and it may also happen in somewhere else. The price of local chicken (live weight) is 6000-6500 riels per kg (US$ 1.5-1.65) and 3500 riels per 10 eggs (US$ 0.88) as compare with 3500-4000 riels per kg (US$ 0.89-1.0) and 2500-2800 riels per 10 eggs (US$ 0.63-0.70) of the industrial chickens. The market for the commercial chickens is mainly in restaurants and hotels where foreigners and tourists are staying. However, the products from local chickens are preferred by most of the local population. We must look into ways/strategies to improve the production of the local chickens that will bring better revenue for the rural population.

Nitya Ghotge (India) - I wish to raise the marketing issue. While ideally it may be wonderful that traditionally /"organically " raised products get a premium price in the market, the concern always remains, are the people who raise these birds organised enough to market their products profitably. Secondly will aggressive vertical marketing compromise nutritional security at the poor household level where it is most needed. In India the dairy model has often been criticised for depriving the families of producers milk as all the produce enters the market. Should we not therefore also be considering the strengthening of local markets whereby there is movement and exchange of goods horizontally /laterally as well as vertically.

Thabani Maposha (Zimbabwe) - In Zimbabwe because eggs from village chickens are small they would fetch either an equal or lesser price compared to exotics. They are slightly expensive when sold by vendors at growth points as boiled eggs. The most expensive poultry egg is that of Guinea fowl mainly because its sold and bought for breeding purposes.

Harm de Vries (Venezuela) - Do the eggs from the scavenging system fetch a higher price than the eggs from the commercial farms?

Frands Dolberg (Denmark) -To Harm de Vries above question, I dare not say whether eggs from the scavenging system fetch a higher price than the eggs from the commercial farms, when the eggs are from exotic birds, but when the eggs are from local breeds they do - according to my own observations from several countries. The price difference we found recently in Cambodia was about 50% per egg. It would be interesting to know of more examples.

MANAGEMENT OF POULTRY WASTE (BIODIGESTOR)

Frands Dolberg (Denmark) - The core of the model is households with 5 - 10 hens, and that is too few to think of any anaerobic digestion. The appeal of the model is its capacity to reach the very poor, who may have no other animals. I am just back from Cambodia, where I have seen the same. The effect of the model may be better measured by its contribution to increased food security, i.e. by families eating 2 or 3 times a day rather than 1 or 2 times and the greater diversity of the diet. Not necessarily by the households eating more eggs and poultry meat, but through their sale of these products and purchase of other items. Thus one household in Cambodia reported that 1kg live bird could buy them 8 kg rice and they also told me that it was better to sell poultry and buy fish as fish was cheaper. This is important for household, who reported only 3 - 4 months of self-sufficiency in grain. We need much bigger units to make anaerobic digestion a matter of concern, but with bigger units, we would not reach the many poor households.

I do know the biodigesters that Horst refers to as I have followed their evolution and in one case been involved as one of the supervisors of a M.Sc that broke important new ground in Vietnam. You can find a paper on this at http://www.cipav.org.co/lrrd/lrrd9/2/an92.htm. I was happy when in March this year in Vietnam, I was told that more than 20 000 of these digesters have now been sold in that country. I understand that a Vietnamese student is presently working on incorporating duckweed grown on the slurry from these digesters in the diets of semi-scavenging chicken. This work is led by Dr. T.R. Preston http://www.utafoundation.org/

If the work succeeds this is an opportunity to integrate resource-use as Horst mentions. Late 1970-80s I worked much on crop residues for ruminants, mainly cattle. Anyone, who wants to know, can search on my name (Frands Dolberg); www.google.com is one place to do that from.

However, my enthusiasm has always gone down when I - after some time in each case - have found out that there were still a fair number of people left out. In short, our technologies did not reach the poorer sections of the village. This is the problem with the biodigester Horst, so I do not want to insist that people have to use it. It does not make sense for a poor landless woman and her family. For some it may do subsequently, if they begin to invest in larger animals etc. Other families will have other preferences and go other ways. Most (this is at least what I have seen in many cases) will, if they begin to earn something, start to feed their children better and send the children to school (and this is much more likely to happen if the money is in the hands of the mother, which is another advantage of a poultry program). IFPRI studies above indicate this would mean a move in the right direction.

Lylian Rodríguez (UTA Foundation www.utafoundation.org) - Regarding the biodigester in the system, I think it would be an alternative for small-scale farmers and even for landless people. As Frands mentioned it definitely would not be the fist step in the ladder to get out of poverty. A small plastic digester of 2 m long is linked to the toilet as a source of effluent for duckweed or any other plant that can be used for as a supplement for the chickens. 2 m biodigester with plastic of 0.94 diameter has a capacity of 1.4 m3 and it does not use so much land and will bring benefits from the point of view of sanitation and welfare through the use of toilets (I am not sure in Bangladesh but in Vietnam and Cambodia toilets are not very common).

Chicken manure can be used if it is coming from poultry housed in a high pen where there is not use of any thing as a bed (rice husk or residues from wood cleaning) so may be in some cases it would not be feasible to use the manure in the biodigester, but manure and other residues from the poultry can be used to produce larva to feed the chickens even on a very small scale, so integration can be promoted and practise even on a very small scale. Poultry cannot be seen as the unique tool for alleviation of poverty.

Asifo O. Ajuyah (Fiji) - I will presume that it is important for us to look at waste streams from the various enterprises viz. a viz. appropriate procedures to design practical waste management systems. Consequent to the table below (waste output for different species), average flock size of less than 100 birds (high side) and management system (semi-scavenging) in Bangladesh, I don't see how waste could be managed via a biodigester within the following Enterprises 3, 4 and 5. Even within the Government Poultry Farm

where parent breeders are raised on deep litter. The characteristic of the waste stream which is usually available at the end of the breeding cycle (72 weeks may be) is not a sustainable feed stock for a biodigester which requires daily input of biological waste.

This and other considerations (C:N ratio, total solids, antibiotics in faecal droppings, etc) might explain why the concept of biodigester as a strategy for waste management is most successful with pigs and other ruminants and not poultry. I am not saying that it is not feasible, for example in Australia where broiler farmers generate large volume of waste a subsidiary and not integrated central waste management plant could be designed (appropriate configuration) to receive feedstock from all poultry farms. However, in Fiji, Philippines and Bangladesh such a system even a scale down version as proposed by a participant would not be practical for small-scale village chicken producers, whose only option may be composting. As a waste management strategy, composting is good for the environment because it precludes the use of inorganic fertilizer the production and use of which is more harmful to humans, the environment - water and air than few scavenging chickens in rural areas.

In fact in rural areas the people, natural vegetation, clean air and scavenging livestock make a better and healthier community than in cities with locked in people and livestock in brick houses, polluted air with no natural vegetation. All that the rural community require is a global outreach program that can reverse the follow of goods and services from urban to rural areas from developed to developing countries, then and only then will there be global economic, social and environmental sustainability.

TABLE 1. LIVESTOCK DAILY WASTE.

Parameters	Dairy	Beef	Pig	Poultry
Live wt. (kg)	630	360	60	1.8
Fresh manure (l/day)	47.3	23.1	5.1	0.12

Frands Dolberg (Denmark) - It is interesting to hear about your experiences from Fiji and it is perhaps in situations like yours in Fiji that the biodigester Horst W Doelle (Austria) advocates is in place.

Thabani Maposha (Zimbabwe) - I fully agree with others that it is not worth to put up a biodigester for most of the reasons that have been put forward. My only emotional contribution to this is that remember these chickens spend most of their time scavenging and their droppings (not so many) are all over their SFRB. My question is who collects these for a biodigester? The woman, who is overloaded with house chores that go up to bedtime! To me it is not economical and after all most of the bugs if there are at all die because of exposure to the sun.

Jonathan Bell (Bangladesh) Moderator, Asian Hall

Asifo's last remarks have highlighted a very important asset of the semi-scavenging poultry model: its contribution to the stabilising of the village economy, and thus the slowing of migration to mega cities. Its beauty lies in not only that it can allow poor people, by making use of the scavenging feed resource base, to produce an egg at lower cost than the industrialised system does using only manufactured feed, but also in that it allows them to live in the balanced and human environment of the village, instead of the degrading

environment on the margins of cities. In other words, this sort of poverty alleviation model provides not only economic, but also social advantages.

I congratulate the pioneers of the Bangladesh model and I would say among the conditions, which made the work a success is the commitment of the scientists who worked with it. What I am not very sure of is the policy support associated with the model. I see very good prospects for adapting some of its components in the other parts of developing world. More so now has given the effects of liberalisation and globalisation on rural life. I am referring to the growing trend of forming common interest groups in rural areas to address issues best handled collectively such as marketing. In a social setting found in Western Kenya, where we have undertaken a brief study on family chickens I imagine youth groups can easily take up enterprise 1, 2,and 6, whereas women would do best in Enterprise 3 and 4 and men do enterprise 5 (The contribution of Dr. Dr. Ziauddin of May 21, 1:48pm). However, it all has to be a process; the Bangladesh poultry model concept started in 1983.

Lessons from the Bangladesh and other poultry development models

Funso Sonaiya

By now, at the close of the e-conference, the importance of poultry as a tool in poverty alleviation must be getting clearer to us.

Did we identify the essentials of the Bangladesh Poultry Model? That is:

- The minimum interrelated set of component activities and procedures necessary for its successful implementation?
- Comparison, evaluation and analysis of the 3 levels and the components of these levels as presented by various contributors especially Jensen and Dolberg?

Did we note the progress in the development and complexity of the model (e.g. the number and nomenclature of the components - model rearer, key rearer, etc.)?

Could we find the functional equivalents for these essentials in the different cultural, economic and policy contexts of the countries where we work and or live?

What similarities and differences did we find in the other models presented from:

- Asia - Vietnam, Nepal, Philippines, Fiji, etc.;
- Africa - Benin, Burkina Faso, Mozambique, Kenya, Morocco, etc.
- Latin America - Cuba, Ecuador, Nicaragua, etc?

Can we start developing a viable process of implementation in our country of concern? This may involve the following steps:

1. Assessment of the socio-economic indices related to poverty, (e.g. UNDP's Human Development Index) as well as the causes of poverty.
2. Location and Density of poverty (population), i.e. proportion of poor in the villages (rural), slums (peri-urban), inner cities (urban) ; relate poverty density to the administrative costs of services and supply;
3. Project Target(s): Identifying the very poor and moderately poor rural women (and the educated jobless youth, for different components?) by using, for example, agricultural land holdings, CASHPOR's Housing Index, Participatory Wealth Ranking, etc.
4. Group Formation or Alternative Social Collateral Group size and dynamics; optimum group numbers/village Group/Participant interest exclusive or inclusive (SHP only or not) Alternative Social Collateral - matching loan to participant's savings
5. Model Component Mix Model enterprises to be implemented, based on availability of inputs and technical services, cultural, social and economic parameters
6. Viable Credit Strategy First loan size (USD 50-100?) versus input prices (DOC, feed ingredients, pullets, vaccines and medicines, parent stock, etc.); Loan form (cash or

kind). Interest and pay back period versus production cycle for components, compared with the commercial bank interest rates and specifications.

What about the essential or enabling conditions and contextual factors related to the implementation?

1. Human and Institutional Capacity:
   Availability of suitable GO, NGO and/or Partner Organisations
   Availability of technically qualified human resource in GO and NGO
   Capacity for Project Coordination and Administration:
   Management of technical services
   Management of extension and credit services;
   separately or combined - by the same or different institutions.
2. Political (policy) imperatives
   Poverty alleviation priority
   Freedom of entry and exit into self employment in the different enterprise components of the model especially marketing, vaccination, feed milling, breeding, etc.
3. Efficient system of marketing poultry products
   price, demand and supply

With these few questions, we can ensure that the end of our e-conference will be the beginning of our closer engagement with the potentials and problems of family poultry development.

These issues will be further dealt with during the workshop in Bangladesh. Plan to attend by starting early to look for funds, getting a "country team" together and attempting answers to the questions above. We look forward to your answers during the workshop.

Thank you very much for your patience throughout this long e-conference.