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HLPE e-consultation  
to set the track of the study on:

## Food losses and waste in the context of sustainable food systems

From 02 to 30 April 2013

<http://www.fao.org/fsnforum/cfs-hlpe/food-losses-waste-scope>

– Collection of contributions received –

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## Topic

The Committee on World Food Security (CFS) in its thirty-ninth Session (October 2012) requested the High Level Panel of Experts (HLPE), to undertake a study on ‘Food losses and waste in the context of sustainable food systems’ to be presented to the Plenary in 2014. *This report has to be policy oriented, practical and operational.*

As part of its report elaboration process, the HLPE is launching an e-consultation to seek views, public feedback and comments, on the pertinence and interconnections of some key questions that the report proposes to address, in line with the request from the CFS, and that could form the building blocks of the report. References of global and national studies and data on the subject, especially on food waste, are also welcome.

The feedback received will be used by the HLPE Steering Committee to finalize the terms of reference of the study and the HLPE Project Team that will be appointed to prepare the study and policy recommendations.

In parallel, the HLPE is calling experts interested in participating or in leading the Project Team for this report. Information on this call is available on the [HLPE website](#). The HLPE Steering Committee will appoint the Project Team after review of candidatures.

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The issue of food losses and waste has recently been given high visibility. According to FAO (2011), **almost one-third of food produced for human consumption—approximately 1.3 billion tonnes per year** is either lost or wasted. Their global reduction is now presented as essential to improve food security (HLPE 2011, FAO 2012ab) and to reduce the environmental footprint of food systems (HLPE 2012, FAO 2012ab, UNEP 2012ab). It was prominent on the agenda towards the preparation of the Rio+20 Conference, which linked the reduction of food losses and waste to the issue of more sustainable food systems.

The Zero Hunger Challenge launched by the Secretary General of the United Nations in Rio during the conference integrates a **zero-food-loss-and-waste** challenge and a 100%-sustainable-food-systems challenge.

The formulation of the request by the CFS seeks to understand food losses and waste, and the means to reduce them, from a sustainability perspective, including the three dimensions of sustainability: environmental, social and economic. It requires defining what “food losses and waste” means, to consider their extent and the means to reduce them, keeping in mind the three dimensions of sustainability. It also implies adopting an integrated view of food production, commercialization and consumption.

By requesting the HLPE to examine the issue of food losses and waste in the context of sustainable food systems, the CFS invites the HLPE to investigate how the reduction of food losses and waste could improve the sustainability of food systems, as well as how unsustainable food systems

contribute to food losses and waste<sup>1</sup>. This in turn requires considering the very notion of sustainable food systems, which includes their contribution to the four dimensions of food security, now, and in the future.

It is generally agreed to distinguish food losses and food waste:

- Food losses happen at the earlier stage of food chains; major issues are the post-harvest losses mainly in developing countries, the development of infrastructure and the most suitable technologies to address them.
- Food waste happens at retailing and consumption stages mainly in developed countries but also as an increasing concern in developing countries. The key issue is food distribution and consumer behaviour.

Food losses and waste can be first seen as a reduction of food availability for the poor and hungry. By reducing the amount of food available, they also have an impact on prices and thus on access to food. Losses occurring during storage make it more difficult to ensure stability.

Loss of nutritional quality (and particularly important losses found on certain categories of food such as fruits, vegetables and fish) has an impact on nutrition. This calls for an extension of the mere notion of “quantity” of loss towards integrating quality aspects in the measure and in the problem of reduction of food losses and waste.

Moreover the production of food, which is finally not eaten, whether it is lost during the production and transformation processes, or wasted at the consumption stage, entails **the use of resources in vain**. Therefore, reducing food losses and waste would also reduce the pressure on natural resources. Reducing food losses and waste appears thus as emblematic of **better resource efficiency**, a key dimension of more sustainable food systems.

This explains also why some enlarge the perspective from “food waste” (which by definition is edible food wasted, i.e. which could have been eaten, non edible part not accounting as waste) to food-related waste (which includes the wastage of *non edible* biomass/material). In the latter perspective, the focus is more on reducing the ultimate amount of waste, accounting also for not wasting non-edible parts, by re-use or recycling, either as feed for livestock, feedstock for energy production or, ultimately, as compost to return nutrients to the soil.

**Food waste at the consumer level in developed and in some developing countries is also emblematic of non-sustainable consumption patterns.** As such, reducing food waste appears as a way to raise awareness more generally on sustainable consumption as a driver of sustainable food systems.

Whatever the approach, there is no doubt that reducing food losses and waste is a key dimension of improving the sustainability of food systems.

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1 Food systems encompass the ecosystem and all activities that relate to the production, processing, distribution, preparation and consumption of food. A food system also includes the inputs needed and outputs generated by each of these activities as well as their outcomes, insofar as they contribute to food and nutrition security.

But actions to reduce food losses and waste are not necessarily immune from impacts on one dimension or another of sustainability.

Causes of food losses and of food waste are very different and call for very different solutions. **Most of food losses can be traced back to biophysical, including biosafety aspects, or technical causes. Food waste is often linked to behavioural causes.**

The economic costs of technological improvements have to be taken into account and compared to the economic costs of losses, both of which are very context dependent.

Actions to reduce food losses shall also take into account sanitary issues, for instance as regards the development of cold chains. Reducing losses for fresh products could also have environmental impacts as they often require either refrigeration or quicker means of transport, or both.

There is the need to deepen the understanding of the relations between the price of food and the amount of food lost and wasted. Policies to reduce food losses and waste might, everything else being equal, lead to a reduction of the overall effective demand, and thus to less pressure on the price system, with different consequences for producers and consumers. Other advantages could also be offered in terms of food price and the use of agro-resources for non-food uses, among others.

Such considerations show how food losses and waste and the ways to reduce them have to be considered in their specific context.

The main question underlying all the above mentioned aspects is *what can be the contributions of a reduction in food losses and waste to improve food and nutrition security in the context of sustainable food systems.*

To address this question, the HLPE proposes to look at several issues:

1. Concept/definitions (state of art and debates): existing definitions; taking into account for quantities and quality of food lost and wasted; other uses of food (livestock, energy); “overuse” of food (natural resources and over-nutrition/obesity); actual uses of food losses and waste as feed for livestock and feedstock for energy production; food losses and waste circulating through informal circuits, food banks or food charity.
2. Measuring and data availability (indicators, extension and trends): adequate indicators to be used; extent of food losses and waste; expected trends; lack of data and monitoring systems.
3. Impacts: impacts of food losses and of food waste on the four dimensions of food and nutrition security.
4. Sustainable food systems: causes of food losses and of food waste; economic, social and environmental dimensions; economic constraints and social and environmental consequences of reducing losses and waste or of better valorisation; connections with poverty and social inequalities; food production and consumption patterns.
5. Public policies: present state of public policies; policies leading to or ignoring related food losses and waste; programmes aimed at reducing food losses and/or food waste.
6. Recommendations: The HLPE proposes to look at the following axes for possible recommendations:

- potential for reduction for food losses, and by what means (technical and policy tools, information etc), taking into account regional and product specificities, as well as actions at different levels,
- potential for reduction for food waste, and by what means (technical and policy tools, information etc), taking into account regional and product specificities, as well as actions at different levels,
- potential for better valorisation of food waste and food related waste, including modifications of systems in place,
- appropriate programmes and instruments for reducing food losses and food waste,
- on the above, what role for governments, consumers, social actors, private sector and social responsibilities?

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## Contributions received

### 1. Subhash Mehta, Devarao Shivaram Trust, India

The world produces double the quantity of food needed by our population, most of which is wasted, post harvest losses and the balance rots in Government godowns.

The group may like to consider focusing on 'Integrated Producer Oriented Development (IPOD) as against 'Market Oriented Development', the cause of the current agrarian crisis and look at the following possible solutions to make food accessible to the hungry, under nourished and the poor smallholder producers/ rural communities:

- a) Communities in rural areas to set up their producer orgs/ company (PC), staffed by educated rural youth, trained to become general practitioner (GPs)/ MBAs in agriculture, with public funding for managing the risks and take over all problems and responsibilities other than on farm activities, from their members
- b) Human and institutional capacity building of unemployed women and rural educated youth
- c) Develop plans and budgets for nutrition through integrated smallholder agriculture as applicable to each area
- d) Create a mechanism for rural communities to access nutritious food at farm gate price (half to one seventh the retail price)
- e) Advocate for assistance and support by the public sector to mobilise adequate resources
- f) Ensure that the local species, breeds and varieties are adapted, as followed by successful farmers practicing low cost integrated agriculture as applicable in each area, are supported and widely replicated
- g) Primary and secondary value addition to optimize shelf life to minimize post harvest losses

The group may like to consider the following actions:

- a) Get the different stakeholders to focus on nutrition through agriculture
- b) Emphasis on human and institutional capacity building
- c) Share experience and information among stakeholders
- d) Increase work at the local level
- e) Align programmes and funding
- f) Adopt innovative approaches to mobilizing resources
- g) The producer company (PC) to manage members' risks and take over all problems and responsibilities including finance and marketing, other than on farm activities
- h) Document comparative research and successful farmer models for wide replication
- i) Engage the Private Sector, in this case the successful farmers in each area for wide replication

Subhash

### 2. Lizzy Igbine, Nigerian Women Agro Allied Farmer Association, Nigeria

Food wastes and sustainable food practices is an interesting topic. Food wastes starts from the farms, it exposes our lack of cohesion, planning and proper management of the food production chain.

This brings to study the implication of poor post harvest arrangement. Post harvest is now that the crop is ripe. Do we have a good post harvest handling technology and expertise.

Do we have appropriate preservation experience and equipments example silos. How do we handle our harvests ,were they properly harvested and put in appropriate sack and bags designated for proper preservation.

In the case of fisheries, were the fishes properly caught, preserved in freezers or smoked and packaged in dry nylons.

Mostly sixty percent of farm harvests are lost between harvest and the markets. This issue has brought losses and discouragement to farmers who do not have the know how for proper harvesting, preservation and transfer to the market to meet the end users.

This calls for urgent attention if we are to meet up with curtailing wastes in the food value chain. a sturdy on the best practices and immediate actions are crucial, and an intervention urgently taken to curtail food loss.

To this end, the UN system should set up a study group on post harvest and food preservation to come up with solutions.

Also a parallel study of Aflatoxins in foods mostly in underdeveloped parts of the world will make interesting the results and control of food wastes and post harvest losses.

Lizzy Igbine

### **3. Daniel Adotu, NGO, Uganda**

We produce a lot of food which could have been enough for consumption and for sale, but the challenge is over 60% is lost to post - harvest losses . Either due to ignorance of the producers or its deliberate. Because when you interact with them , they seem to know that they lose so much but you find them doing exactly the same thing.

like, you can find a farmer transporting oranges in a sack yet by the time s/he reaches the market over 60% of the produce is damaged but they continue to do the same thing.

Our communities and everyone who consumes any agricultural produce needs to be taught how to prolong the shelf life of the products they are handling. So that they can handle their food well and ensure they eat good food which not contaminated with food poisoning germs(aflatoxins, Botulism e.t.c)

### **4. Krishna Kaphle, Canadian Hunger Foundation, Nepal**

Rightly pointed, there are two problems:

Loss at farm, transport and storage prior to reaching the plates and loss from plate to garbage. The first issue needs multi approach in infrastructure development, technology adoption to sustainable harvesting. The second matter needs education right from crib and the most important thing is to remodel the way of life. Sustainable, healthy choices of food and lifestyle needs to be first implanted/established upon parents/teachers/community leaders and whoever that can influence generations to come.

Media, entertainment, education and everything else needs to have that dimension of "do you care" and "how will you do your part" challenges and competition. Stressing on nature and outdoor education (doses of Vitamin N), right to play and instill the values of colours, smells and nutrition should be incorporated in early education.

Let us all think about the problem and do our part, changing one person at a time beginning with self.

### 5. Sreekanth G B, India

I would like to contribute in terms of the post harvest losses happens in the field of fisheries especially in the countries like India where the existence of a multispecies fishery multiplies the possibility of food loss. This is a very important aspect to be studied as there is a surplus production of fish in India. The percapita consumption of fish in India is about 9.7 kg. The improvement is not taking place as the enhanced population growth as well as the accessibility of the commodity. The major chunk (80%) of the production will be eaten away by about 20% of the population and the wastage is also huge to the tune of 30-40% of the total production. Thus the facts should be more studied in this regard

### 6. Kenneth Cassman Univ. of Nebraska /CGIAR Independent Science and Partnership Council, United States of America

Previous studies of food losses and waste have often been confounded by lack of transparency about methods used to estimate losses and waste, and by not equalizing quantities of food losses and waste in terms of human edible calories and protein. Instead they often report losses in fresh weight, which in developed countries heavily biases the results towards perishable foods that contain lots of moisture (e.g. fruits, vegetables, liquids, etc) but relatively sparse caloric content. So, please in the current study provide clarity on methods used to estimate losses and waste, and also please focus on the major food crops that provide more than 80% of human caloric intake, including: rice, wheat, maize, sorghum, millet, cassava, potato, groundnut, common bean, cowpea, chickpea, and lentils.

Without such clarity and focus, studies of the food waste and food losses are not very relevant to concerns about global, national and regional food security issues.

### 7. Henri Baissas, NVB, France

*[Original contribution in French]*

J'ai mis au point une méthode de panification totalement innovante, qui me permet de produire des baguettes absolument délicieuses et particulièrement digeste.

Cette baguette présente l'énorme avantage d'être parfaitement consommable, le jour de fabrication, le lendemain et même le surlendemain, de sorte que l'on ne la perd pas.

L'usage du procédé conduit à une économie de farine et à une réduction du gaspillage de l'ordre de trente pour cent. C'est considérable.

Je suis sur le point de terminer la mécanisation du procédé indispensable à son développement à grande échelle.

Cette innovation à obtenue une médaille d'argent au CONCOURS LEPINE 2010, à été nominée au GRAND PRIX MEDICIS 2010, à gagné à l'unanimité du jury le concours de l'agropole 2010.

Cette innovation mérite votre soutien.

*[English translation]*

I have developed an innovative method of making bread, which enables me to produce delicious and especially digestive baguettes.

This baguette presents the great advantage of being perfectly consumable, the day of production, the next day and even the day after that, so that nothing is lost.

Using the process produces savings in flour and a reduction of waste of around thirty per cent. It is significant.

I am about to finish the mechanization of the procedure, indispensable for its large scale development.

This innovation has obtained a silver medal in the contest CONCOURS LEPINE 2010, has been nominated to the GRAND PRIX MEDICIS 2010, and has won with unanimity of the jury the Concours de l'agropole 2010.

This innovation deserves your support.

## **8. Alois Leidwein, Austrian Agency for Health and Food Safety Research Coordination, Knowledge Transfer, Austria [first contribution]**

Dear colleagues

Comment on track of the "HLPE report on Food losses and waste in the context of sustainable food systems"

I think the concept is reasonable,

To enhance implementation the reports should describe technical and policy tools for reducing food losses very striking, particularly

- plant protection on the fields
- harvest techniques and transport (maintenance of equipment)
- storage facilities and storage protection (on farms, commercial storage and in households),
- 

2 more issues for developed countries we know from statistics that

1. 70 % of fruit growing in private gardens is not harvested. (windfall), because it is not needed, there is not enough time, people do not know how to conserve or store
2. we need up to 10% of the agricultural area for the production of pet food (mainly for feeding dogs and cats). around half of the meat used for pet food is not edible for humans, but half of the meat fed to pets is suitable for human consumption

Dr. Dr. Alois Leidwein  
Head of Department

AGES - Austrian Agency for Health and Food Safety  
Research Coordination, Knowledge Transfer, AGES Academy

## 9. Vincenzo Lo Scalzo, Agorà Ambrosiana, Italy

I put to the attention of the HLPE Committee the open Talk at Barilla Center for Food and Nutrition held at © Barilla Center for Food & Nutrition 2012 - [www.barillacfn.com](http://www.barillacfn.com) with the participation of Jean Schwab, Tristram Stuart and Andrea Segre.

An issue of the relevant report with the title “Spreco alimentare: come ridurlo dal campo alla tavola” is edited in few languages and available to download at the Barilla’s Center.

The European and global scenario which was presented is a valuable effort to an updated assessment to face at the HLPE. The debate took place on May 23, 2012 in Milano and discussed again at 4th International Forum 2012 November 28-29.

The relevant themes at the Forum have been:

*I paradossi della globalizzazione: Eccesso di cibo o accesso al cibo? Mangiare nel 2030: Il futuro dell'alimentazione tra stili di vita e innovazione. Lo spreco alimentare: una opportunità da cogliere. Come comunicare il cibo?*



*Sprechi e perdite sono due dei più eclatanti paradossi del sistema agroalimentare globale. Oggi alle 17, segui il live del BCFN Talk “Spreco alimentare: come ridurlo dal campo alla tavola” e scopri le dimensioni del problema e le possibili soluzioni con Jean Schwab, Tristram Stuart e Andrea Segrè.*

As author of a proposal of international debates scheme which is still “idle” of implementation with the necessary complement of “strategic tag-deliveries” for each specific meeting, AgoraAmbrosiana and myself had taken a proper contribution by the above contribution, which is one of the themes of major concern in the larger issue of Food and Security for the Planet, known to FAO/XXX as DRAFT AA, issued August/September 2011.

I took part at the Forum and commented further with personal contributions as I did in occasions of the previous Forums. I suppose that the important contributions in all these appropriate forms will be part of the final document of this open debate.

Sincerely,  
Dr V. Lo Scalzo, AgoraAmbrosiana

5 April, 2013 – Cannes/Milano

## 10. Lisa Kitinoja, The Postharvest Education Foundation, United States of America

**The Postharvest Education Foundation** is involved in work to address both of these issues by providing information, advice, training and mentoring of young professionals who are involved in the fields of agriculture, horticulture, home economics and food processing.

### FOOD LOSSES

Key factors affecting food losses and the gaps in knowledge/skills that we have identified:

- Poor understanding of harvest indices of plant foods and how maturity is related to quality and shelf life
- Poor sorting and grading practices during preparation for market, allowing damaged /decaying foods to enter the supply chain and spread decay to other foods

- Poor temperature management and lack of control of relative humidity, leading to shriveling, wilting and deterioration of perishable foods
- Poor quality packages which provide little or no protection during handling, transport and storage
- Delays in marketing without proper storage (cool storage for perishables, drying of staple grains/beans/legumes before storage)
- General lack of education on appropriate postharvest handling practices and technologies, leading to rough handling, mechanical damage, improperly handled mixed loads, and food safety dangers
- Lack of the utilization of sustainable cost effective postharvest practices, leading to high levels of food losses on the farm, and in wholesale and retail markets

## FOOD WASTE

Key factors affecting food waste and the gaps in knowledge/skills that we have identified:

- Over-sorting and over-grading on the farm and in the packinghouse based on strict guidelines that have more to do with appearance (color, size, shape) than nutritional value or eating quality, leading to higher discards of edible foods
- Poor choice of packages and packaging materials, with focus on cosmetic features rather than on strength, cleanliness, ventilation, moisture control, etc., which would help extend shelf life
- Over-reliance on long term cold storage, refrigeration and freezing, leading to development of off-flavors, chilling injury and freezer burn, causing discards of improperly stored foods along the supply chain
- Confusing or unnecessary “sell-by” or “use-by” dates, based upon cosmetic changes or inventory management schemes rather than on food safety concerns, leading to waste of edible foods at the retail level
- Lack of education regarding proper packaging, cooling/cold storage, storage of cooked foods and reusing left-over foods, leading to increased discards of foods in the home

For a few ideas on how you can reduce food waste:

<http://earth911.com/news/2012/02/03/reduce-food-waste-in-5-easy-steps/>

<http://www.ecocentricblog.org/2012/08/13/18-little-known-facts-that-will-motivate-you-to-cut-back-on-food-waste/>

## WHY ARE POSTHARVEST FOOD LOSSES AND FOOD WASTE SO UNSUSTAINABLY HIGH?

This is a big, complex question that remains to be answered satisfactorily. One way we might be able to get at some of the answers is to ask instead: **Who stands to benefit from maintaining the status quo?**

Consider this: High levels of food losses and food waste create continuous demands for:

- more seeds, fertilizers, land, water and other inputs used for production
- more packages, packing materials, plastic bags, etc used to package foods
- more of the transportation (trucks, drivers) used for distribution of food products

- more food warehouses, cold storage and/or food processing facilities
- more traditional food markets and alternative marketing outlets (internet, CSAs etc)
- higher volumes of sales of foods at wholesale and retail markets, food service companies and restaurants.

### 11. Omar Allahham, Jordan Ministry of Agriculture, Jordan

Dear colleagues,

According to the study of "Role of sustainable fisheries & aquaculture for food security and nutrition" I think it's important to study the following :

- Test of water and its content as Chemicals wastes and heavy metals
- Test of Food produced , Microbial Tests and Chemical tests to have an clear idea about food Quality ( post - Harvest Physiology and pollution of the food produced )
- Test results will be used to arrange policies about the food use and food consumption .

In fact , food loss starts from the production area , and continue of losses from the production area to the consumption , it's important to study the post - harvest losses as quantity and quality .

Eng. Omar B. Allahham  
Head of Policies Division  
Studies & Policies Department  
Ministry Of Agriculture  
Amman-Jordan

### 12. Mahfuja Parven, IHRC GreenWorldOne, Bangladesh

Greetings.

As I am from a developing country I always give emphasis to sustainable agriculture. Developed countries industrial revolution as well as developing countries poor industrial waste management hampered our planet whole ecosystem .That why we see worldwide floods, drought , typhoon and extreme weather as well as food crisis . About 870 million people are now in chronic hanger and it's a millennium challenge to solve it. For this reason I like to divide the agriculture system into two major parts: pre harvest and post harvest .

To be continued.

### 13. Zippora Segessenmann, Federal Office for Agriculture FOAG, Switzerland

We welcome the effort to establish the reduction of food losses and waste as a mean to achieve sustainable food systems.

Looking at point 1 of the proposed issues we would like indicate that other international organizations such as the OECD and Eurostat are also working on the subject. In order to come to an

universally valid definition the processes should be harmonized. We suggest a coordination. The contact persons are Mr. Morvarid Bagherzadeh of the OECD, Mr. Rainer Muthmann and Mr. Hartmut Schroer representing Eurostat and Mr. James Lomax of the FAO/UNEP initiative "think.eat.save".

#### **14. Alois Leidwein, Austrian Agency for Health and Food Safety Research Coordination, Knowledge Transfer, Austria [second contribution]**

Dear colleagues,

An additional comment:

in many regions damages caused by game bites may be a considerable problem too. There is a conflict between nature protection and food security interests

Dr.Dr. Alois Leidwein  
Head of Department  
AGES - Austrian Agency for Health and Food Safety  
Research Coordination, Knowledge Transfer, AGES Academy

#### **15. Mendu Srinivasulu, India**

I would like to highlight on part of the produce/food the way it is being handled. I mean at the time of harvesting, processing and selling. Most of the food produce (Farm, Sea food etc) are still being poorly handled lack of good and required infrastructure, in many cases under utilization of the available infrastructure, lack of monitoring on quality and hygiene issues among sellers, buyers and administrative staff.

Hence, proper awareness on the importance of the food along with their nutritional values, economic value and negative impacts of lack of quality and hygiene is to be given highest importance.

Finally there should be a good sharing mechanism on various types of food availability at various stages so that if at all any waste is inevitable then it can be used properly by necessary process or value addition...

A dedicated website or blog to keep updates on selective areas/industries food waste or it's improvement in reducing the food waste and how the waste is being hadled properly or minimised can be shared to all periodically.

#### **16. Lourdes Laureano. Brazil**

As Centrais de Abastecimento (CEASA) de alimentos que operam no Brasil despediçam acintosamente toneladas de alimentos, principalmente os alimentos hortifrutiferas, enquanto inúmeras famílias deixam de alimentar de frutas e legumes em suas refeições diárias.

Outro aspecto importante a ser observado na alimentação da família de baixa renda no Brasil é que a cesta básica é composta unicamente por alimentos industrializados, de baixo valor nutritivo, além de incluir transgênicos, como é o caso do óleo de soja e do fubá de milho. Isso fere o direito do povo à alimentação adequada e fere a soberania alimentar.

Atenciosamente,

Lourdes Laureano.

### **17. Miriam Ofoeze, Postharvest Unit National Root Crops Research Institute Umudike, Nigeria**

In most developing countries, attention is being given to production of farm products and little or non to postharvest aspects of farming eg. mechanization, provision of improved varieties, extension services etc.

In Nigeria and so many other developing countries most farmers are rural women and lack the technology and female friendly equipment to handle postharvest losses. These lead to reduction of income, and hunger few months after harvest

In other to reduce postharvest losses, adequate attention should be given to postharvest aspects of farming as much as is being given to production of farm products

Rural women and girls should be educated, empowered and assisted by postharvest extension worker during and after harvest on Morden post harvest processes so as to increase their income and provide food for their families for sustainable development in Africa.

### **18. Yakindra Timilsena Commonwealth Industrial and Scientific Research Organization (CSIRO), Australia**

Dear all,

After reviewing the paper and the contributions already posted in the websites, I have found that the paper lacks the inclusion of safety aspects of food and agrosystem and only focuses on the reducing losses and wastes. I think we can include the following comments

1) The major obstacles in the least developed countries like Nepal is the lack of infrastructure. This has not only lead to huge amount of food losses during the distribution channel but also resulted in serious health problems. Poor refrigeration system due to frequent power cut has made the entrepreneur to use the sodium hydroxide as neutralizer in milk. This, in the view of preventing the possible loss of milk, has put the public health a serious threat.

2) The excessive use of pesticides in order to protect them from the possible damage of pests has resulted the pollution of the whole agro-ecosystem and the consumption of such vegetables has resulted in increased number of hospital cases.

3) The focus is to be given to the awareness programs and education to make more people aware on food security and food safety issues. For example in the mountainous districts of Nepal, the availability of locally produced crops and tubers and fruits and vegetable can help in reducing their hunger problem but "the mere fond of rice attitude" made them parasite to depend on the white rice to be transported by government in subsidy. So the subsidy policy should be revised and encouraging the local production should be promoted.

4) Another important thing is the stamping the expiry date on several processed food without proper research about their shelf life. It made the regulatory body to destroy the food product, may be prior to the real consumable period. So the provision for expiry date has to be revised or enforced scientifically.

### 19. Analúcia Couto, Brazil [first contribution]

Minhas sugestões:

Políticas públicas que priorizem a capacitação dos agricultores familiares com o objetivo de minimizar as perdas do cultivo `a colheita investindo em projetos que aproveitem os alimentos que não tem valor de mercado por apresentarem imperfeições mas ainda possuem valor nutricional. Transformar legumes processando-os agrega-se valor e tudo é aproveitado.

As Ceasa's podem ser o local de processamento desses alimentos que já viriam em veículos climatizados direto para as unidades processadoras que fariam a separação, qualificação, higienização e envase. Esses alimentos poderiam ser comprados pelo PAA e direcionados aos programas de combate á desnutrição, encaminhados aos hospitais que recebem pacientes orindos dos programas de assistencia à famílias em vulnerabilidade social e econômica que ao terem a alta hospitalar não possuuem condições de arcar com os custos de uma dieta prescrita , imprescindível para a recuperação plena de sua saúde.

Supermercados poderiam destinar esses mesmos produtos para uma central que faria a pre-seleção e encaminhar às Ceasa's que após o processo de aproveitamento encaminharia às unidades vicentinas que possuem a maior capilaridade tendo milhares de Conferências que direcionam alimentos aos seus assistidos , sendo a ONG mais antiga do mundo.

Políticas públicas:

- que priorizem a conservação de estradas que escoam a produção da agricultura familiar

-logística garantida para o escoamento da produção da agricultura familiar que comercializa para o PAA, PNAE e outros com veículos climatizados, adquiridos da mesma maneira que se tem os ônibus escolares

-ampliar o mercado institucional para os agricultores familiares comercializarem seus produtos para os quartéis da Aeronáutica, Exército e Marinha, Hospitais Públicos, Universidades, Ifet's e onde haja a produção de refeições coletivas públicas governamentais.

-diminuição da burocracia e adequação da legislação à capacidade produtiva de pequenas unidades processadoras de alimentos (frutas e legumes), beneficiamento, pasteurização do leite e produção de seus derivados

## 20. Analúcia Couto, Brazil [second contribution]

Políticas Públicas que possam garantir a logística ao escoamento da produção de alimentos oriunda da agricultura familiar

Ampliar o mercado institucional aos agricultores familiares para além do PAA e Pnae comercializarem seus produtos para a produção de refeições coletivas feitas nos quartéis da Aeronáutica, Exército e Marinha, Hospitais Públicos, Universidades, Ifet's, Restaurantes Populares

Garantir a manutenção das estradas vicinais que escoam a produção

Garantir veículos apropriados , climatizados para o transporte de seus produtos perecíveis (frutas, legumes e verduras)

-Incluir o Técnico de Nutrição e Dietética onde tenha a produção de alimentos e refeições coletivas ( escolas, creches hospitalares, restaurantes populares), unidades processadoras de alimentos, laticínios, banco de leite materno

Adequação da legislação sanitária à realidade da capacidade produtora da agricultura familiar

Aproveitamento dos alimentos desde o cultivo à colheita, processando legumes e frutas fora do padrão comercial mas com as características nutricionais preservadas em preparações in natura "embaladas e comercializadas no mesmo dia que chegam às unidades de processamento que podem-se localizar nas Ceasa's, próxima aos produtores

## 21. Manuel Flury, Swiss Agency for Development and Cooperation, Ethiopia

Thanks a lot for this opportunity to share perspectives on food losses and food wastes.

Cultural aspects - at household and community levels - may not be underestimated. In our preliminary assessments in Ethiopia and in feasibility studies carried out in Tanzania, we encountered

- access to stored crops needs to be secured for both women and men, individually. This has implications for the technologies and their appropriateness for household storage

- people tend to favor storage within their premises, protected from potential misappropriation and as well hidden from "the eyes" of others, them not to know the amount of harvests stored.

Best regards

Manuel Flury, Global Programme Food Security  
Swiss Agency for Development and Cooperation  
Addis Ababa / Ethiopia

## 22. Kelly Martins, Ministério de Desenvolvimento Social e Combate à Fome, Brazil

Enquanto Especialista em Desenvolvimento Sustentável e Analista de Políticas Públicas em Segurança Alimentar e Nutricional e Agricultura Familiar do MDS, sugiro algumas ações para o combate ao desperdício de alimentos:

- 1 - Produção deve ser mais próxima do local de consumo; a fim de evitar perdas e gastos com transportes longos, os quais também trazem impactos ambientais negativos. Nesse sentido, deve ser dada prioridade para projetos que produzam mais próximos das áreas urbanas. Isso também reduz os custos do alimento, pois os gastos com transporte diminuem.
- 2 - Promover a realização de parcerias entre produtores, donos de mercados, restaurantes, numa rede, para aproveitamento de alimento em instituições de caridade, creches, asilos, etc.
- 3 - Lembrando que na Natureza nada se perde, nada se cria, tudo se transforma (Lavoisier), os dejetos orgânicos devem ser totalmente encaminhados para compostagem, a fim de produzir adubos orgânicos para produção de mais alimentos;
- 4 - Devem ser promovidas ações educativas junto à população, em escolas, associações, para que aprendam a aproveitar melhor os alimentos (ex. folha de cenoura, casca de manga, folha de mandioca...) em sua alimentação diária, assim como a aprender a cultivar alimentos mais perecíveis, como tomates, folhas, etc;
- 5 - Deve ser promovida uma relação mais próxima e direta entre consumidor e produtor de alimentos, pois isso evita a perda dos alimentos nas permutas entre os vários sujeitos envolvidos, ajuda na geração de renda e sustentabilidade do produtor e contribui na redução do custo do alimento.

## 23. Jane Battersby, African Centre for Cities , South Africa

We at the African Food Security Urban Network ([www.afsun.org](http://www.afsun.org)) have been working on urban food security and food systems within the Southern African context. Within South Africa we have undergone rapid supermarketization of the food system, which has shifted consumption and production trends within the country.

While there has been much focus on reducing post-harvest food loss within the region, and increased interest in reduction food waste at the household scale, the role of the supermarket itself as a source of food waste has not received substantial attention. The work of Food Bank in South Africa has been important in deferring some food waste from the supermarket sector to agencies that support food insecure households, however this organization addresses only a small proportion of the food waste generated by the sector.

In 2012 one of my Masters students completed her thesis which examined issues of policy and practice which acted as barriers to the wider deferment of supermarket food waste from landfill. It was particularly interested in the reframing of food waste as potential resource. Our municipal waste policies in Cape Town that seek to defer waste from landfill address only municipal waste and

household recycling, neglecting the retail sector as a source of waste that could (in theory) be more easily separated and re-used than household waste. It became apparent through the course of the thesis that there were disconnects between government policy and its framing of waste and the mechanisms to enact these policies. In addition, the supermarkets were not consistent in the transfer of their sustainability policies from head office to store level and although waste was framed as a potential resource at the strategic level, the day-to-day management of waste within the store reduced waste to just something to be gotten rid of as quickly as possible. This made it difficult to conceive of any other waste management system other than the efficient systems that simply took food waste to landfill. The following URL provides access to the thesis: [http://srvrhdig001.uct.ac.za/R/?func=dbin-jump-full&object\\_id=88582](http://srvrhdig001.uct.ac.za/R/?func=dbin-jump-full&object_id=88582)

I would happily share a link to this thesis should there be interest.

Jane

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Dr Jane Battersby-Lennard  
African Centre for Cities,  
University of Cape Town.

#### 24. Andrew Daudi, Malawi

Many farmers lose a lot of produce this time when harvesting has started. In Malawi, the losses can go as high as 30-40%. This is a significant figure that we cannot afford to sustain food security development. Malawi Government is on subsidy program and we cannot afford to lose this much. If we improved on this loss to 7% loss, we do not need to further increase the subsidy program, just look after what has been produced and stored properly. The losses originate from the field with infestation by Sitophilus maize weevils and Prostephanus truncatus, the Larger Grain Borer. Some rotting occurs due to high humidity and improper drying processes. The storage dust pesticides are usually obsolete and it even leads to pesticide treadmills. In processing the grain, high losses abound and if we manage all these processes well, I do think we can sustain food security Development initiatives.

Dr. Andrew T Daudi, Malawi

PS Agriculture, retired

#### 25. William Silva, Faturpe, Brazil

Concordo que o desperdício ainda é altíssimo no Brasil, e no mundo. Atuo na área de produção de alimentações escolares, e temos acompanhado os processos logísticos das empresas fornecedoras, bem como temos tentado minimizar as perdas e desperdícios de alimentos em nosso processo de produção, distribuição e consumo. No entanto, há muitos elementos que não contribuem para tal fato se concretizar em 100%. Alguns dos elementos são: os tipos de embalagens - que favorecem o desperdício; o não gerenciamento logístico é outro elemento que favorece a perda; a utilização integral dos alimentos in natura - quanto à este elemento temos criado uma cultura de

aproveitamento máximo dos insumos, contudo enfrentamos barreiras culturais (no aspecto alimentar). Enfim, precisamos de subsídios mais variados para conter este fato: desperdício.

## 26. Mahgoub Emad Ahmed, Agricultural Research Corporation, Sudan

Dear all,

Importance of farm gate to consumer's food chain:

- Eating patterns
- Environmental impact
- Resources use

Importance of eating patterns:

- Available supply of 3,000 Kcal/person
  - of which 500 from animal and aquatic products
- This would imply in OECD countries
- \* A 25 % drop in available Kcal,
  - \* an over 50 % drop in calories from animal products (1200- 500)

regards..

MAHGOUB Emad Ahmed

## 27. Senait Regassa, Swiss Agency for Development and Cooperation, Ethiopia

Dear Sir/Madame,

Many thanks for the chance to provide ideas regarding reduction of food losses and waste in order to bring about a sustainable food system.

My first suggestion is to take stock of what went well and not so well in the past efforts to reduce food loss in developing countries. Lessons learnt globally from former initiatives should give direction for our future strategies.

I would also like to make other suggestions based on an assessment we did in some parts of Ethiopia.

Access to credit is very crucial for technology adoption. Adoption of a technology can be economically rewarding but that is not a sufficient condition for a resource poor farmer to decide to take up the technology as s/he might be constrained by lack of cash.

Low cost and freely available chemicals that are not supposed to be used on food grains may discourage adoption of other appropriate options. Biosafety regulations and enforcements are areas that need to be closely looked at in connection with reducing food losses.

Another crucial aspect is ensuring political commitment to take on post harvest losses as a core issue in the national food security/agriculture agenda coupled with capacity building in Rural Advisory Services in general.

Best Regards

## 28. Kodjo Dokodjo, Ministry of Agriculture, Livestock and Fishery, Togo

Dear all,

The proposed orientation for the study focuses on food waste and gives key issue as food distribution and consumer behavior. Of course, this is true but there is another form of food waste in developing countries due to the lack of development of infrastructure and the most suitable technologies to address them.

Food consumer behavior often depends on food distribution: if the offer is higher than the demand, this contributes to food waste. This means, as the price of the food is very low, the consumer has purchased the smallest quantity that he cannot use.

Sometimes in developing countries, the agricultural production is higher than the demand. The surplus of the production is often wasted because there is no infrastructure and suitable technology for storage or conservation. Vegetables such as tomatoes, okro... and tubers such as yams are subjected to waste during the seasonal production. In rainy season, tomatoes are so produced that their cost price is ten times lower than that in the dry season. As there is no purchaser, they are often left on the ground uselessly. This situation often brings the producer not to harvest the crops.

## 29. Kevin Moran, Kemnovation Ltd, United Kingdom

Improved quality of some fruit, vegetable and tuber crops, particularly their resistance to physiological breakdown disorders, can be strongly linked to the use of specific fertilizers. The use of fertilizers containing nutrients such as calcium (Ca), potassium (K) and boron (B) can extend the life of these crops after harvest and onwards to markets. Furthermore a reduction in physiological breakdown disorders reduces the sensitivity of crops in transit to pathogenic attack and the onset of rotting. Both the above benefits from appropriate fertilizer applications will contribute to a reduction in wastage in the food chain.

I have many examples of replicated trials work by the international fertilizer industry to demonstrate these benefits from fertilizers and would be very willing to contribute these in a presentation at the plenary.

I am also a Corresponding Member of IFA ([www.fertilizer.org](http://www.fertilizer.org)) and am active on their Post-2015 SDG's Group on which reduction of food wastage is a focus topic.

If you need further explanation I am happy to comply,

Dr Kevin Moran, Kemnovation Ltd.

## 30. Devinder Sharma, Forum for Biotechnology&Food Security, India

Sometimes, when I am finished with my meal at a marriage ceremony and go out to throw my patal (made from leaves) in the dustbin, I watch with great regret and concern when a team of urchins would descend to look for leftovers. After these children are done away with, I find the dogs moving in. At the same time I can spot a number of crows waiting for their turn.

The clamour for food security extends beyond us, the well-to-do.

What we therefore consider as food wastage becomes essential to meet the food security needs of not-so-lucky, and also that of the animals and birds. I have always therefore wondered whether food actually goes waste. I still find my mother providing a handful of kneaded wheat to the cows every morning, and also leave aside some chapatis for the dogs after dinner. What she does it so religiously is actually aimed at ensuring food security for the animals. Indian religion teaches us compassion and to believe in sharing and caring.

This however does not mean that food does not get waste. In America and Canada, 40 per cent food is wasted, much of it at the household level. The landfills are full of stale food, adding greenhouse gases. There are studies which have computed the food wastage in the US, including this NRDC study (How America is losing up to 40 per cent of its food from farm to fork to landfill. <http://bit.ly/QWpLOv>). In fact, the other day on a TV show on FDI in retail the anchor asked me would FDI not help reduce the 40 per cent wastage we have in fruits and vegetables. My reply was that first I don't buy these figures, and secondly how can Wal-Mart curb food wastage when it has not been able to do so in America where 40 per cent food gets wasted. I think the anchor didn't even know that food wastage was so high in the US.

Nevertheless, where has this figure of 40 per cent food wastage in India come from? As a student of agriculture, some 30 years back, I remember my teachers would often quote this figure. And I find even now the same figure is being nauseatingly used again and again simply to justify FDI in retail. Prime Minister uses it, Food Minister K V Thomas too uses it, and of course the Wal-Mart Minister Anand Sharma has to use it. FICCI/CII have been playing it up. But now I find Rahul Gandhi going a step ahead and saying 60-70 per cent food gets wasted !

Sometimes back FICCI had asked McKinsey (or was it some other consulting firm?) to do a study on food wastage. It also came up with the imaginative figure of 40 per cent. Speak a lie a hundred times and it becomes a truth, isn't it?

The Central Institute of Post-Harvest Engineering & Technology (CIPHET) at Ludhiana has finally cleared the mist. Based on a nation-wide study to make quantitative assessment of harvest and post-harvest losses for 46 agricultural produces in 106 randomly selected districts in 2010, showed wastage in fruits to vary between 5.8 (in Sapota) to a maximum of 18 per cent (for Guava). In vegetables, cauliflower has the minimum loss at 6.8 per cent while tomato faces 12.4 per cent loss.

Wastage for other items was much lower. For crops (3.9 to 6 per cent), cereals (4.3 to 6.1 per cent), pulses (4.3-6.1 per cent), oilseeds (6 per cent), meat (2.3 per cent), fish (2.9 per cent) and poultry (3.7 per cent).

These figures are much lower than the imaginative 40 per cent food wastage figure that is being tossed around. It only goes to show how we hype the crop losses to benefit the industries. This is primarily the reason why most Indian policies fail to deliver. If the foundation is faulty, based on incorrect figures and estimates, the policy too will be faulty. Lots of people blame implementation to

be the cause for tardy progress. I blame the wrong policies to be the primary cause for this lop-sided development.

### 31. Subhash Mehta, DST, India

Dear Colleagues,

The focus of this consultation, as I understand is meeting the AR4D needs of the rural poor smallholder producers to minimise waste and losses in transit.

By enabling the smallholder communities to access nutritious food produced by them at farm gate price and the growing nutritious food needs of markets in the vicinity, value adding locally to the surplus would minimise waste and transit losses in the future.

I am trailing a Russian AR4D output which could be widely replicated after it is locally adapted in each of the soils and agro climatic conditions of all developing countries. This could ensure our ability to feed the growing world populations of the future, reduce hunger, malnutrition, poverty, effects of climate change and suicides whilst improving livelihoods, net income and purchasing power.

If Russian families can manage such production in their region's very short growing season (approx. 110 days), imagine the output most parts of the developing world could manage by comparison.

Warm regards  
Subhash

<http://reclaimgrowsustain.com/content/russians-proving-small-scale-organic-gardening-can-feed-world>

#### Russians Proving That Small-Scale, Organic Gardening Can Feed the World

When it's suggested that our food system be comprised of millions of small, organic gardens, there's almost always someone who says that it isn't realistic. And they'll quip something along the lines of, "There's no way you could feed the world's growing population with just gardens, let alone organically." Really? Has anybody told Russia this?

On a total of approximately 8 million hectares (20 million acres) of land, 16.5 million Russian families grow food in small-scale, organic gardens on their Dachas (a secondary home, often in the extra urban areas). Because growing your own food happens to be a long-lived tradition in Russia, even among the wealthy.

Based on the 1999 "Private Household Farming in Russia" Gosmkostat (State Committee for Statistics) statistics, these Dacha families produced:

- 38% of Russia's total agricultural output
- 41% of the livestock
- 82% of the honey
- 79% of the sold cattle
- 65% of the sold sheep and goats

59% of the milk  
31% of the sold poultry  
28% of the eggs  
91% of the potatoes  
76% of the vegetables  
79% of the fruits

In contrast, the US lawns take up more than twice the amount of land Russia's gardens do (est. 40-45 million acres).

### 32. Selina Juul, Stop Wasting Food movement Denmark (Stop Spild Af Mad), Denmark

- We call on the United Nations to include the fight against food waste as an additional target within Goal 7 (“Ensure environmental sustainability”) and so that food waste reduction is achieved in a coordinated and agreed way and through intermediate stages.
- We urge national governments and organisations such as the Food Standards Agency to develop practical solutions and improved communication to make it easier for consumers to get the most from the food they buy and learn how to waste less of it.
- We urge the promotion of transparency in labels as well as more appropriate packaging solutions as to enable consumers to get the last remaining food out of the packaging.
- We ask politicians, public institutions, authorities and the media to continuously inform the public about food waste issues through public awareness and education campaigns.

From Selina Juul, Founder, [Stop Wasting Food movement Denmark](#) (Stop Spild Af Mad) and a co-signer of *Joint Declaration Against Food Waste*, Brussels, 2010:

### 33. Fatima Jubran-Stengel, Belgium

I believe very much that we should start teaching from childhood at school how to economise using our food as well as at home, supermarket and hospitals.

I worked in the hospital and I saw how much waste food we had every day.

I used to teach home economy in NGO and it was much more effective to start from home to make a difference only by education we can.

### 34. Lindinete Saturno Souza, Brazil

Olá! sou graduanda em Nutrição.

Falar sobre desperdício de alimento se torna até intrigante onde a fome e a falta de alimento assola o planeta, causando à varias familias ao desconforto pela insegurança alimentar.

Diante das pesquisas vários fatores contribuem para que ocorram os desperdícios de alimentos, uma das principais razões são: a falta de planejamento em toda produção, da plantação aos distribuidores, a carência de conhecimento técnico, tendo por consequência a falta de mão de obra qualificada, o uso de máquinas inadequada e ao manuseio e acondicionamento incorreto, estradas precárias e descarregamento sem nenhuma padronização.

Vejo então a necessidade de mais investimento das políticas públicas e privadas que possam possibilitar, mas conhecimento aos pequenos agricultores para que possam criar projetos, cooperativas com tecnologias de alimento, campanhas no combate aos desperdícios, com dados oficiais da quantidades de alimentos que são desperdiçados para que a população que é consumidora tenham conhecimento e contribuam na redução dos desperdícios e venham colaborar no combate a fome e na preservação do meio ambiente, já que os desperdícios de alimentos causam lixo orgânico que são depositados a céu aberto aumentando a produção de chorume, poluindo assim a atmosfera, o solo os lençõs freáticos, ocasionando impacto ambiental.

### 35. Kodjo Dokodjo, Ministry of Agriculture, Livestock and Fishery, Togo

Dear all,

The proposed orientation for the study focuses on food waste and gives key issue as food distribution and consumer behavior. Of course, this is true but there is another form of food waste in developing countries due to the lack of development of infrastructure and the most suitable technologies to address them.

Food consumer behavior often depends on food distribution: if the offer is higher than the demand, this contributes to food waste. This means, as the price of the food is very low, the consumer has purchased the smallest quantity that he cannot use.

Sometimes in developing countries, the agricultural production is higher than the demand. The surplus of the production is often wasted because there is no infrastructure and suitable technology for storage or conservation. Vegetables such as tomatoes, okro... and tubers such as yams are subjected to waste during the seasonal production. In rainy season, tomatoes are so produced that their cost price is ten times lower than that in the dry season. As there is no purchaser, they are often left on the ground uselessly. This situation often brings the producer not to harvest the crops.

Best regards

Kodjo Dokodjo

### 36. NAFA/AGE Austria

**Guiding question:** What can be the contributions of a reduction in food losses and waste to improve food and nutrition security in the context of sustainable food systems?

**Guiding Issues (1-6 below):**

**1. Concept/definitions**

- Food and nutrition security should explicitly include food quality because it entails optimizing food quality in terms of wholesomeness and food safety issues. For example, mould and mycotoxin-contaminated foods contribute to food losses as these degrade the food quality, potentially making them harmful to consume even though the contaminated food could be abundant. Therefore the contaminated food is lost.

**2. Measuring and data availability**

- Perhaps a better subtitle for this section would be “Metrics and Data” and then “measuring and data availability are subtopics that would fall under this title as would the others listed under this heading.
- The estimated 1.3 billion tonnes of food losses should include losses attributed to moulds and mycotoxins (and other chemical contaminants) based on respective analytical tests.
- In addition to considering and defining indicators for a sustainable food system there is a need to ensure that the baseline for any indicator system can be characterize.

**3. Impacts**

- Food losses that are safety/quality related directly impact availability/utilization and indirectly stability/accessibility. For example, foods containing mycotoxins may be deemed unavailable to a health conscious consumer.
- Such foods would also not be recommended for use by at-risk groups such as the immune-compromised, elderly and infants.
- As livestock feeds, may be unpalatable thus affecting utilization and hence reduced livestock productivity. The mycotoxins could contribute to health stress factors thus negatively impacting productivity as well.
- Poor storage/harvesting facilities and or practices contribute to cyclical instability to food safety.
- In the long run, unhealthy individuals can't produce or access adequate food.
- This section is not clear, there is a need to include strategies and/or techniques that have a potential to either avert food losses and waste or in some way render food losses into useful products.

#### **4. Sustainable food systems**

- This section should include potential strategies to optimise the sustainability of food production in terms of reviewing both pre-harvest techniques and post-harvest applications as well as policies that can be used to ensure the quality and availability of food. These would include technical aspects such as agro-chemicals, irrigation, harvesting, storage, packaging, transportation, processing (cooking, cold storage, pickling, food irradiation, ohmic heating etc.) and traceability schemes that encompass the whole food chain system.
- Given that most food waste is attributed to non-sustainable consumption patterns, this section should also deal with strategies to address consumer habits (i.e. ways of incentivising and promoting sustainable consumption patterns)
- Fungicide/pesticide use in agriculture may be inevitable where moulds are endemic and especially if storage/harvesting facilities and practices remain underdeveloped. Such chemicals may have negative environmental and health impacts.
- Prudent use of such agrochemicals as part of integrated pest management system, aided by sound cost effective analytical services, will enhance sustainability.
- Unhealthy individuals will struggle to contribute to food and nutrition security and also improve socio-economic development.

#### **5. Public policies**

- Current policies do not seem to associate food safety (especially natural/chemical hazards) to food losses and insecurity.
- Strengthening the role analytical laboratories in Good Agricultural Practices (GAPs) and residue monitoring programs could contribute to reduced food losses.
- More policy-related work is needed on use of mouldy feed in livestock production since such feeds - especially when containing mycotoxins - lower production performance and increase animal health risks thus exacerbating food and nutrition insecurity.

#### **6. Recommendations: Axes**

##### **A. Potential for reduction of food losses: *e.g. in tropical developing countries***

##### **Technical:**

- Investing in mould resistant cereals varieties (mould specific).
- Promoting GAPs to ensure optimum harvests in relation to moisture content to preclude elaboration of mycotoxins.
- Promoting improved modes of technology for prompt or real-time harvests (in case of moulds and mycotoxins).
- Awareness on proper storage of grains/cereals to prevent postharvest mould growth and elaboration of mycotoxins.
- Initiating/promoting delivery of analytical services (including field rapid screening tools) to monitor mycotoxins and inform GAPs.

- Awareness, GAPs and promotion of analytical laboratories including use of rapid field screening tools is also applicable to other chemical food contaminants such as veterinary drugs and pesticides among others.  
Prudent use of fungicides, other pesticides and veterinary drugs in disease control.

Policy: Support for

- Continued delivery of extension services.
- Training and decentralization of laboratory analytical services.
- Research on improved cereal varieties.

B. Potential for food waste:

Technical:

- Awareness on preservation of seasonal foods such as abundant produce for instance fruits like mangoes (including the wild), cassava, and potatoes etc. in developing countries wasted starvation/famine unforeseen.

Policy:

- Early education curriculum on preservation of such foods/fruits.

C. Potential for better volarization: No comment.

D. Appropriate programs and instruments for reducing food losses and waste

i. In relation to natural/chemical food contaminants: Education/awareness campaigns to improve GAPs, proper harvesting and storage of foods, monitoring/control of such contaminants; research on mould-resistant grain varieties. Targeted technical cooperation and coordinated research projects can make a contribution.

ii. Instrumentation/tools: Rapid screening tools to support control/monitoring of natural/chemical food contaminants; home-made food drying/preservation tools.

E. Stakeholder roles:

i. Government:

- Continued delivery of extension services.
- Training and decentralization of laboratory analytical services.
- Research on improved cereal varieties.
- Promoting development partnerships.

ii. Consumers:

- Consumer vigilance through awareness on potential causes of high food prices and possible volarization food.
- Demand for better quality and quantity of foods thus influencing production systems and GAPs.
- Awareness on role of various stakeholders such as laboratories.
- Awareness on the causes of food losses and ability to influence national policy through political leadership.

iii. Social actors (e.g. Civil society)

- Media: contribution to relevant awareness campaigns
- iv. Private sector:
- Investing in and supporting food preservation technology including continued research.
  - Creating markets for traditional yet valuable foods e.g. fruits that are wasted due to lack of preservation tools and knowledge.
- v. Developing e.g. through formal or information education, the culture of preparing for a season of lack in an environment naturally endowed with abundance.

### 37. Robin Bourgeois, Global Forum on Agricultural Research, France

While the issue of food losses and waste is certainly important from a resource management standpoint, it is still largely unknown how reducing losses and wastes can contribute to reducing food insecurity. Most of the work done on food insecurity indicate that total availability is not the core problem but access to food.

My first point is that we can see some direct links between reduction of losses during production and harvest and improved access to food, first and above all for the products which are directly consumed at farm level by the farmers, and then for the products which are sold through short distribution circuits (local markets). However in the first case, when it comes to food insecure food producers, losses are very limited and usually not due to harvest or post-harvest problems but due to production losses related to climatic and biological hazards. Food insecure farmers do not lose edible products at harvesting time or at processing time in the household. They are too poor for that. So in the first case, gains will be marginal in terms of solving food insecurity. In the second case (local markets) this will depend on the purchasing power of the local consumers and on the real impact on local prices loss reduction will provide. This is a complex issue where we cannot take for granted that some percents in loss reduction will significantly impact on local food prices. The same is true for international prices. Let's assume that food availability increases by 10% due to a drastic reduction of losses by 70% (taking losses at 30% of total production) which is somehow a formidable challenge. Will that be enough to significantly reduce the price of agricultural products at consumer level, given the fact that in many cases the price of the raw material accounts for less than 50% or even lesser of the retail price? Will that significantly increase the number of food secure people in the world? This requires at least more investigation and this investigation needs to be locally specific, it cannot be done through partial or general equilibrium models.

My second point is about waste reduction. Again what is needed here is a theory of change or an explanation of the links between waste reduction and reduced food insecurity. So far, nobody, as far as I know, has produced logical evidence that reducing waste (which are above all a problem of high income countries and wealthier consumers) will improve the situation of food insecure people whose access to food is limited by their purchasing power. Again waste management deals with total availability of food, but it does not affect access to food for the poorest and most food insecure, except through a potential price effect which, as I already indicated above, is more than uncertain.

Finally, I am not saying that better losses and waste management is not needed. What I am pointing out here is that we should not raise too much expectations about the impact of improved waste and losses management on food insecurity. I am in favor of clarifying how food insecurity issue can be addressed through loss and waste management issue (in my opinion very little) and in assessing the efficiency of loss and waste reduction policies for the reduction of food insecurity against the

efficiency of other policies directly targeting food insecurity. This should be a necessary starting point of the study before making any kind of policy recommendations to policy makers.

### 38. Khaled Al-talafih, Jordan

1. The focusing in this issue is very important thing because of the high amount of losses and wastes in food if which it decreased these lead to make food available with good price to hungry people in the world without need to increase the area of production.
2. It is very important to increase the awareness in all the world about the important of food and we must used what we need and avoid buying and storing more what we need, specially in these days the food is available all the time in markets, and clarify for all people about the efforts for production, transportation, storage and cost of the food and that many other people didn't have the food or cant afford to buy it.
3. It is important to inform the people about the cost of wasting food in the personal level and national and international level by decrease the bill of buying the food.
4. Focusing on how anyone to buy and how to storage food in the home consumption level.
5. Encouragement of the local associations to collect the surpass food in hotels, restaurants, after the big feast, and what the people donate to distribute to hungry people.
6. Encouragement the consumer to buy what need of food (fresh) because it is available and not buy more than they need to store.
7. Increase the awareness for all people in the world about the difficulties that encounter the agriculture sector ( water shortage, climate change, environment issues,...) and the difficulties to increase the production of foods.

Khaled Al-talafih  
Amman-Jordan

### 39. Maimouna Thiaw, Canada

[Original contribution in French]

Madame, Monsieur,

Afin de me joindre à la consultation sur les pertes et gaspillages alimentaires, voici ma modeste contribution:

Il serait important de mettre en place des campagnes de sensibilisation sur le gaspillage alimentaire, en utilisant les medias populaires (TV, internet) afin de toucher le plus de monde possible.

Cette sensibilisation devrait s'étendre aussi au niveau des chaines de distribution alimentaires et des restaurants. En effet, d'après le rapport final (nov, 2011) sur les pertes et gaspillages alimentaires du ministère français de l'Agriculture, de l'Alimentation, de la Pêche, de la Ruralité et e l'Aménagement du territoire, les pertes s'élèvent à plus de 350g par personne par repas dans la restauration et à environ 200t/ etablissement/an dans la grande distribution ([http://alimentation.gouv.fr/IMG/pdf/Pertes-gaspillages\\_RAPPORT270112\\_cle02c35d.pdf](http://alimentation.gouv.fr/IMG/pdf/Pertes-gaspillages_RAPPORT270112_cle02c35d.pdf)). Il est donc primordial de mettre en place un système de gestion efficace afin d'évaluer les besoins des consommateurs et de limiter les excès d'inventaires.

Aussi, l'uniformisation de nombreuses cultures et la recherche de l'esthétisme a conduit à un rejet automatique de produits alimentaires, nutritionnellement satisfaisants, mais physiquement inattractifs pour le consommateur. Prenons l'exemple des tomates et des carottes qui sont automatiquement calibrées afin de répondre à des cahiers de charge spécifiques. Les produits "non conformes", bien que consommables, sont automatiquement rejetés, ce qui constitue un gaspillage évitable. Il serait donc intéressant de réapprendre à apprécier la qualité intrinsèque des produits alimentaires que nous consommons, tout en donnant une chance aux variétés abandonnées car non rentables économiquement.

Enfin dans les pays pauvres ou en voie de développement, la mise en place d'unités de transformation et de stockage adéquats dont le fonctionnement ferait appel aux énergies vertes (unités de réfrigération alimentées par l'énergie solaire par exemple) permettrait de limiter grandement les pertes de production.

Cordialement,

Maimouna Thiaw,  
Professionnelle de l'Agroalimentaire,  
Montréal, Canada

*[English translation]*

Ladies, Gentlemen

In order to take part in the consultation on food losses and waste, here is my modest contribution:

It will be important to develop awareness campaigns on food waste, using popular media (TV, internet) with the object of reaching the maximum possible of the population.

This awareness should also cover the food distribution chains and restaurants. Indeed, according to the final report (Nov. 2011) on food losses and waste from the French Ministère de l'Agriculture, de l'Alimentation, de la Pêche, de la Ruralité et de l'Aménagement du territoire [Ministry of Agriculture, Food, Fishing and Rural Affairs and Spatial Planning], the waste reached more than 350g per person per meal in catering and about 200t/installation/year in the large scale distribution ([http://alimentation.gouv.fr/IMG/pdf/Pertes-gaspillages\\_RAPPORT270112\\_cle02c35d.pdf](http://alimentation.gouv.fr/IMG/pdf/Pertes-gaspillages_RAPPORT270112_cle02c35d.pdf)). It is therefore essential to implement an efficient management system with the object of assessing consumer needs and of limiting stock surplus.

Also, the uniformity of many cultures and the pursuit of aesthetic goals have resulted in an automatic rejection of food products, which are nutritionally satisfying but which are physically unattractive to the consumer. Take the example of tomatoes and carrots which are automatically measured to comply with specific requirements. The "non-conforming" products, even if they are consumable, are automatically rejected, which constitutes an avoidable waste. It will therefore be interesting to re-learn to appreciate the intrinsic quality of the food products that we consume, thereby giving a chance to those varieties which are abandoned as not economically viable.

Finally, in poor or developing countries the implementation of transformation units and adequate storage whose functioning will use green energy (for example, refrigeration units supplied by solar energy) would allow a significant reduction in production losses.

Sincerely,

Maimouna Thiaw,  
Professionnelle de l'Agroalimentaire [Agro-food professional],  
Montreal, Canada

#### 40. Peter Steele, Italy

*Here's my contribution to the debate scheduled for next year; and currently due for completion by 30 April 2013.*

#### **Contribution - Taking account of information already available - Prevention of Food Losses (PFL) Programme**

It's always difficult keeping track of work undertaken earlier, and particularly when the people involved have moved on and the work undertaken may have been originally designed to explore parallel avenues of development. There is also this thing about materials filed and largely forgotten; it is sometimes easier to re-explore similar objectives with the funds and enthusiasm of those involved in the current day. Thus it is with the FAO PFL Programme. PFL? This is the '*Prevention of Food losses*' Programme which, like other institutional action programmes of its kind, eventually staggered to a halt (*in this case in the early 1990s*) as a result of declining interest at the time. Yet the work undertaken included much that remains relevant to the current study.

There is this thing about corporate memory and too, the topicality of current R&D investigations. Your scoping paper to which you refer '*Food losses and waste in the context of sustainable food systems*' references six sources of information from the past two years. Included in this list is the key document '*Global food losses and food waste: extent, causes and prevention*' that dates from 2011. It lists 10 reference sources and, again, draws upon information that is relatively new (<7 years dated, apart from a single fisheries source from 1994). What this Gustavsson/Cederberg/Sonneson document does do well, however, is to list an estimated 150 alternative sources of information.

For the keen of eye, this listing included the FAO *INPHO* network (shared with CIRAD & GTZ) - the Information Network on Post-Harvest Operations that was first established in the mid-1990s; as a means of handling the wealth of information originally derived from the PFL Programme. You can find out more about this resource at: [www.fao.org/inpho](http://www.fao.org/inpho), but you would need to dig deeper to explore the PFL Programme and its heritage value.

*To assist - and assuming that this is of interest to the network of contributors - some additional information is attached.*

**Peter Steele**  
**Rome**  
**14 April 2013**

#### 41. Andrew MacMillan, Italy

Friends,

It is extraordinary how long it has taken for institutions concerned with food policies and food management to wake up to the scale of the food loss/food waste problem. At last we have some apparently quite reliable figures on food waste, and these are startling. The idea that food waste in developed countries is more or less at the same level as the total net food production in all of Africa can only shock. Hopefully it will spur efforts to tackle the problem.

This same *blindness to reality* is also behind the widespread popular perception that almost 1 billion people face chronic hunger because there is not enough food available for everyone to eat well. The big stress on food supplies, however, comes from the increasing per caput consumption of food, at levels beyond what is required for a healthy life, by a rising proportion of the world's population as their incomes rise. The tip of the iceberg is represented by the 1.5 billion people who are overweight or obese, but I suspect that a careful analysis would show that a large proportion of the 60% incremental food demand forecast by FAO for 2050 (when population may have grown by about 30%) will be the result of general over-eating by existing and 'new' middle income families whose members do not necessarily reach high BMI scores. When I looked at how much extra food would be required to raise 1 billion hungry people above the hunger threshold (in energy terms) it would amount to less than 2% of current global food production!

So the problem of food waste is not so much that it is robbing the hungry of extra food, except to the extent that it may raise food prices: most of them are hungry because they simply cannot afford to buy the food their families need. The long term solution is for governments to adopt economic and fiscal policies that share the benefits of growth much more equitably especially through stimulating productive employment. But, until they do this, the best investment that they can make is in targeted social protection programmes that enable all their citizens to eat adequately. Not only will this respect their right to access to adequate food but it will generate a huge economic dividend, resulting from greater individual productivity, better health and greater longevity.

The background note correctly reflects on the efficiency gains that would accrue to the food system from cutting food and food-related waste. I hope when the full study gets under way, however, that it will give particular attention to identifying/quantifying the environmental as well as health implications of food waste and overconsumption because these probably provide the strongest justification for public expenditure and actions to reduce waste. The extra food that is produced simply to be discarded is probably – but this needs to be carefully checked – putting more pressure on forests, soils and water supplies than the current production of biofuels which has captured so much public attention. Equally seriously, when food is produced, transported, processed, packaged, distributed, cooked and then thrown away it has a double impact on the processes of climate change – first through the fossil fuels used in the production to table process, and then through its decomposition, resulting in incremental methane production in landfills.

One of the major constraints to changing policies with the aim of reducing waste, especially waste occurring at the later stage of the food chain, is that very large numbers of people earn their living – or part of it – from creating the surpluses that end up being discarded at various points in the system. Beyond that, in many developed countries, a burgeoning fitness industry is developing to burn off

the fat resulting from a combination of increasingly sedentary life styles and over-consumption of food!

The background note briefly touches on the issue of food pricing policies, and this seems to be crucial. Intuitively, it would seem that a substantial rise in retail food prices would have the effect of moving consumer behaviour away from wastage and over-consumption. This could be induced by punitive taxation on *high footprint* foods, but would have to be linked to simultaneous measures that would compensate for any incomes lost in the food chain, especially by small-scale farmers. This could take the form of subsidies designed to hasten the processes of transition to more sustainable food production systems. It would also be vital to match any measures that increase food prices with compensatory growth in social protection to safeguard adequate food consumption by low-income families.

Elsewhere (see *How to End Hunger in Times of Crises* (2nd edition), just published by FastPrint Publishing), Ignacio Trueba and I have put forward the idea of creating a voluntary *Global Mechanism to Cut Food Waste and Over-Consumption*. This would require the governments of countries in which food waste is a problem to set self-imposed goals for reduction in average per caput food consumption/waste and, to the extent that they fail to meet them, to buy entitlements to over-consume from countries with a high incidence of hunger. It would be based on similar principles to those on which the Clean Development Mechanism is founded, which allows for the purchase of entitlements to exceed emissions targets. When we first proposed this in 2011, we suggested that the CFS examine this idea: it now seems appropriate to reiterate this proposal!

Andrew MacMillan

#### 42. Martine Rutten LEI Wageningen UR, Netherlands

The impacts of (reducing) food losses and/or waste: what we do not know

*Martine Rutten, LEI Wageningen UR*

Recent data (for example, from FAO, 2011) shows that food losses and waste are relatively high, equivalent to 1/3rd of food produced for human consumption. Consequently, as indicated in the HLPE e-consultation, their global reduction is deemed essential to improve food security.

**Whereas the scale of the problem is clear** - measured in terms of production, consumption (mouths to feed, nutrients embodied in the waste), money that could have been used for something else, emissions that could have been avoided, water and land implicitly embodied in the waste – **the impacts of food losses and waste or, more importantly, the impacts of reducing food losses and waste have not been investigated in detail as yet. This includes the impacts on food security.**

Westhoek et al. (2011) is the only applied study so far on the impacts of reducing food waste, discussed in the context of healthy and sustainable diets. It assumes that 15 per cent less food production is required to meet the same level of nutrition, implemented globally as a 15 per cent supply chain efficiency increase and reports on global impacts, rather than using available evidence.

If one wants to understand food losses and waste and the means to reduce them, as requested by the CFS, it is important to also understand their impacts (environmental, social and economic). Relevant questions are, for example:

- What food commodities/products to focus on when reducing food losses and/or waste
- What parts of the food supply chain to focus on?
- How does reducing food losses and/or waste compare to other strategies/policies? (E.g. healthier diets, market access/trade policies, improving the investment climate,...)

Answers to these questions depend on the perspective taken (a focus on resource efficiency in Europe – for example land use, may give different outcomes compared to a focus on food security in developing countries – as measured by the consumption of food and prices paid for it by households).

**It is important to note that food losses (operating on the supply side) and food waste (operating on the demand side) have distinctly different impacts.** A framework to analyse and structure impacts, showing what factors are important for the outcomes, has been developed recently by Rutten (2013). Using economic theory this paper shows that:

- reductions in food losses and/or waste may improve food security of the wider population due to lower food prices and increased food consumption, if not in the market where losses and/or waste are reduced then elsewhere due to increased spending from savings on previously wasted food.
- Consumers, and producers in other commodity markets, will favour actions to combat food losses and/or waste of a particular food commodity, whereas its producers may object, especially when reducing food waste is concerned as this diminishes their revenues.
- Trade-offs also arise over time, as in the short-run producers may have to incur costs and welfare losses when food losses and/or waste are tackled, whereas the gains, if any, in terms of increased sales may only be realised later. Consumers may delay spending savings on previously wasted foods.
- How these trade-offs compare to the broader trade-offs between economic, health and environmental goals, also across countries, is an issue for policy makers.
- The outcomes of this and further formal and applied analysis are crucially depending on, amongst others, the extent to which losses and/or waste are avoidable, the costs involved, the causes of food losses and waste, including scale and price factors, and consumer preferences.

**An important finding is that costs associated with measures to reduce food losses and food waste undo beneficial impacts, but are relatively little researched.** Food losses and waste happen for a reason and it may well be that relatively low food prices in comparison with the costs associated with measures to reduce them, may explain their existence. Behavioural change on the part of consumers and producers may not cost that much, but investments in improved storage and transport may cost much more.

## Background

LEI Wageningen UR is currently carrying out a large-scale applied study for DG Environment looking at the impacts of reducing food waste within the EU as part of a broader project relating to the

modelling of the impacts of greater resource efficiency. The project is called 'Modelling Milestones for Achieving Resource Efficiency' and is being led by BIO Intelligence Service.

LEI Wageningen UR is also carrying out an applied study on the impacts of reducing food losses in the Middle East and Northern Africa. This work will be presented during the 16th annual Global Trade Analysis Project (GTAP) Conference on Global Economic Analysis "New Challenges for Global Trade in a Rapidly Changing World" in Shanghai, 12-14 June, 2013.

<https://www.gtap.agecon.purdue.edu/events/conferences/2013/>

Previous work at LEI Wageningen UR focused on obstacles experienced in both legislation and regulations by chain actors that cause food waste, resp., make it difficult to reduce food waste (Waarts et al., 2011).

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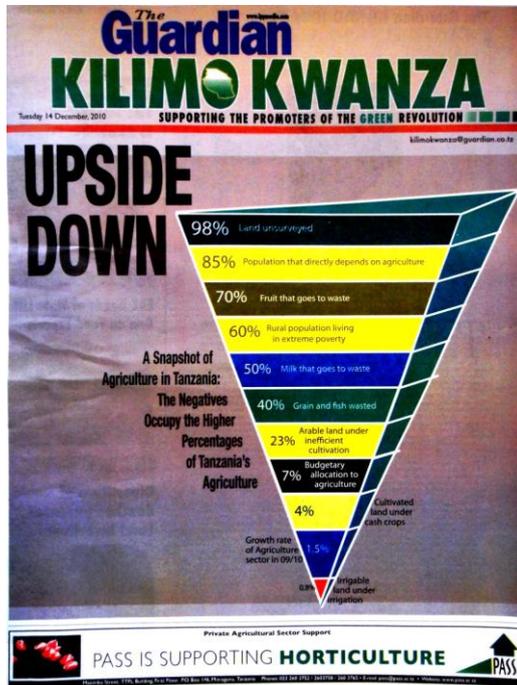
## 43. Anne Perera, Food & Nutrition Consultancy Service, New Zealand

During a two year period (2010-2012) as a New Zealand VSA volunteer Food & Nutrition Advisor to the Small Industries Development Organisation (SIDO), I realised what a great potential Tanzania has as a nation to set up sustainable food systems.

The programs run by SIDO to promote small industries, one of which is food related, could play a significant role in reducing the currently reported losses of food by transforming them into shelf stable products that can be marketed locally and internationally. The training and motivation (with incentives) of potential entrepreneurs are vital in reducing losses and waste of abundantly available produce throughout the year.



## Tanzania: *A country with great potential*



*This write up in Kilimo Kwanza supplement of Guardian on 14<sup>th</sup> December 2010, refers to 70% loss of fruit  
50% milk that goes to waste and 40% grain and fish wasted...*

A write-up in New Zealand Herald (Friday Jan 11, 2013) reported that as much as half of all the food produced in the world - two billion tonnes worth - ends up being thrown away.

The waste is caused by poor infrastructure and storage facilities, over-strict sell-by dates, "get-one-free" offers, and consumer fussiness, according to the Institution of Mechanical Engineers. Each year countries around the world produce some four billion tonnes of food, but between 30 per cent and 50 per cent of this total, amounting to 1.2 to two billion tonnes, never gets eaten, according to the report *Global Food; Waste Not, Want Not*.

Half the food purchased in Europe and the US is thrown away after it is bought, the report adds. Vast quantities of water are also wasted in global food production, it is claimed. Around 550 billion cubic metres of water is used to grow crops that never reach the consumer, according to the report. Producing one kilogram of meat is also said to take 20 to 50 times more water than producing the same weight of vegetables. The demand for water in food production could reach 10 to 13 trillion cubic metres a year by 2050, the institution said. This is up to 3.5 times greater than the total amount of fresh water used by humans today, raising the spectre of dangerous water shortages. Dr Tim Fox, head of energy and environment at the Institution of Mechanical Engineers, said: "The amount of food wasted and lost around the world is staggering. This is food that could be used to feed the world's growing population - as well as those in hunger today. It is also an unnecessary waste of the land, water and energy resources that were used in the production, processing and distribution of this food.

"The reasons for this situation range from poor engineering and agricultural practices, inadequate transport and storage infrastructure through to supermarkets demanding cosmetically perfect foodstuffs and encouraging consumers to overbuy through buy-one-get-one free offers."

By 2075 the United Nations predicts that the world's population will reach around 9.5 billion, resulting in an extra three billion mouths to feed. Added stresses on the ability of the world to feed itself include global warming and the growing popularity of meat, which requires around 10 times more resources than staple plant foods such as rice or potatoes.

Dr Fox added: "As water, land and energy resources come under increasing pressure from competing human demands, engineers have a crucial role to play in preventing food loss and waste by developing more efficient ways of growing, transporting and storing foods.

"But in order for this to happen governments, development agencies and organisation like the UN must work together to help change people's mindsets on waste and discourage wasteful practices by farmers, food producers, supermarkets and consumers."

The application of Food Science & Technology as well as Educating the Public need to go hand in hand in reducing food losses and waste in the context of sustainable food systems.

#### 44. Abdul Rahim Khan, Post Harvest Research Centre

It is true that post harvest losses in countries like Pakistan is at very high end. These losses create frustration in the farming as well as for consumers. Due to insufficient post harvest technology farmers lost their day & night efforts on the other quality has deteriorate and prices are increased. At present all efforts are focus to increase the production and very less efforts are being made to save which you have got after putting struggle on pre harvest phase. Everybody knows how to handle the egg but very less people know how to manage the fresh crop.

Each and every crop has its own post harvest management pattern. If the pattern is followed then losses will at lower level. Frequency of post harvest losses at various stages in different countries are quite different from each other. We need the approach to minimize the post harvest losses in existing varieties and replace these varieties with efficient one, gradually.

Maturity stage is the junction among preservation and losses which directly depends of its' intend use and market distance from the place of harvesting. This statement is much true for those crops having bigger moisture contents. Farmer should know the right maturity stage prior to harvest.

Other post harvest technology aspects like washing, drying, waxing, grading, packing, pre cooling, storage etc great impact on the shelf life of any fresh commodity but mostly it is highly difficult for small farmers to adopt it. There is need to develop low cost infrastructure for small farmers for their post harvest losses preservation. Small farmers are the unit who can support to minimize these losses.

Pattern of marketing should change, it should the duty of famer to sale their yield in open market rather than involving third person. This type of practice is well common in India, Pakistan, Bangladesh etc. Produce should prepare close to the field for marketing.

Immediate processing of crops into various products can minimize the post harvest losses and enable the environment for utilization of defected produce but it needs much more R & D.

#### 45. Elhadi Yahia, Egypt

At RNE we are working on food losses and waste as a priority, especially after Elhadithe request of our national Conference to reduce to half in 10 years. We have done few activities so far such as an ECM held few weeks ago (see link below).

[Report on Expert Consultation on Food losses in NE](#)

Report on Expert Consultation on Food losses in NE

Best regards

Elhadi

#### 46. Fernandes Dorothy, Brazil

Compreender a importância do desperdício de alimentos na garantia da segurança alimentar e nutricional e da sustentabilidade do planeta, requer cada vez mais estudos e pesquisas na área. O desperdício no Brasil, e em especial na Bahia de onde falo, é muito visível, pois desde a produção rural até o consumo final observamos perdas que poderiam ser aproveitadas ao longo do processo fornecendo nutrientes e reduzindo a presença de materiais orgânicos nos sistemas ambientais. Entende-se, portanto, que a maior questão do aproveitamento dos alimentos e redução de desperdício se fortalece com políticas educativas no tema e com o papel dos profissionais envolvidos na área, pois muitas vezes o desperdício é elevado porque falta o conhecimento prático aplicado para sua conservação. Entendemos também, que no nosso país, o desperdício não deveria e nem poderia existir visto que temos pessoas na miséria e total pobreza que lutam por um prato de comida diário. Assim compreendemos que desperdiçar além de não ser sustentável também não é humano e nem solidário. Concluo essa breve explicação garantindo que, enquanto as pessoas não obtiverem conhecimento sobre a temática elas continuarão a desperdiçar e isso contribuirá para uma possível elevação da miséria bem como da poluição orgânica da natureza.

#### 47. Vijay Yadav, Postharvest Education Foundation (Trainee), India

Out of all basic necessities of human being food is the most important necessity. It is very unfortunate that a huge amount of food in the world is being wasted daily, while there are millions of people in world who are dying of hunger. There is an urgent and serious need to prevent food wastage/food loss, whatever level it may be.

Many factors at different levels are responsible for Food Loss/ Food Wastage:

i. Field Level:

- Over Production: Improper production strategy of farmers would result in over production which ultimately leads to wastage and also very low returns to the farmer.
- Mono-cropping in large areas: Growing single crop in large areas at a stretch may lead to production more than needed leading to wastage.

- Improper cultivation practices: Lack of proper knowledge about cultivation, harvesting and package, lot of food grains, fruits and vegetables are lost.

Remedy:

- Crop Diversification: Growing different type of crops in an area.
- Enlighten farmers about advances in cultivation practices of different crops along with care to be taken while harvesting and also after harvest.
- There should be a government policy to plan production strategy for farmers, to decide crop area based upon demand in the nation.

ii. Post Harvest:

- Judging proper maturity indices, based upon market availability would prevent food loss to great extent.
- Enlightening farmers about proper post harvest, packing, storage techniques depending upon on crop, climate and demand would play a very important role in reducing food loss during storage and transport.
- Conducting campaigns and courses to increase processing of over produced fruits, vegetables and grains into ready to eat products.
- Grading of produce depending upon quality and market them based upon demand.

iii. Market Level:

- Encouraging market facility to diversified crops.
- Strong policies are needed to prevent illegal storage of grains (which is common situation in developing countries).
- Policy to decide price based upon grading, which would allow producer to get good price for his quality produce and also population of different economic status to get good food.

iv. Consumer Level:

- Educate people to prevent domestic food wastage by conducting campaigns in communities, schools, colleges and other public places.
- Make a strong policy to prevent food wastage by levying extra tax on people wasting food in the restaurants.
- A rule must be passed to make it compulsory to provide sample food before taking order in restaurants so that it is not wasted after being ordered.

- Linking up restaurants with needy orphanages, juvenile homes etc... so that extra food can be transferred and not wasted.

All the countries in the world should come up onto single platform not only to prevent food wastage but also to maintain balance in food availability in different parts of world. International policies must in such a way to prevent wastage of excess of food in few countries and supply the excess to needy malnutrition and hungry nations.

Other useful links:

<http://www.imeche.org/knowledge/themes/environment/global-food>

<http://www.guardian.co.uk/environment/2013/jan/10/half-world-food-waste>

<http://www.lovefoodhatewaste.nsw.gov.au/>

#### 48. Hannah Semler, Spora Sinergies, Spain

In the past ten years my expertise has focused on ethnographic research methods exploring human ecological problems such as food waste. My latest research project on food waste in the retail business has provided me with key insight to contribute research ideas on strategically designed communications strategies between retailers and consumers that can influence wasteful behaviors. Retailers are in a strategic position to influence consumption patterns through little nudges that can lead to a collective behavioral change. A sign reading “Bananas for Banana Bread” can completely undo the complex problem of when to replace day-old bananas on display with ones on the verge of decay. Our team of social consultants at Spora Sinergies, work collaboratively with Citizen and Multi-stakeholder Participatory Research Methodologies, leading to suggestions for innovative strategies the food industry can implement to solve the uncertainty of the market system while best satisfying the needs of consumers.

[www.spora.ws](http://www.spora.ws)

#### 49. Shane Vaughan, United Kingdom

I am a student studying sustainability and psychology and have recently written an essay on food waste in developed countries. Here are some ideas for long term reduction of food waste at an individual/retailer level.

##### **Education**

In order to bring long term change in how food is discarded (and consumed), educating the future generation is critical. Knowledge of food waste issues and how each and every individual can make a difference will bring change.

##### **Encouragement**

In psychology, the concept of self-efficacy is known to have an impact on whether people will take action or just give up. It is the notion of whether one CAN do something about an issue. So encouraging and making people *think* they can reduce food waste may make a difference.

## Reconsidering the law for best-by/use-by/display-until dates

Much food is thrown away just because the display-until-date has passed even it is completely safe to eat. I have seen vast amounts of food in the dumpster of supermarkets in my area (Exeter, UK). (Note that not all discarded food is due to the passed date.) If food safety regulations were slightly looser, this may be prevented. This clearly has its concerns, nevertheless, how the dates are set should be reconsidered.

## Monitoring

How much food waste is generated must be monitored more closely. This is a difficult thing to do in households, but if laws were made to monitor food loss/waste generated from factories and supermarkets, they will strive to reduce food waste. Major supermarkets in my area frequently try to cover up how much unsold food they are discarding (which is an unacceptable about...daily) by deliberately opening the packaging and mixing everything up.

Also by monitoring, the trend of food waste reduction would be clear, which can lead to encourage mentioned above.

## 50. Nurul Istiqomah, Ministry of marine affairs and fisheries, Indonesia

Dear leader of the Project Team,

I would like to give my opinion and my suggestion about this topic.

### 10. What other policies and relevant technology option are available for minimisation, better resource accountability and management

Aquaculture Effluent: How to natural treatment

Dillution system of waste treatment will impact Eutrophicatn in coastal and river area.

The impact of dillution system are eutrophication of the water surrounding coastal and rivers areas. Fish excretion and fecal wastes combine with nutrients released from the breakdown of excess feed to raise nutrient levels well above normal, creating alga blooms. In Indonesia contaminated waste generated from industries, sewage, agriculture, aquaculture, etc. Once the resulting algal blooms die, they settle to the bottom where their decomposition depletes the oxygen. Before they die, however, there is the possibility that algal toxins are produced, the example is red tides. Although any species of phytoplankton can benefit from an increased nutrient supply, certain mplesspecies are noxious or even toxic to other marine organisms and to humans. The spines of some diatoms can irritate the gills of fish, causemple is exang decreased production or even death. More importantly, blooms ("red tides") of certain species such as *Chattonella marina* often produce biological toxins that can kill other organisms. Neurotoxins produced by several algal species can be concentrated in filter-feeding bivalves such as mussels and oysters, creating a serious health risk to people consuming contaminated shellfish.

Intensive Farming system depend on a diet of artificial feed in pellet form. This feed is broadcast onto the surface of the water, and is consumed by the fish as it settles through the water column. Because not all the feed is eaten, a great deal of feed can reach the bottom where it is eaten by the

benthos or decomposed by microorganisms. This alteration of the natural food web structure can significantly impact the local environment. The waste could be minimalization with natural management, like *Moringa olifeira* seed, *Sargassum plagyophyllum*, shellfish, ,polyculture with trophic level system, probiotic, etc

Dr. Nurul Istiqomah

From: Indonesia

### 51. Tony Bennett, FAO, Italy

Dear Participants,

Pls find hereunder the link to a slightly dated study on losses in the dairy sector which was done in 2003/4.

As a result of the study and awareness raising around the high levels of losses being incurred, significant investments (public and private) were made in reducing these losses hence increasing household nutrition and income opportunities for mainly smallholder farm families.

<http://www.fao.org/ag/againfo/themes/en/dairy/pfl/home.html>

### 52. Seed to Feed Team, FAO, Italy

Dear CFS/HLPE,

We are a group of FAO interns participating in the challenge Thought for Food (<http://tffchallenge.com>). The purpose of this challenge is to inspire and mobilize young professionals around innovative ideas to ensure that everyone in the world has access to adequate, safe, and nutritious food in the future.

Our group has focused the issues of food losses and waste as a means of addressing the problem of food production and consumption, from Seed to Feed (<http://tffchallenge.com/team/seed-to-feed>). We believe that informed choices can contribute to improve the food supply chain by assisting consumers in purchasing only what will be used. For this reason, we are designing a mobile application, SmartBasket, that concretely connects consumers to information on sanitary food practices (independent of expiration dates), food travel distance as it impacts spoilage time and other crucial information to making sure all food purchased is consumed rather than wasted.

We have been reading with great enthusiasm the many contributions made to the HLPE Open E-Consultation on Food Losses and Waste in the Context of Sustainable Food Systems. We understand that this consultation is part of a larger elaboration process that will contribute to the publication of a CFS report that will be presented to the Plenary in 2014.

We hold the current work of the CFS and the HLPE in high regard, we believe that these upcoming events are great opportunities to be seized. We would like to know if there is an expert in your group

that would be willing to meet with us and help us gain insight from your experience, as it pertains to technical aspects of food spoilage as a driver of consumer waste.

Sincere regards,

**Seed to Feed Team**

Joana Borrero  
BeeGeok Cham  
Céline Dumas  
Chamim Foroughi  
Amanda Hickey

**53. Helena Kaisa, Maersk Line, Denmark**

Hello,

Maersk Line together with Institute of Applied Economics and Health Research has looked into Indian banana trade and food waste issues have come up as part of the research.

I would like to share some of the key findings with you:

The proportion of Indian fruits and vegetables estimated to go to waste in India due to the absence of an effective cold chain is 20 – 30%. This amount is equivalent to the total annual consumption of fruit and vegetables in Great Britain

Most food waste in the supply chain comes directly or indirectly from poor temperature control

The main cause of waste in the domestic market is due to a combination of low quality bananas from the farmer, insufficient sorting schemes at the packing stations, insufficient packing technologies, problems and lack of capacity in inland transport and storage

Waste in export (bananas) is lower than in the domestic trade due to efforts made with harvesting, sorting, packing and transport

Even if the domestic market prices in periods are higher than the prices in the export markets, the waste in the domestic markets is so significant that the export is still more profitable

Reduction of the overall waste by improving the cold chain infrastructure is a key to sustainable Indian banana trade

Please find the link to the summary of the case we have put together on: [Unlocking the potential of the Indian banana trade](#). In case of interest of the background report, please let me know.

With best,

Kaisa

**Kaisa Tikk**

Advisor  
Environment & CSR  
Maersk Line

**54. Roberto Azofeifa, Ministry of Agriculture and Livestock, Costa Rica**

It is extremely important for every country to have national statistics on post-harvest losses and waste of food even when they supply centers (wholesale markets, local markets, supermarkets, retail stores) are not captured.

In the case of Costa Rica statistical data are outdated. In the field of post-harvest losses data are available only for certain crops. After a quick search conducted by the Sustainable Production Department concluded that food waste in market places, no data are available.

**55. Anne Gichau, Kenya**

I wish to comment on postharvest losses on cereal grains; about a third of the grain harvested in a farm does not get to intended consumer. The grain is lost during harvesting, handling and storage. The major contributors to the loss are;

- Damage and consumption by field and storage pests that include insects, rodents and birds.
- Spoilage
- Spillage and
- Contamination
- The farmers and other grain handlers need to be equipped with the basics post harvest handling techniques in order to save a considerable quantity of grains increasing earning capacity of the farmers and traders.
- The grains should be harvested early as soon as they have reached the physiological maturity, in case of maize drying should be done first to attain a moisture of below 18% before shelling otherwise the sheller will crush the maize resulting into high level of broken grains. After shelling the maize should be dried to moisture 13.5% or below for safe storage. The grain should be treated with fumigants for the control of store pests before storing in bags or bulk. The store where the grain is to be stored must be cleaned thoroughly by removing all cobwebs, debris and spillage from previous crop as they harbour insects and become a source of infestation and sustain rodents and other pests.
- Part of the preparation of the store should involve treatment with a recommended pesticide. Every care must be taken to reach the hidden points and crevices as these are areas that act as breeding ground and hideout for pests.
- One should also make sure that the store is water proof and that the walls and floor are intact and able to carry the weight of the grain. The store should be secured against larger pest such as rodents and pilferers.
- If the grain is kept in bags, then the choice of the bags is important. For grains in transit, polypropylene bags could be used, however the period of storage must be very short. For safe and prolonged storage, jute or sisal bags should be used. These bags allow free circulation of air and dispensation of generated heat and are easy to fumigate.

## 56. Phaniraj Bellary Lakshman Rao, Agri Consultant, India

India is vast country with diversified climatic zone and fertile land/soil spread over the entire country, with different river sources which can be used effeicently to grow different crops for food security and health security. India is blessed with natural resoures and minerasl to have sustainablility in the feild of agriculture. Even today we get many natural herbs which have medicinal values for human beings and has good effeciency compared to allopathic medicines.

Coming to the point, with all this advantages our government policies are unable to tap the potentiality of our natural resorces and get the benefit to the poor peasants cultivating their lands desperately. At the same time the loss incurred is to the tune of 50 to 60 % through poor crop management, post harvest management, price flacuation of agri commodities, poor transportation and airline facilities, poor storage facilities etc., all this has lead our country to make loss upto 60% on the produce we get from mother earth. Farmers here depend on mono cropping in large area which leads to glut in the market and inturn influence the rate in the market. Hort duration hybrids varieties of different crops also add up to this. Indian farmers gorw the crops and the sell thier produce at less remunerative price and sometime throw away the produce as they do not get the invested returns as they grow crops which are perishable due to lack of transportation facilities from one market to the other markets. The major causes for food loss are as follows in the Indian context

1. Lack of crop planing ( Selection of Crop, time of sowing, water management, Organic manure & Fertilizer management, pest and diseases management etc.,)
2. Lack of Post Harvest technologies (lack of innovative harvesting machiniers and tools, lack of harvesting platforms and lack of transportation facilities)
3. Lack of cold storage chain link in order to increase the shelf life of the produce.
4. Lack of value addition to the produce grown by the farmers.

Farmers grow the crops and sell the same to the market at prevailing rate whether they get high returns or not. They should go for value addition to their produce through Dehydration & Food processing method. Farmers can also go sustainable agriculture like Integrated Farming System approach on their land (Agriculture Crop, Horticulture crop, Appiculture, Pisciculture, Dairy, Sheep & Goat, Poultry farming in their land) instead of monocropping in their land.

These are the some of the breif ideas which I would like to share the same with the organisation.

## 57. Åsa Stenmarck, IVL Swedish Environmental Research Institute, Sweden

Dear Sir/Madam

Some comments from Sweden:

\*We'd like to refer to our national study Censen et al 2012, available on [www.smed.se](http://www.smed.se) – showing food waste data and methodology for 2010. We are doing quite a lot on food waste data and will hopefully in autumn publish a summary of all this work in English.

\*I don't fully agree with loss/ waste terms proposed. I know that FAO uses this terminology, many other refer to loss as something unnecessary being thrown away throughout the whole food chain.. Please have a look at the FUSION-project work with definitions. Contact Karin Östergren – [karin.ostergren@sik.se](mailto:karin.ostergren@sik.se) for more information on that topic.

Your other writings sounds reasonable to me.

All the best  
Åsa Stenmarck  
Climate and sustainable cities - Waste

### 58. Annika Korzinek, European Economic and Social Committee, Belgium

Please find attached ([http://www.fao.org/fsnforum/cfs-hlpe/sites/cfs-hlpe/files/resources/ces1918-2012\\_00\\_00\\_tra\\_ac\\_en.doc](http://www.fao.org/fsnforum/cfs-hlpe/sites/cfs-hlpe/files/resources/ces1918-2012_00_00_tra_ac_en.doc)) the European Economic and Social Committee's opinion on food waste, adopted on 20 March 2013.

Kind regards,

Annika Korzinek  
Administrator  
European Economic and Social Committee  
NAT Section (Environment and Agriculture)

### 59. Foodwaste.ch, Switzerland

*foodwaste.ch* is the independent information platform for food waste in Switzerland. We carry out science communication measures through our website, presentations and other communication channels and actively engage in the dialogue to find sustainable solutions to food losses and waste in Switzerland. To this end, we are organising a conference with distinguished experts on strategies against food waste at the School of Agricultural-, Forest- and Food sciences in Zollikofen (Bern) ([www.foodwaste.ch/konferenz](http://www.foodwaste.ch/konferenz)).

#### Social sciences and interdisciplinary research

As a non-governmental association *foodwaste.ch* reviews and analyses the current research on the topic in Switzerland. The papers we analysed showed a strong trend towards quantitative measurements of food losses and waste (although many are not representative and do not sufficiently inform counter measures). Apart from measuring the quantities of food losses and waste we propose to put a scientific focus on other scientific disciplines in order to answer questions regarding:

- Market forces and mechanisms generating food waste and losses
- Business management practices generating losses and waste
- Consumer behaviour (while shopping and in the household)

We think that food waste research should be completed and extended through such social science approaches in order to inform action against waste and losses. We could provide you with the – to our knowledge – first theoretically informed food waste behaviour paper that used the CADM environmental behaviour model to describe food waste behaviour of consumers<sup>2</sup>. \_\_\_\_\_

As food losses and waste are a phenomenon that arises through natural, technological as well as purely social factors we propose to conduct interdisciplinary research in areas such as:

- Consumer behaviour where empirical research on food waste could be coupled with social science approaches.
- Food losses in agriculture
- Business management practices and processing technologies

We think that such interdisciplinary approaches yield better insight into the causes and possible measures against food waste.

### **Food Waste at the consumer level in developing countries**

Nutritional transitions in many developing and emerging countries prove that societies tend to develop wasteful consumption patterns in the process of growing richer (just as it happened through the 20<sup>th</sup> century in industrial and post-industrial countries). One goal of the study should be to explore how these developments can be faced in order to prevent developing countries to shift their post-harvest losses today into consumer level food waste tomorrow.

### **Losses due to cosmetic and quality standards**

The amount of food waste due to cosmetic and quality standards varies among countries. A comparative study on the various standards, on the amount of sub-standard food, and on the ways of using sub-standard food (for food processing, for sale as 2<sup>nd</sup> quality) could help identify measures reducing quality induced food waste.

If you wish more detailed information on our suggestions please do not hesitate do contact us.

Markus Hurschler

MSc.SustainableDevelopment  
CEO

Claudio Beretta

MSc. Environm. Science  
President

João Almeida

MSc. Sustainable Development  
Project Manager

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<sup>2</sup> A master thesis written at the University of Basel by Laura Abbas under Prof. Dr. Manfred Bruhn, Faculty of Business and Economics (now sent for peer-review and publication in *Psychology and Marketing*).

## 60. Yetty Violeta Quirós Ballester, SEPSA, Costa Rica

*[Original contribution in Spanish]*

El determinar las pérdidas en los cultivos es muy importante ya que no se tienen datos oficiales de cuanto producto se pierde, la mayoría de las veces se habla de porcentajes estimados.

Por lo tanto, un estudio que señale realmente cuanto se pierde y las causas de estas pérdidas ayudaría a implementar acciones correctivas para disminuir las pérdidas tanto en el campo como en el manejo pos cosecha. Esto incrementaría el ingreso en los productores al aumentar el producto para la venta.

*[English translation]*

Determining crop losses is very important as no official data are available and, in most cases, estimated percentages are used.

Therefore, a study specifying the amount of food lost and the related causes would help to implement corrective actions to reduce food losses both in the field and in the post-harvest management. This would improve farmer incomes, as a higher amount of product would be available for sale.

## 61. Atef Idriss, MEFOSA sarl, Lebanon

Middle East North Africa Food Safety Associates (MEFOSA sarl) is a private sector food security consultancy that would like to contribute its share in addressing the particulars of our food insecure region.

MENA food processors can do much better if FAO \* and the UN 3 sisters can address private sector infrastructural food security needs , including PPP and alliances when addressing food waste , safety, and sustainability .

Academia should be better empowered to research food losses as a result of food dumping in a measure to address developmental socio-economic , as well as trade needs .

Visit our website [www.mefosa.com](http://www.mefosa.com) and see our current broadcast on the issue,

Regards to All

Atef Idriss

## 62. Takeshi Matsuda, Japan

Dear all,

I have studied household food waste at university. We found that prevention of food losses led to a significant reduction in GHG emissions. Although composting and biogasification of food waste are good treatment methods, food losses prevention has higher GHG reduction potential.

<http://link.springer.com/article/10.1007/s11367-012-0400-4/fulltext.html>

Additionally, we found that "food waste separate collection program" could reduce the amount of waste. It suggests that the "visualization" is an effective approach to reduce household food waste.

So we need **appropriate monitoring method**. It will make possible to identify hotspots, measure the program achievement and visualize the information.

### 63. Tolly Lolo Emmanuel, Open Markets Agency, Cameroon

*[Original contribution in French]*

Cher CFS/HLPE,

Bien vouloir trouver ci après ma contribution à la consultation sur les pertes après-récoltes du secteur des produits vivriers agricoles au Cameroun.

En raison de leur fort enjeu économique, leur impact sur la sécurité alimentaire, leur contribution à l'équilibre alimentaire et d'une faible maîtrise de leurs techniques de conservation et de transformation, certaines cultures (filières) vivrières telles : le manioc, la pomme de terre, et la tomate font actuellement l'objet d'une attention particulière de la part du Gouvernement Camerounais.

En effet, la consommation énergétique actuelle au Cameroun qui se situe à environ 2300 Kcal/personne/jour reste inférieure à la moyenne des pays en développement qui est de 2600 Kcal/j/personne. Et l'Etat Camerounais, dans sa stratégie (volet agriculture et développement rural) s'est fixé comme objectif d'atteindre un niveau de 3100 Kcal/jour/personne à l'horizon 2015, ce qui correspond à un accroissement moyen annuel de 2,8% entre 2010 et 2015.

Pour atteindre cet objectif, il est indispensable non seulement de maîtriser les techniques de production, mais aussi et surtout de réduire significativement les pertes après-récolte qui représentent environ 20 à 50% de la production pour certaines cultures vivrières, notamment les racines et tubercules, les fruits et légumes. En effet, les pertes alimentaires et leur prévention ont un impact significatif sur l'ensemble des piliers de la sécurité alimentaire : la disponibilité, l'accessibilité, la stabilité des approvisionnements des marchés, ainsi que la qualité sanitaire et nutritionnelle des aliments. Actuellement, l'ampleur et les principales causes des pertes de produits alimentaires sont assez bien connues (faible qualité du matériel agricole ; techniques culturales non adaptées ; enclavement des bassins de production ; accès difficile aux équipements de transformation, de transport et aux infrastructures de stockage adéquats ; mauvaise organisation des marchés, accès difficiles aux informations sur les marchés, faible structuration/organisation des filières vivrières ; faible professionnalisation des acteurs ; ...). Cependant, compte tenu de l'absence de données statistiques nationales dans le domaine des pertes après-récolte ou des gaspillages alimentaires en général, l'évaluation des pertes est restée jusque là assez générale et non quantifiée par cause ;

rendant ainsi difficile l'établissement des priorités pour la mise en œuvre d'interventions spécifiques pour la réduction significative des pertes et l'obtention d'un maximum d'effets escomptés.

C'est donc dans l'optique de trouver des mesures idoines pour réduire les pertes après-récolte que le Ministère de l'Agriculture et du Développement Rural (MINADER) du Cameroun, a décidé d'entreprendre avec l'appui des consultants de la FAO, depuis janvier 2013, une étude les trois (3) cultures principales suivantes : le manioc, la pomme de terre, et la tomate. Il s'agit, à partir d'une analyse détaillée des causes de pertes sur certains points critiques des chaînes d'approvisionnement prioritaires, d'identifier les facteurs influant sur la quantité et la qualité des produits agricoles tout au long de la chaîne post récolte, qui part de la récolte à la consommation, en passant par la récolte, la manutention, le transport, le conditionnement, la conservation et la transformation.

L'étude est encore en cours, mais les résultats préliminaires auxquels nous sommes arrivés montrent que le niveau de pertes après récoltes pour l'ensemble de la chaîne du manioc est d'environ de 45% (avec environ 25 à 30% au niveau de la récolte!). Les causes des pertes sont nombreuses et sont présentes sur l'ensemble de la chaîne d'approvisionnement ; mais les principaux points critiques ont été identifiés au niveau de la récolte, de la transformation (épluchage et/ rûpage), puis au niveau des marchés (conditionnement et stockage).

Au regard de l'état des lieux qui montre que l'offre en produits de manioc est largement inférieure à la demande actuelle et potentielle nationale et sous régionale, la stratégie d'intervention proposée en vue de la réduction des pertes en manioc a mis un accent particulier sur :

1. la nécessité d'harmoniser le cadre d'intervention des nombreuses initiatives en cours actuellement sur le sous secteur manioc, que se soit d'une part par le secteur privé, les ONG ou d'autre part, dans les différents départements ministériels et projets sous-tutelle. Ceci pourrait être grandement facilité par la création d'un **Observatoire National de la filière Manioc** ;
2. de faciliter la collaboration entre le Ministère de l'Agriculture et du Développement Rural avec les autres Ministères et collectivités décentralisées en charge de l'aménagement rural (tels le Ministère de l'Economie, du Plan et de l'Aménagement du Territoire, les Mairies,...) pour faciliter le désenclavement des bassins de production de manioc ;
3. la facilitation de l'accès aux ressources financières en vue de l'acquisition par les différents acteurs des équipements de transformation, de transport, de conditionnement, et de stockage adéquats ;
4. le renforcement des capacités des différents acteurs en termes de bonnes pratiques agricoles, bonnes pratiques de transformation, techniques organisationnelles et managériales, accès aux informations sur les marchés,... en vue de faciliter la professionnalisation des groupes de bénéficiaires de la filière manioc.

D'autres pistes d'intervention sont envisageables, toute fois nous avons tenu à privilégier celles dont la mise en œuvre présenterait un meilleur ratio Coût/Bénéfice.

M. Tolly Lolo Emmanuel  
Ingénieur de conception en Industries Agro-alimentaires  
Consultant FAO  
Open Markets Agency (Cameroun)  
Directeur

[English translation]

Dear CFS/HLPE,

Please find below my contribution to the consultation on losses post-harvest in the agricultural food production sector in Cameroon.

As a result of their important economic role, their impact on food security, their contribution to nutritional balance and an insufficient understanding of the techniques for their conservation and transformation, certain food crops (sectors) like: cassava, potatoes, and tomatoes are the object of special attention from the Government of Cameroon.

Indeed, the present energy consumption in Cameroon which is around 2300 Kcal/person/day is less than the average in developing countries, which is around 2600Kcal/person/day. And the Cameroonian state, in its strategy (for agriculture and rural development) has set an objective of reaching a level of 3100 Kcal/person/day by 2015, which corresponds to an average annual increase of 2.8% between 2010 and 2015.

In order to achieve this objective, it is essential not only to master the production techniques, but also, and above all, to reduce significantly the losses post-harvest which represent around 20 to 50% of production for certain food crops, in particular roots, tubercles, fruits and vegetables. Indeed, the food losses and their prevention have a significant impact on the whole of the foundations of food security: availability, accessibility, stability of market supplies, as well as the sanitary and nutritional quality of food. At present, the extent and main causes of food losses are pretty well known (insufficient quality of agricultural equipment, inappropriate techniques of cultivation, isolation of production centers; difficult access to transformation and transport equipment and to adequate storage infrastructure; bad market organization, difficult access to market information; poor structuring/organization of food sector; insufficient professionalism of the operators; ...). However, taking into account the absence of national statistical data in the field of losses post-harvest or of food waste in general, the assessment of losses remains up until now, very general and not quantified by cause; making it very difficult to establish priorities for the implementation of specific interventions to reduce losses significantly and to gain the maximum expected effects.

It is therefore with a view to finding adequate measures to reduce the losses post-harvest that, from January 2013, the Ministère de l'Agriculture et du Développement Rural (MINADER) [Ministry of Agriculture and Rural Development] in Cameroon has decided to undertake a study, together with the support of FAO consultants, of three main crops: cassava, potatoes and tomatoes. It means, from the detailed analysis of the causes of losses at some critical points of priority supply chains, to identify the factors influencing the quantity and quality of agricultural products throughout the post-harvest chain from harvest to consumption, passing through harvest, handling, transport, packaging, conservation and transformation.

The study is still being carried out, but the preliminary results obtained show that the level of losses post-harvest for the cassava chain is around 45% (with around 25 to 30% at the level of harvest!) There are numerous causes of losses and they are present in the whole supply chain; but the main critical points have been identified at the level of harvesting, of transformation (peeling and/grating), and at the market level (packaging and storage).

Regarding the overview which shows that the offer of cassava products is largely inferior to present and potential national and sub-regional demand, the intervention strategy proposed for the reduction of losses of cassava has put a special accent on:

1. the need to harmonize the framework for the intervention of numerous initiatives currently in progress on the cassava sub-sector, whether it is by the private sector, the NGOs, or by the different ministerial departments and projects under-supervision. This could be made much easier by the creation of an **Observatoire National de la filière Manioc** [National Commission for the Cassava Sector]
2. the facilitation of collaboration between the Ministère de l'Agriculteur et du Développement Rural and the other decentralized bodies in charge of rural planning (such as the Ministère de l'Economie, du Plan et de l'Aménagement du Territoire, the Mayors Offices, ...) to assist in the opening up of the cassava production regions;
3. to facilitate access to financial resources so that the different operators may acquire appropriate equipment for transformation, transport, packaging, and adequate storage;
4. the reinforcement of different operators' capacities in terms of good agricultural practices, good transformation practices, organizational and managerial techniques, access to information about markets, ... so as to facilitate the professionalization of groups making a living in the cassava sector.

Other means of intervention can be envisaged; however we have had to prioritize those whose implementation would realize a better cost/benefit ratio.

M. Tolly Lolo Emmanuel  
Ingénieur de conception en Industries Agro-alimentaires [Design engineer for Agro-food Industries]  
FAO Consultant  
Open Markets Agency (Cameroon)  
Director

#### 64. Samuel Ayuba Hamisu College of Agriculture Gujba, Nigeria

Freshly harvested Crops (at commercial maturity) need to be handle with care, postharvest losses is not merely the damage which is occurring through bruises, cracks, or deterioration per se but also the nutritional composition of the produce which is a matter of great concern. Food security need to be intensify so that to promote quality of products.

Moreover, one need to know not only to have this Crops in abundant but also to able to safeguard the nutritional composition, because apart of being food for body building it serves as medicinal and many people administered them as source of Vitamin etc. HIV/AIDS patients, Malnutrition and so forth need them as empathizer and minerals. The losses begin from harvesting and handling in store, when reaching the wholesaler, retailer before reaching the final consumer its depreciate along this chain.

The successibility to minimize Postharvest losses laid on simple improve technological practice which will be implemented and to be affordable to small scale farmer because they cannot cater for the complex one.

In Sub-sahara Africa where the temperature is very hot there is high amount of damage frequently due to negligence of Government Agencies coming in to fund the internal system to get some means of brainstorming the farmers. The Extension Officers who can reach the farmer were no longer knowledgeable to carry out the task of easing the impending problem of losses. I suggest Postharvest Technology to be a Curriculum beginning from Secondary Education where students will learn on how to determine and practices use of maturity indices to identify proper harvest period, Benefit of improved containers to protect damage during handling and transportation, the use of shade, sorting/grading to enhance market value and use of on-farm storage in every secondary school. In case of the farmers that did not school the extension officer will put them through and encourage and teach Him/Her more about marketing and to take more responsibility to their Crops after harvesting, target to reduce losses. If this is carry out and adopt surplus of food will be all year round in the World community, and the surplus they were the cheaper it become.

Another lapses from the stakeholders is there is no available scholarship for the people who have key interest to further their studies in this field. Sub –Sahara Africa where left behind and we that are in the region have a challenges face us because we were not skilled enough to face the challenges of Postharvest losses. The stakeholders need to encourage young scientist by offering scholarship to motivate them to go and study this course by so doing we can bridge the gap to reduce losses and ravage food availability to keep pace with the increasing world population. Pest save as factors of losses which include Rodents, Insects, microorganism also Moisture content, Humidity plays their role on the other hand, the most problems we encountered in cereals and pulses grain which also resulted to so many losses in store grain, is lack of awareness, farmers were exercising wrong ideas, most of their stores are not well insulated and it leads to infiltration, dampness of the wall partition, they did not have a knowledge of how to site their storage systems they construct them on water way and during raining season run-off water will wash out the side of the store in form of erosion, or in the rainy windy day water splashes through the wall partitions which were poorly constructed.

They don't use to keep their produce on shade before storing due to ignorant, these lead to increase in the rate of respiration and resulted to Hot-Spot, condensation etc and when combine with humidity in the store will cause Caking and infestation of microorganism which will bring about loss of flavor and nutritional value, if this affect the grain I don't think if something will remain good in the store produce.

In every region we knew our people lapses and capability in the field of Postharvest Technology and their social behaviors so one need to improve when performing a similar task.

Whereas, in horticultural produce the Climacteric produce were found to be very difficult to control among the farmers due to it ethylene (C<sub>2</sub>H<sub>4</sub>) production in the hormone of the crops, while this triggering by hot temperature which hastened the ripeness that lead to senescence stage of deterioration .

These indicate that flesh resistance to O<sub>2</sub> diffusion in horticultural commodities may not be negligible and therefore in considering this Modified/Control atmosphere has to be taking as measures. But as mentioned eallier on, the attributed lack of awareness and understanding lure the farmers to losses.

Nevertheless, reaching the unreached is among the task ahead because farmers need some traditional practices to control ethylene action, such as preventing the plant being exposed to biologically action of ethylene, prevent it from responding to perceived ethylene, controlling

exposure to ethylene, and to prevent the plant tissue from perceiving the ethylene that is in its surrounding atmosphere or that is being produced by tissue. Although, application of ethylene in some fruits increased the quality of mature harvested cultivars and withstand the duration of transport and then treated with ethylene gas (C<sub>2</sub>H<sub>4</sub>) to promote ripening before sale. For these reason these are gleams to the knowledge of farmers, one need to brainstorm Him/Her with innovation of how to reduce losses to nearest minimum as we know that ethylene stimulate many metabolic activities in horticultural produce including respiration, Oxygen (O<sub>2</sub>) use can be increased, as it goes high, Carbon dioxide (CO<sub>2</sub>) also rise and produces heat which resulted to Hot-Spot in store.

## RECOMMEDATION

I would suggest the Triple bagging system of Purdue Improve Cowpea Storage (PICS) to be introduce to cowpea farmer to use them in storing their Cowpea, as we know Cowpea weevil or Bruchid cause a lot of destruction to farmers when they did not store their beans properly, the Adult live 5-10 days. Each female lays 40-60 eggs and glued to the cowpea seed till hatches and they feed on the cowpea and emerge an Adult after 3-4 weeks. Triple bagging have 99% of controlling their infestations.

Postharvest technologist should work hand in hand with:

1. Non Governmental Organizations.
2. Community Leaders.
3. Producers and Farmers Organizations.

To popularized any innovation that would reduce losses, we should use demonstration in village to impart "Cost Benefit Analysis", sensitization through means of radio using posters and Flyers.

Also to motivate the farmer through marketability of His/Her produce so that when you come next He/She will be eager and willing to receive your instruction (Innovation), and increasing of small producer's income. Mind, sometimes the farmer due to lack of knowledge and affordability to cater to construction complex storage system He/She have no option than to sale His/Her produce immediately after harvesting cheaper to reach people in the community, and when the day go by He/She will remain poorer and the reach get reached.

### Submitted to:

**Committee on World Food Security (CFS)**

**By:** Samuel Ayuba Hamisu

Postharvest Education Foundation (PEF) USA (International Consultant).

**Address:** Yobe State College of Agriculture, Gujba, Dept. of Agric. Techn. P.M.B. 1104 Damaturu.

**Country:** Nigeria, West Africa.

**Date:** 25th April, 2013

## 65. Zenón Porfido Gomel Apaza, ASAP, Peru

[Original contribution in Spanish]

Estimados señores.

Atento a la convocatoria tengo a bien precisar lo siguiente:

Primero, me suscribo con los 6 puntos propuestos por HLPE para examinar la pérdida y desperdicio de alimentos.

Segundo, para el caso de la sierra de Perú y concretamente del Altiplano peruano -donde vivo y laboro- habrían abordajes mas especificos en la cadena agroalimentaria. a) por lo menos en los últimos 20 años a la pérdida de los alimentos ha contribuido el aumento del efecto de los eventos extremos climáticos (dicho de otro modo los efectos del cambio climático), por ejemplo las granizadas, heladas plagas y enfermedades que afectan a los cultivos en periodo de crecimiento en terreno, cuyas pérdidas no se han estimado mi medido con exactitud; por tanto necesitamos saber cuanto es la pérdida por este factor. Por otro lado la incorporación de nuevas tecnologías modifican el patron tecnológico de las comunidades, es decir una agricultura "mas tradicional" ha asumido nuevos conocimientos y procedimientos que han generado una mayor producción de alimentos y también una mayor afectación a los recursos naturales agrícolas, pero esta producción no es sostenible en el tiempo, por tanto genera una pérdida de la producción y productividad por unidad de superficie frente a la producción anterior cuando se basaba sólo en conocimiento tradicional; es importante también aquí evaluar la productividad actual de los campos cultivados en planicie frente a la productividad de los cultivos en ladera de antes.

Segundo, en que medida se está haciendo el adecuado manipuleo de los alimentos en periodos post cosecha, siempre a la luz de los efectos de las variaciones extremas de los factores climáticos los productos tienden a deteriorarse pronto si no se los procesa o almacena correctamente y en los tiempos correspondiente. Es necesario evaluar cuanto es la pérdida en este etapa.

Tercero, he constatado que el desperdicio ocurre en la medida que los nuevos estilos de vida se van incorporando a las comunidades campesinas indígenas y locales, y van generando nuevos comportamientos. El niño no prefiere el "k'ispiño" hecho de quinua sino una galleta o que se vende la quinua para adquirir el arroz. Este es un punto que requiere se explorado. Y finalmente es necesario tambien saber el pérdida o desperdicio en el proceso de transformación o industrialización de los productos agrícolas versus la utilización de los insumos o energia en ese proceso para lograr un producto de calidad y que sea util fisiológicamente.

Muchas gracias por su atención y muchos saludos desde el Altiplano peruano.

Atte.

Zenón Gomel

*[English translation]*

Dear Sirs,

Following the consultation, I would like to share the following comments:

Firstly, I endorse the 6 topics proposed by the HLPE to analyse food losses and waste.

Secondly, in the case of the Peruvian Plateau where I live and work, more specific approaches for the food chain can be foreseen. The intensified impact of extreme weather events (in other words,

climate change impacts) such as hail, frost, pests and diseases that affect crops during the growth period, has contributed to food losses at least during the last 20 years. These losses have not been estimated or accurately measured, and therefore need to be precisely determined.

On the other hand, the incorporation of new technologies modifies the technological pattern of the communities. A "more traditional" agriculture has taken on new knowledge and procedures that have led to increased food production and greater impact in agricultural natural resources. However, this approach is not sustainable in the long term, as it leads to a loss in production and productivity per unit area when compared to the previous one, based only on traditional knowledge. Comparing the current productivity of plain crops with respect to former hillside crops is also important.

Thirdly, analysing to what extent an adequate food processing is being undertaken in postharvest periods is deemed convenient. Due to the extreme variations of climate factors, products experience a rapid deterioration if not properly and timely processed or stored. Evaluating the losses in this stage is necessary.

Fourthly, I have observed that wastage takes place as new lifestyles break into the indigenous and local farming communities and generate new behaviours. Children do not prefer the "k'ispiño" made of quinoa but rather a cookie or selling the quinoa to buy rice. This is a topic that needs to be further studied.

And finally, it is also necessary to know the loss or waste in the agricultural products transformation or industrialization process with respect to the inputs or energy used to achieve a quality and physiologically useful product.

Thank you very much for your attention and best regards from the Peruvian Plateau.

Yours sincerely,

Zenón Gomel

## **66. Jiwan Prava Lama, Department of Food Technology and Quality Control, Nepal**

It is my pleasure to send the comments on the paper on Food Losses and Waste in the Context of Sustainable Food System as a participant of HLPE as well as subject of my profession. The comments are as follows:

- 1) The major obstacles in the least developed countries like Nepal is the lack of infrastructure. This has not only lead to huge amount of food losses during the distribution channel but also resulted in serious health problems. Poor refrigeration system with interrupted electricity, poor road facilities, poor capacity of farmers on hygiene and sanitation has made the entrepreneur huge loss of perishable food products like milk and meat products.
- 2) The over use and misuse of pesticides in order to protect them from the possible damage of pests has resulted the pollution of the whole agro-ecosystem and the consumption of such vegetables has resulted in public health problem. The case studies on Total Diet Study (TDS- Pesticide Residues) reported that the contamination of pesticide residues in fresh vegetables were higher than other food crops.

In the media coverage, the farmers usual dump the left over vegetables instead of feeding to animals due to excessive use of pesticides.

3) The focus has to be given to the awareness and education programs in order to make people aware on food and nutrition security as well as food safety issues.

For example in the mountainous districts of Nepal, the availability of locally produced crops and tubers and fruits and vegetable should be optimally used as food basket in reducing hunger problem rather than providing subsidy in imported rice. So the subsidy policy should be revised to encourage the utilization of local production.

4) Another important thing is the stamping the expiry date on several processed food without proper research about their shelf life. It made the regulatory body to destroy the food product, may be prior to the real consumable period. So the provision for expiry date has to be revised or enforced scientifically.

5) The joint monitoring of different regulatory agencies seize the suspicious food products from food market and industry and dump, dispose, burn without taking consideration of food losses and environmental protection.

6) Excessive use of food products in feast and festival results in huge loss of food products.

7) The regulatory body use to dump and dispose the food products of small food services due to poor hygiene and sanitation.

**Recommendation:** The policy and regulation need to be address on food loss and waste. There are need of adequate awareness program on food safety, hygiene and consumption pattern.

## 67. Xavier Meignien International Institute of Refrigeration (IIR), France

*[English version version provided by the participant]*

Dear all,

For many years, the IIR has been concerned about post-harvest losses and would like to thank those who have set up this survey and the High Level Panel of Experts who are working on these issues.

One cause of such losses is a lack of logistics in general and refrigeration of perishable foods in particular (which tend to be high-added-value products with high nutritional value).

The impact of quantitative losses can be investigated by examining reduced accessibility for the consumer (prices that are too high, reduced availability) as suggested in the on-line document.

The loss of nutritional value can also be examined where product loss has not occurred, but quality is impaired.

And this is not all; it would also be valuable to investigate not only the impact of losses but also, on a broader scale, the consequences of a lack of logistics and a cold chain or poor logistics and a poor cold chain:

- On one hand, consumers alone are generally unable to cover the cost of losses and deterioration in quality; such costs are thus a burden also for professional stakeholders, in particular producers, and this situation discourages production;
- On the other hand, a lack of logistics and a cold chain have consequences that go beyond the loss issue:
  - - It would be useful to evaluate the agricultural production potential which does not come into play even if soil and climate conditions are favorable, simply because without logistics and refrigerated storage facilities and refrigerated transport, products cannot be placed on the market under good conditions in major consumer areas in producer countries and even more so in other countries, and it is impossible to spread the marketing of products over a certain period in order in order to match supply and demand.
  - - The lack of a suitable transport system for products such as fish, milk or fruit means that such products are not in fact supplied to persons living in regions that are in fact sometimes close to the production sites.
  - - The obligation to sell perishable foods within a very short time frame means that producers are forced to accept prices that fluctuate greatly and from day to day, whereas the use of suitable storage facilities would reduce such fluctuations without profoundly affecting the market; farmers, as is the case for other economic stakeholders, need visibility in order to launch production and expand their activities.

Lastly, it would also be useful to evaluate the health costs generated by poorly functioning cold chains; this issue above all concerns intermediate countries which have cold chains that are relatively developed but not sufficiently reliable, and have a significant percentage of consumed foodstuffs that are handled within cold chains.

Yours sincerely,

*[French version provided by the participant]*

Bonjour à tous,

L'IIF est préoccupé depuis de nombreuses années par les pertes après-récolte et remercie les organisateurs de cette consultation ainsi que les experts du HLPE qui travaillent sur ces sujets.

Une des causes de ces pertes est le défaut de logistique, en particulier de logistique du froid pour les produits périssables (qui se trouvent être aussi des produits à forte valeur ajoutée et à forte valeur nutritionnelle).

L'impact des pertes quantitatives peut être étudié en considérant la réduction de l'accessibilité pour les consommateurs (prix trop élevés, disponibilité physique plus faible) comme c'est suggéré dans le document mis en ligne.

On peut aussi considérer les pertes de qualité nutritionnelle dans les cas où les produits ne sont pas complètement perdus mais altérés.

Mais ce n'est pas tout ; il serait intéressant d'étudier non seulement l'impact des pertes mais aussi, plus généralement, les conséquences du manque ou de l'insuffisance de logistique et de chaîne du froid:

- D'une part les consommateurs ne sont généralement pas capables de payer seuls le coût des pertes et de la dégradation de la qualité ; celles-ci pèsent donc aussi sur le prix payé aux acteurs professionnels, notamment les producteurs, ce qui décourage la production
- D'autre part l'absence ou l'insuffisance de logistique et de chaîne du froid a des conséquences qui dépassent le problème des pertes :
  - - Il serait intéressant d'évaluer le potentiel de production agricole qui n'est pas mobilisé alors que les conditions pédoclimatiques sont bonnes, simplement parce que faute de logistique et d'entreposage et de transport frigorifiques il n'y a pas de commercialisation possible dans de bonnes conditions vers les grands centres de consommation des pays producteurs et a fortiori vers d'autres pays, ni de possibilité d'étaler dans le temps l'écoulement des produits pour améliorer l'adéquation entre l'offre et la demande.
  - - Le manque d'acheminement correct des produits tels que le poisson, le lait ou les fruits, fait que ces produits ne sont pas accessibles physiquement pour les habitants de régions pourtant proches, parfois, des lieux de production.
  - - L'obligation de vendre des produits périssables dans un délai très court contraint les producteurs à accepter des prix très fluctuants d'un jour à l'autre alors que la possibilité d'entreposer correctement permettrait d'atténuer ces fluctuations sans pour autant fausser les fondamentaux du marché ; les agriculteurs, comme les autres acteurs économiques, ont besoin de visibilité pour entreprendre et se développer.

Enfin, il serait intéressant également d'évaluer le coût sanitaire des mauvais fonctionnements de la chaîne du froid ; ce sujet concerne surtout des pays intermédiaires où il existe des chaînes du froid relativement développées mais insuffisamment fiables, et où une part significative des aliments consommés par la population passe par une chaîne du froid.

Cordialement.

## 68. Robert van Otterdijk, FAO - Working Group on Food Losses, Italy

The study should investigate:

1. how the reduction of FLW could improve the sustainability of food systems
2. how unsustainable food systems contribute to FLW

The scope of issues that the HLPE proposes to look at, is too wide. It would be better to stay more focused on the core objectives mentioned above.

1. Don't enter the discussion of the definition of FLW; just take the FAO definition in its current state.
2. Don't include agricultural production for non-food uses.
3. Don't include 'over-use' of food; far too little is known, or can be defined at this stage.

4. Don't include 'measuring and data availability (indicators, trends, monitoring); just use the available data of the extent of FLW
5. Regarding the impact of FLW on the 4 dimensions of food & nutrition security (availability, access, utilization, stability), only consider availability and access. Rationale: FLW have a direct effect on the availability, and an indirect effect on the access if FLW reduction leads to increased income.
6. Focus the study on two regions only: Europe and Sub-Saharan Africa.
7. Study the mutual impact of the 3 dimensions of sustainability plus the policy dimension (ENV, SOC, ECO, POL) on FLW.
  - a. Impact of FLW:  
ECO: reduced income, reduced GDP, reduced investments, no growth  
ENV: waste of natural resources, unnecessary GHG emission  
SOC: reduced food security
  - b. Causes of FLW (how unsustainable food systems contribute to FLW):  
SOC: culture and behaviour of people, consumption patterns; lack of education, organizational and managerial skills  
ECO: poverty; lack of investments; no access to technology; poor infrastructure; logistics  
POL: enabling environment/ investment climate, subsidies, legislation, standards and norms for food quality, trade regulations
  - c. Reduction of FLW and Valorisation of FLW (how the reduction of FLW could improve the sustainability of food systems):  
ECO: economic feasibility of solutions; distribution of economic benefits among the value chain actors; valorisation of FLW  
SOC: acceptability of solutions  
ENV: net environmental impact of the solutions, especially regarding energy consumption and ghg emission  
POL: political will to make changes
8. The impact, causes and solutions should be assessed in the national, regional and inter-regional context, the latter meaning that FLW in one region can be caused by conditions in another region, and can have a social and economical impact in another region. For example: more value addition in a poor region could reduce losses in that region, reduce imports into that region, and increase export of high-value products as well as reduce exports of raw materials to a rich region.
9. Answer the two questions above.
10. Make recommendations to reduce FLW and increase the sustainability of food systems.
11. The study could be undertaken by studying a large quantity of cases from projects (FAO, WB, private sector, IFAD, EU, AfDB etc.) on food security and value chain development, and develop models to assess 7a, b and c above.

## 69. Wageningen UR Food & Biobased Research, Dutch Ministry of Economic Affairs , Netherlands

Network of Excellence Postharvest Food Losses (to be established)

Toine Timmermans, Bart van Gogh & Peter Ravensbergen on behalf of Wageningen UR Food & Biobased Research, and Mireille Boshuizen on behalf of the Dutch Ministry of Economic Affairs

Motivation: food security & postharvest losses

Supply chains for fruits and vegetables in developing countries are characterised by relatively high losses between harvest and consumption and in all the steps and processes that take place between these. Postharvest loss is often used to describe losses between harvest and the onward supply of produce to markets and equates broadly with waste in the food supply chain. In its Food Loss Reduction Strategy the FAO stated that the losses for perishable crops, by their nature, are higher than those for cereals and highly varied by region and by commodity type, suggesting losses over 50%.

Analysis: causes of postharvest losses in the FSC of fruit and vegetables

The causes of postharvest losses in the fruit and vegetables postharvest chain in developing economies are diverse and often interconnected. The majority of these causes are foremost concerned with the categories cold chains/refrigerated transport, storage facilities and product handling. This top-3 accounts for more than 40 percent of the identified causes of postharvest losses. Another major cause of postharvest loss is lack of market-oriented production (no demand). Soon a report will be published by Wageningen UR Food & Biobased Research in which the main causes of postharvest loss have been examined (please contact Bart van Gogh). Topics that are reviewed in view of these causes are: cooling and refrigeration, conditioned atmosphere storage, postharvest handling, agrolistics, product physiology, packaging, food nutritional value and food safety, fruit/vegetable processing, market information, capacity building and system innovation.

Food security in metropolitan areas is under pressure

Estimates of the UN indicate that 70% of the world population will live in urban area by the year 2050. In the same period, the middle class (consumers of processed food) in for example BRIC countries will rise in a very fast pace. The middle class in India will rise from 5% in 2007 to 40% in 2030. These developments place high pressure on food safety and food security. This demands sustainable, efficient and technologically advanced food chains

Food security and postharvest losses: Dutch (institutional) framework

The Ministry of Economic Affairs has addressed food security as one of their top priorities and announced to explore the possibilities to improve efficient chains in upcoming countries and to develop these in co-operation with the partners from the private and not-for profit sector in the Netherlands.

Intervention: Network of Excellence postharvest losses

In the Netherlands, the concept of a Network of Excellence (NoE) with a clear focus on global postharvest food losses will be established. Such a network is based on the idea that a conglomerate of stakeholders, rather than a single party, would engage with the complexity of causes of postharvest losses more effectively. The NoE also encourages co-operation between private and public sector, as well as knowledge institutes.

#### Network of Excellence: opportunities

The concept of the NoE facilitates stakeholders to combine efforts in designing and implementing solutions to reduce postharvest losses. The private sector has a role to play in the process of

developing and implementing practical and appropriate solutions, as well as knowledge institutes, not-for profit organizations, intermediary organizations and public agencies, in order to tackle the mentioned complexity of postharvest losses. Keyword within the context of the Network of Excellence is postharvest knowledge and the transfer of this knowledge to the identified target groups. The Network discloses knowledge on postharvest related issues to the network's target groups, as well as between network members themselves. By performing an intermediary role as matchmaker between network members and network clients, the Network of Excellence makes this knowledge available to chain actors in developing countries.

Relevant challenges for HLPE are:

- Design and implementation of supply systems connecting rural production areas to urban consumers.
- Solutions for fine distribution in urban areas in developing countries and emerging economies,
  - (f.i. last mile, price / performance ratio).
- Recognize economic incentives in the food chain leading to food waste.
- Sustainable logistics are often more efficient (faster, less losses) and cheaper (less water, less petrol) . An overview of successful showcases can serve as a source of inspiration.
- To achieve a maximum result it is advisable that the private sector will be involved in formulating solutions.

See also the contribution of Martine Rutten, LEI Wageningen UR The Netherlands , posted 16-4-2013

#### References:

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Metropolitan Food Clusters & Agroparks: <http://www.wageningenur.nl/en/Expertise-Services/Research-Institutes/alterra/Projects/Metropolitan-Food-Clusters-en-Agroparks.htm>

Platform Metropolitan Food Security <http://www.metropolitanfoodsecurity.nl/nl/welcome>

## 70. Josph Schmidhuber, FAO, Italy

Dear Members of the HLPE Steering Committee,

I am referring to the e-consolation process you have initiated on "Food losses and waste in the context of sustainable food systems" [http://www.fao.org/fsnforum/cfs-hlpe/food\\_losses\\_waste\\_scope](http://www.fao.org/fsnforum/cfs-hlpe/food_losses_waste_scope). I am also referring to the paper on the scope proposed by the HLPE

Steering Committee [http://www.fao.org/fsnforum/cfs-hlpe/sites/cfs-hlpe/files/files/Food\\_losses\\_waste/topic\\_en\\_food\\_losses\\_waste.pdf](http://www.fao.org/fsnforum/cfs-hlpe/sites/cfs-hlpe/files/files/Food_losses_waste/topic_en_food_losses_waste.pdf)

In keeping with the basic scope outlined in the guidelines, I would like to suggest that 3 analytical pieces be commissioned by the HLPE. They include:

A. Case studies to empirically measure waste and losses.

This paper would measure the extent of waste and losses along the various stages of the food chain. It would cover 5 developing countries, ideally representative of 5 different developing regions (e.g. sub-Saharan Africa, Near East & North Africa, South Asia, East Asia & Pacific, Latin America and the Caribbean) as well as 2 developed countries (e.g. 2 countries in North America and Europe). The paper would propose a statistically sound methodology to gauge nationally representative quantities and values of food losses and waste and do so at 3 key stages of the value chain:

- i. Post harvest, farm, stores
- ii. Distributors, processors, wholesalers and retailers
- iii. Households, individual and common (cantinas, hospitals, prisons, etc.)

In tandem with measuring the extent of losses and waste at different stages of the value chain, the study would collect the parameters that characterize the technologies used at the 3 different stages of the food handling chain. Data collection would, where possible, also include contextual information, such as data on the overall infrastructure endowment (access to roads, public storage, electricity, communication, etc.), overall farm mechanization, etc.

B. Establishing the economic case for the reduction of losses and waste

Based on the results gathered and presented in the case studies of the first paper, this paper would examine the basic economic rationale for the reduction of food losses and waste at different stages of the value chain. Without preempting the results of this paper, basic economic analysis suggests that the economic rationale for waste and losses reduction at different stages of the value chain can be fundamentally different, with different beneficiaries within a society and different marginal reduction/abatement costs. The paper will cover the following points:

- i. Introducing the reasons why losses occur (low food prices, inadequate infrastructure, handling and storage facilities, etc.)
- ii. Introducing the externalities associated with waste and losses, differences in economic and financial costs. To illustrate this point: waste in developed countries households is often a reflection/the result of low food prices. Food prices are too low to capture the full economic costs/the scarcity of the natural resources needed for the production of food, i.e. water scarcity and pollution, land degradation, loss in biodiversity, carbon emissions, insufficient land fill, etc. While important, here waste and losses are primarily a sustainable development issue, they affect heavily though not exclusively developed countries and their reduction is unlikely to help address hunger and other forms of malnutrition. These losses/waste could be contrasted by losses that occur at the upper part of the value chain (farm, storage, distribution). Such losses reduce farm incomes (lower

volumes of sales) and food availability. Their reduction is likely to have a stronger impact on hunger reduction, both by raising farm incomes and lowering food prices.

iii. Measuring the economic and the financial costs and benefits of food losses and waste: empirical analysis based on the 7 case studies.

iv. Identifying economically optimal levels of waste and losses at the various stages of the food chain. This includes an illustration of increasing marginal abatement costs depending on the level of waste reduction targets, an understanding that there are economically optimal level of waste/losses. Results include a differentiation of optimal waste levels across population groups within a country and across the countries identified in the case studies. The results will help inform the Zero Hunger Challenges and in particular the Zero Waste Challenge. The results will also help understand that it is important to differentiate between an (uninformed) advocacy goal and an economically sound target.

C. Examining policy interventions to reduce waste and losses

Based on the results of the case studies in the first paper and the economic analysis in the second paper, this study will examine possible policy interventions and evaluate their differential impacts. Specifically, it will:

i. Identify costs and benefits of different policy interventions at different stages of the food value chain

ii. Identify differential impacts of different interventions alternatives, costs and benefits (beneficiaries). It will provide a differentiated analysis of costs and benefits within and across countries.

iii. Identify optimal policy measures wrt to different policy objectives, e.g. hunger reduction or sustainable resource use.

## 71. Víctor Manuel Arriaga Haro, CONAPESCA, Mexico

*[Original contribution in Spanish]*

Al respecto me permito comentarle que el documento plantea la propuesta del HLPE para establecer el alcance del estudio solicitado y poder definir, al término de esta primer consulta electrónica, los términos de referencia para comprender las rutas y procesos vinculados a las pérdidas y el desperdicio de alimentos a nivel mundial y poder establecer directrices y recomendaciones para reducir su impacto social, ambiental y económico, así como su posible contribución para fortalecer de forma sistémica la seguridad alimentaria a través de sus cuatro dimensiones: disponibilidad, acceso, utilización y estabilidad de los alimentos.

Sin duda alguna, buscar alternativas de solución para tal problemática mundial, conlleva la integración de equipos de trabajo multidisciplinarios, así como la evaluación y análisis de múltiples factores que convergen en este fenómeno. Tan solo por mencionar algunos de estos factores:

Nivel de desarrollo de los países.

Comportamiento de los consumidores (patrones de consumo).

Fenómenos naturales y climáticos (sequías, inundaciones, alteración en la corriente del Niño).

Sociales (niveles de pobreza alimentaria).

Ambientales (manejo de desechos sólidos, emisión de gases de invernadero).

Prácticas de mercado (estándares de calidad y estéticos de los productos alimenticios).

En el caso particular de la pesca y la acuicultura, si consideramos sólo el nivel de desarrollo de los países; las principales causas de pérdidas y desperdicios, en los países con alto desarrollo, están asociadas al descarte de productos durante la pesca y a los patrones de comportamiento del consumidor, esta última causa adquiere niveles de hasta un 25%, mientras que en los países en vías de desarrollo, las principales causas son el manejo pos-captura, los procesos de transformación y la distribución, todas ellas relacionadas a las limitaciones en infraestructura y tecnologías de los procesos productivos.

Según estimaciones recientes, se considera que en México se desperdician o pierden casi 100 kg de alimentos por persona por año, colocándonos entre los países con mayores mermas causadas por hábitos o patrones de consumo (Estados Unidos y Países de la Unión Europea desperdician entre 95 y 115 kg per cápita).

Dada la falta e insuficiencia de datos, estos estudios se hacen con muchas suposiciones sobre el desperdicio y la pérdida de alimentos, sobretodo en lo que se refiere a la cuantificación de éstos a niveles tan estrechos como el núcleo familiar.

Es por ello urgente que se investigue a un nivel de mayor certidumbre sobre los diferentes procesos y factores intrínsecos asociados con las pérdidas y desperdicios de los alimentos, desde la cadena de suministro de la producción primaria, pasando por aquellos relacionados con las prácticas de gestión y gobernanza, tanto públicas como privadas, hasta los patrones de comportamiento del consumidor final. Especialmente si se tiene en cuenta que, en países como México y otros de menor desarrollo, existe una preocupación que ocupa a sus gobiernos para disminuir los niveles de pobreza alimentaria y mal nutrición.

La participación de México, tanto en la contextualización como en la ejecución de este estudio, sería de gran importancia para establecer líneas base de esta problemática, ya que desde el inicio de la actual administración, el Lic. Enrique Peña Nieto está impulsando la Cruzada Nacional Contra el Hambre a partir de una alimentación y nutrición adecuada, programa que busca mediante la implementación de sinergias multisectoriales y acciones para minimizar las pérdidas de alimentos, apoyar de forma inmediata a aquellos sectores de la población en pobreza extrema y carencia alimentaria.

*[English translation]*

I want to mention that the document includes the HLPE proposal for the determination of the scope of the requested study and the definition, at the end of this first electronic consultation, of the terms of reference to understand the causes and processes related to global food losses and waste and

establish the guidelines and recommendations to reduce their social, environmental and economic impact, as well as their potential contribution to the systematic strengthening of food security through its four dimensions: availability, access, utilization and stability of food.

Undoubtedly, finding alternative solutions to this global problem implies integrating multidisciplinary work teams, as well as evaluating and analysing diverse factors affecting this phenomenon. Some of these factors are:

- Countries development level
- Consumers behaviour (consumption patterns)
- Natural and climate phenomena (droughts, floods, changes in *El Niño*)
- Social (food poverty levels)
- Environmental (solid waste management, greenhouse gas emissions)
- Market practices (food products quality and aesthetic standards)

In the particular case of fisheries and aquaculture and, only considering the development level, the main reasons behind food losses and waste in highly developed countries are related to fish discards and consumer behaviour patterns, with the latter one amounting up to 25%. However, in developing countries, the major causes are post-harvest management and distribution and transformation processes, all of them related to productive processes limitations in infrastructure and technologies.

According to recent estimates, nearly 100 kg of food are lost or wasted per person every year in Mexico, putting us among the countries with greatest losses due to consumption patterns (United States and European Union countries waste between 95 and 115 kg per capita).

Due to the lack of data, these projections are based on numerous assumptions regarding food waste and losses, especially when quantifying these in a confined environment like the family nucleus.

Researching with enhanced certainty the different processes and intrinsic factors related to food losses and waste, from the primary production supply chain to those elements linked to public and private management and governance practices or to the final consumer behaviour patterns, is an urgent need. Especially when considering that, in Mexico -and other less developed countries-, governments are concerned with the reduction of food poverty and malnutrition levels.

Mexico's participation, both in the contextualization and preparation of this study, would be of great importance to determine the baselines of the problem, since from the beginning of the current term Mr. Enrique Peña Nieto is fostering the National Crusade Against Hunger. Based on adequate food and nutrition, the program aims to provide immediate support to the population suffering extreme poverty and food shortages, through the implementation of multisectoral synergies and actions to minimize food losses.

## 72. Jeffrey Klein, The Global FoodBanking Network, United States of America

With regard to points 5 and 6, I believe it is critical to acknowledge and quantify with respect to point 5, the amount of food waste that CANNOT or IS NOT recovered and re-distributed because of the following policies many/most countries have in place

- 1) Lack of or unfavorable good samaritan laws relating to insulation donors who provide food fit for human consumption
- 2) Lack of or inadequate tax policy allowing for full and complete tax deductibility of PRODUCT and/or CASH DONATIONS to food banks
- 3) Any VAT or VAT-like tax that is levied on the value of surplus food items to food banks.

This data should be used to proactively make the case for changes to all relevant aspects of points 1-3 where the necessary conditions for full and enthusiastic participation in and support of food banks is compromised by lack of these structural incentives.

### **73. Felicitas Schneider, Institute of Waste Management, BOKU-University of Natural Resources and Life Sciences, Austria**

Dear Sir or Madam,

many thanks for the opportunity to give response on the call “Food losses and waste in the context of sustainable food systems” which is very interesting. The Institute of Waste Management of the BOKU-University of Natural Resources and Life Sciences in Vienna has been dealing with the topic of food wastage for more than 12 years and we have investigated different issues along the food supply chain (<http://www.wau.boku.ac.at/11754.html?&L=1>).

From our point of view, the call includes a very general description of a very extensive issue and one should be careful not to overload the intended study too much. As it is mentioned, the study should be finished in a very short time period and it seems to be in question if it is possible to handle all the different issues in a proper way. Thus, we suggest to focus on issues which have not been already covered by previous studies (such as Gustavsson et al., 2011). A relaunch of an uncertain estimation on the generation of food losses and wastes based on the same very poor data seems not to be very meaningful.

The aspect of over-nutrition/obesity should be better excluded from the food waste prevention discussion as it raises a lot of ethically sensitive questions when thinking about implementation of corresponding prevention measures. Certainly obesity is an important topic but should be targeted in another context (e.g. economic damage due to increased health-care costs etc.).

Although food waste has been discussed for some time, there is no common definition or methodology. Further, uncoordinated research work has been done resulting in various recommendations to several countries worldwide. To facilitate a more efficient approach in future, we suggest to consider the approach and results of current food waste research projects. In August 2012 a 4-year FP7-project named FUSIONS was launched which is supported by 21 respectable European organisations and food waste experts from 13 EU member countries. The overall aim of the project is to contribute significantly to the harmonisation of food waste monitoring, to investigate the feasibility of social innovative measures for optimised food use in the food chain and

the development of guidelines for a common Food Waste policy for EU-27. Utilising the policy and behavioural change recommendations from the delivery of the key objectives, the FUSIONS European multi-stakeholder platform will enable, encourage, engage and support key actors across Europe in delivering a 50% reduction of food waste and a 20% reduction in the food chains resource inputs by 2020. Examples could include uniform labelling addressing sell- or use-by dates, innovations in the chain to improve shelf-life of food products, or creative solutions for behavioural change within stakeholders. It all starts with agreed-upon definitions and a common methodology for referring to the extent of the problem and its drivers. More information can be found via the website (<http://www.eu-fusions.org/>) or via facebook (<http://www.facebook.com/pages/EU-Fusions/525226617504781>).

As the main goals of FUSIONS are very similar to those formulated within the CFS call, it seems to be very wise to consider the already done respectively planned work (FUSIONS will end in July 2016) to include the European Community area into CFS-project. The most reputed European food waste experts already contribute to the FUSIONS consortium, thus it can be seen as think tank for the region and could be used as input for the CFS-project.

Greetings from Vienna,

Felicitas Schneider and colleagues

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#### 74. Jane Ambuko, University of Nairobi, Kenya

Under Recommendations - bullet 2 (potential for reduction for food waste, and by what means (technical and policy tools, information etc), taking into account regional and product specificities, as well as actions at different levels)

My contribution

- Perishable food commodities including fruits and vegetables where high food losses from the production to the retail/consumer level occur, there are various interventions which would significantly reduce the losses. Some of the interventions/practices to minimize losses include
  1. Better production/agronomic practices to ensure produce of high quality potential at harvest
  2. Good harvest practices including right harvest maturity + harvest time, careful harvesting to minimize mechanical damage
  3. Good postharvest handling practices such as grading, shading, sanitization, cooling
  4. Better packaging for transportation to distant markets

5. Maintaining a cold chain from harvest to marketing
  6. Application of some of the tested applicable postharvest technologies that have been used in developed countries to successfully reduce postharvest losses to below 10% compared to 40-50% in the developing countries
- Most of the proposed interventions above simply require capacity building for the producers (farmers) through various methods such as field days,

## 75. Germany

German Contribution to the electronic consultation of the HLPE concerning the report on food losses and waste in the context of sustainable food systems

*General comment:*

In recent times, the topic food losses/food waste has come back to the political agenda. Several studies have been launched since (see Brussels-briefing; FAO, World Bank, GIZ etc.) which came to similar conclusions about the scope of wastage, using existing data from FAOSTAT and from former studies in the 80/90es. Accordingly, technical and institutional solutions are generally known from former times, but not (anymore) applied. New data on losses, which are collected in the affected areas and which rely on scientific research are nevertheless rare and there is the need to invest more in research on losses in the affected areas.

The main focus of this study should lie on institutional and policy frame conditions which are able to reduce losses and waste and should elaborate on the right incentives at a policy level to tackle this problem.

### 1. Concept/definitions:

Food losses and waste which occur from field to fork in value chains should be at the center of the study. Next to cereals, the study should also look at value chains of perishable fruits and vegetables due to the link to nutrition security. Further topics, that are sometimes discussed as food waste in a larger sense (use of biomass for feed, for bioenergy, the growing problem of over-nutrition etc.) have a completely different scope and should not be a focus of the study. Their impacts on food security are already discussed in different policy processes and should only marginally be treated in this study. Only if there is a direct relation to the proper wastage challenge in the narrow sense, these topics should be treated.

The agreement about a precise definition of “food waste” should be one important part of the study – one aspect within the discussion should be if the use of food for bioenergy, feed or compost should count as food waste or not – at the moment many different opinions regarding this issue exist. From our point of view the definition should focus on losses and waste of food that is destined to be eaten by humans. Other topics should be discussed apart, as these are primarily a matter of land usage for different purposes.

Food waste and food losses have similar impacts on food availability and on food prices, but they have different underlying structural causes and need different incentives to be tackled. Solutions and concepts of this study should distinguish between food losses – mostly occurring in developing countries- and food waste, mostly occurring in industrialized countries.

## Waste

With food waste, we propose to differentiate between

avoidable food waste that was still perfectly edible at the time of its disposal

semi-avoidable food waste that is thrown away due to various types of consumer behaviour (e.g. bread crusts, leftovers, canteen waste)

non-avoidable food waste mostly consisting of inedible elements (e.g. bones, banana skins)

## Losses

Food losses occur from field to retailer level. Food losses on the field through pests, diseases and other reasons are a major problem for many farmers in developing countries. Post-harvest-losses occur in the next steps of the value chain, from farm to retailer and caused by bad storage conditions, missing transport and marketing infrastructure. They can reach more than 30 %.

### 2. Measuring and data availability:

Data on food losses, which are cited in recent literature, are mostly not up to date and originate from the 80es and 90es. Therefore there is need for up-to-date data on food losses in the food supply chains, to help policy makers and other stakeholders to make the right decisions. We recommend working towards a standardization of assessment and measurement methodologies to deliver consistent and comparable results. Examples which could be used as a basis are the work currently done by APHLIS on harmonized assessment methods, FAO studies on food losses (2011) and GIZ's recent assessments on food losses in maize and cassava in Nigeria (GIZ is a federal enterprise which assists the German Government in achieving its objectives in the field of international cooperation and development).

At present, only vague estimates are available for Germany and these suggest that between 6.5 and 20 million tons of food end up in the bin each year. For this reason, the Federal Ministry of Food, Agriculture and Consumer Protection (BMELV) tasked the University of Stuttgart with ascertaining the amount of disposed food in Germany and with identifying the main causes of food waste.

The study by the University of Stuttgart has calculated the total amount to be almost eleven million tons of food that is thrown away each year by trade, industry, large-scale consumers and private households. This corresponds to 275,000 truckloads.

Primary agricultural production was excluded from the figures for the time being because evaluating the waste and losses here is a massive undertaking and separate studies are being conducted on this issue. Initial findings will be published in the near future.

The results of our study (without agriculture)

Food waste occurs at every level – from production via trade to consumers. Almost eleven million tons of food are thrown away each year by trade, industry, large-scale consumers and private households (study by the University of Stuttgart).

This can be broken down as follows:

Large-scale consumers 17 per cent 1,900,000 t

|                    |             |             |
|--------------------|-------------|-------------|
| Industry           | 17 per cent | 1,850,000 t |
| Trade              | 5 per cent  | 550,000 t   |
| Private households | 61 per cent | 6,670,000 t |

This amounts to 82 kg per head in private households alone. Two-thirds of this – i.e. 53 kg – would be possible to avoid. That corresponds to € 235 euros per head. For a household of four, this adds up to about € 940 per year. Taking Germany as a whole, avoidable everyday waste costs as much as € 21.6 billion per year.

### 3. Impacts

Food losses and waste reduce the theoretical amount of food which could be used for human nutrition. They put pressure on food availability as well as on food prices:

Food waste has serious consequences: resources like water, energy and arable land are being wasted. What is more, the unnecessary production and transportation of foodstuffs place an additional strain on the environment: it is estimated that 30 per cent of global greenhouse gas emissions are linked to our eating habits.

Finally, foodstuffs that end up in the bin also have an impact on food prices and thus on the global food situation. The more we waste, the greater the demand on global markets and the higher the prices worldwide (see also giz-study on Life cycle analysis of food losses in cassava and maize in Nigeria, [www.giz.de/nachhaltige-landwirtschaft](http://www.giz.de/nachhaltige-landwirtschaft), will be published by mid May 2013).

The exact impact of food losses and food waste on availability and prices is not well known and should be looked at in depth by this study. It is important to understand, how food loss reduction strategies must be designed to really improve food security especially for poor rural and urban households and to make the right policy choice.

### 4. Sustainable food systems – causes of food losses and of food waste

#### a) Investments in storage infrastructure in developing countries

Investment in infrastructure and technologies to avoid post harvest losses must be economically sound, otherwise they will not be sustainable and will not be started without external support. In-depth-cost-benefit-analysis has to be done to understand the economics of PHL reduction and to identify the right investments. Appropriate storage facilities at the farm- or district level can help rural small producers to tackle price volatility and to make best economic use of price development. Further, they can help mitigate the risk of hunger during critical periods (immediately before the next harvest), if the product is stored safely over a longer time. These advantages only materialize if – besides technical equipment and knowledge - the institutional framework conditions are right: Farmers must have access to credit so that they would not be forced to sell their products immediately after harvest, they must have access to market information, they should organize themselves to share post harvest-infrastructure and –facilities. Central storage and marketing facilities should be available to all farmers, as well equal access, especially for women and poor farmers (see also warehouse receipt systems, warrantage, etc.).

#### b) Processing food in developing countries

Processing of food, especially of perishable goods, should be undertaken in the rural areas and in clusters, to make transport more efficient (processed or semi-processed food is of higher value) and to allow value addition in the rural region (see GIZ-Nigeria study on cassava pre-processing, that will be published soon at [www.giz.de/nachhaltige-landwirtschaft](http://www.giz.de/nachhaltige-landwirtschaft)). Inclusive business models can play an important role in reducing food losses by facilitating access to storage and processing technologies.

c) Avoiding food losses at the retailer level in industrialized countries

In most industrialized countries, one major problem are the high quality standards for food products in terms of their appearance, often completely irrespective of their nutritional value. These standards are defined by the retail industry and lead to huge amounts of food being sorted out at producer and wholesale levels. This problem is especially severe for fruits and vegetables. An appropriate adaptation of these standards could diminish the amount of food waste and furthermore lead to a more conscious consumption behavior. How this could be done and what implications would play a role should be investigated in the study.

The BMELV-study by the University of Stuttgart found that in Germany, food waste occurs along the entire value-adding chain. The causes are as varied as the different products and production/distribution processes. The following is a brief overview of the individual segments and the key causes:

Food industry

Non-compliance with the required product and quality specifications

Storing of retained samples that must be subsequently disposed of

Overproduction and incorrect planning

Errors in the production process (e.g. off-specification batches, production downtimes, spillage, incorrect labelling)

Trade

Shelves in supermarkets need to be fully stocked even at closing time – with bakery products, fruit and vegetables, and other perishable goods

Damage to perishable foodstuffs (e.g. squashed fruit)

Expiry of best-before and use-before date

Overstocking due to unpredictable shopping behaviour

Incorrect storage, damage during transportation

Large-scale consumers

Lack of knowledge about waste quantities

Inadequate storage

Advanced calculation is hard if demand fluctuates heavily

Hygiene and safety regulations

Portion sizes are not differentiated enough (e.g. in canteens)

Private households

Insufficient appreciation of food, partly due to permanent availability and the extremely low prices compared with other EU countries

Bad planning, wrong purchases, no overview of existing supplies

Incorrect storage

Expiry of best-before date

## **5. Public policies**

### a) Addressing food losses at the retailer level

Incentives which could foster or which hamper food losses/waste should be studied in detail. Who pays for the losses, who profits from losses/waste respectively? At the level of retailers, smaller quantities of food get wasted but nevertheless retailers have an important impact on food waste amounts at all other levels: by setting high quality standards they force producers and wholesalers to sort out massive amounts of edible food only because of some external properties. Furthermore, retailers often trigger food waste at consumer levels as they offer too large portions or stimulate consumers to buy more than they need. Most probably they profit from the food waste of consumers because they can sell more. Therefore, an important question is how retailers can become more conscious to reduce waste? Where are win-win-situations? To tackle this problem, a combination of appropriate public policies and awareness rising is needed.

### b) What role for the public sector to encourage investments?

To foster food loss reduction strategies, it is important to clarify which investments can be done by private actors and which ones by the public sector. If food security is a public goal, then corresponding investment and support is required. In this context, the potential of public-private-partnerships should be examined. Related to this, it would be necessary to investigate existing bottlenecks for private investment and how public policies could help to overcome them.

### c) The initiative “Too good for the bin” in Germany as an example for measures against waste in an industrialized country

The permanent availability of foodstuffs, the drifting apart of price and value, insufficient knowledge about the entire production chain – these all cause a reduced appreciation of food and a negligent attitude towards it. We want to change this.

To significantly reduce the amount of food waste in Germany, the Federal Ministry of Food, Agriculture and Consumer Protection (BMELV) launched the “Too good for the bin” initiative in spring 2012. It thrives on the many consumers, associations and companies that support this objective.

The *Too good for the bin!* initiative consists of numerous individual activities and events (examples):

The website [www.zugutfuerdietonne.de](http://www.zugutfuerdietonne.de) and smartphone app offer shopping tips, advice on the correct storage of food, recipes for using up leftovers etc. from 50 gourmet chefs.

Events to save food are held in public spaces in six different cities. The events are held in conjunction with the "Tafel" organisations (food banks that collect surplus food and distribute it free of charge to people in need) and the "Slow Food" organisation.

With a joint initiative between "Too good for the bin" and the Deutsches Studentenwerk (German National Association for Student Affairs), information on the subject of food appreciation is provided to students at numerous universities and colleges.

Further cooperation partners include the retail sector and rural women's organisations.

The awareness-raising activities focus on where the most food is wasted: private households. But ultimately, the task of reducing food waste must be a joint effort along the entire chain – from farm to fork.

With its information campaign against food waste, the BMELV has one primary objective in mind: to enhance people's attitude towards how they value food.

## 6. Recommendations

In regard of the manifold experiences of projects to reduce post-harvest losses in the past, lessons learnt about successes and failures should be the base of this study, i.e. by investigating existing bottlenecks for private investment, as well as obstacles for producers to making use of community or district level warehouses.

Studying the potential for better valorization of food waste and loss has to be done under the premise, that especially in developing countries, most of the wanted or not-wanted by-products are already used, be it for feed, bioenergy or soil amendment.

The concept of post-harvest losses reduction should be mainstreamed in existing or newly planned projects to promote agricultural production and rural development. Beyond "simple" storage and processing technologies, the institutional set up of producers, access to market infrastructure, microcredits, capacity development and regional planning (i.e. of processing centers) are general concepts of rural development which have to be enlarged by post-harvest losses aspects.

In Germany, there have been several initiatives that could serve as examples for similarly-structured countries, e.g.:

Cooperation with the retail sector to raise awareness about the meaning of the best-before date, explaining to people that food is often still good after this date. Four million flyers were handed out.

A "get involved" booklet was sent to organisations and other stakeholders. This offers tips on how to organise your own event on this subject and the support that the BMELV can provide.

Local authorities are encouraged to launch their own initiatives and measures to reduce food waste. The best results will be presented in a workshop in autumn.

In a guidebook about donating food to social welfare bodies, we provide information on the most important legal aspects.

Together with the German Hotels and Restaurants Association (DEHOGA), Federal Minister Aigner campaigned in May 2012 for different portion sizes as standard options in restaurants, catering and canteens.

Letters from Federal Minister Aigner to her cabinet colleagues and the leading exhibition organisers, asking them to include the provision of different portion sizes as a criterion within the tendering process for canteens as well as catering services for meetings and conferences.

Beyond that, talks were held at both ministerial and technical levels with manufacturers, retailers, tradesmen and large-scale consumers with the goal of ensuring concrete contributions from all the involved parties towards reducing food waste and losses.

The BMELV is engaged in dialogue with the retail sector with the aim of persuading more supermarkets / retailers to again stock agricultural products that have minor imperfections.

The BMELV appeals to consumers to not restrict themselves to buying only immaculate fruit/products. Fruit, vegetables and potatoes are natural produce, not standardised goods.

Germany is pressing the EU to abolish the remaining ten specific marketing standards that stipulate detailed requirements for ten different types of fruit and vegetable.

## 76. James Rohan, Australia

### 1.0 Executive Summary

The solitary purpose of this report is to begin a dialogue on considering quality systems thinking to improve food security in sustainable food systems. For people to be hungry at a time when we waste food demonstrates that opportunity.

System thinking offers insights in how to define, analyse, and consider solutions. Waste in a Food Security context is much broader than what ends in landfill. By considering food as an operation including raw materials, conversion, inventory and transport, analysis can be targeted with useful comparison to the quality paradigm. In terms of opportunity to improve, a majority of the waste is anticipated to be in first world. Third world though would also benefit in that the ideas are transferable.

Food security is defined by access, availability ,utilisation and reliability. Each criterion has specific waste impacts that must be addressed. Impacts due to soil degradation, water scarcity, arable land availability are seen as areas for system improvement and need a separate discussion. The vision of the report is to offer a framework to engage the public in saving food.

### 1.1 Introduction - food as a productive system

According to former Vice President Al Gore, we have sleepwalked into a problem of food and Climate Justice. Any discussion of Food Security must begin with an understanding of the current system with reasoning as to how our system performance and the cultural aspects might be improved. This report introduces concepts that offer problem and solution, through food as productive sustainable systems.

#### 1.1.a Process

In order to analyse process, it is necessary to consider uniformity, location and economics. Systems are designed to emphasise low cost, which also has driven supporting campaigns such as locavorism.

While process choice has predetermined capability, location is beginning to drive decision making with fossil fuel and other energy price rises. Waste will be predominantly opportunity cost evaluation. These conversion evaluations would consider equipment technology, process flow, layout and job design. It is possible to find examples of crop management which includes setup eg-

High Density Apple Orchard Management  
A Comprehensive Guide to Wheat Management  
Best Management Practices for Small Beef Cow- Calf Herds

Internet examples are easy to find and provide reference to standard management practices. Processes also extend to purchasing, cooking/preparation and consuming. Application of these models can be modified for local conditions or at least frame discussion.

#### 1.1.b Quality

In order to analyse quality, it is necessary to consider raw and semi finished materials in relation to standard. We may also analyse the system itself.

To improve performance, this report will begin a discourse on the workings of controlling normal variation, by looking at the concepts of product quality and process quality. Typically these reviews include a review of standards, training and inspections. Quality design is predetermined.

Quality conformance though is variable and measures availability, reliability and even 'in market' service.

Food waste can occur in each of the aspects of food security and therefore each must be explored from a theoretical viewpoint. While not discussed fully, agreement on the 'sustainable balanced diet' may highlight which components take priority in quality management.

#### 1.1.c Capacity

In order to analyse capacity, it is necessary to consider annual and monthly fluctuation. Reports such as The Economists Global Food security Index and FAO Food security indicators provide a reasonable basis for tracking capacity although are only likely to indicate significant shifts. It is unclear whether data would support analysis of underlying trends. Detailed reports are available at random intervals by country such as "A Report on the status of China's Food Security".

#### 1.1.d Inventory

In order to prevent waiting periods, stock is held to form a buffer. In agriculture, given the batch nature of delivery, while considerable effort is made to expand production periods, downtime does exist. The hunger season created an awareness of the need to store food. While great effort is made to preserve food, waste occurs due to the physical properties which affect availability, demand elasticity due to price while affect access, mix of food groups which affect utilisation.

##### 1.1.d.1 Physical Availability of Food

Food may be wasted due to batch nature of food production and shelf life.

Food may be wasted due to cultural and quality standards.

Food may be wasted due to distance from supplier.

Food may be wasted due to failing to produce(opportunity cost)

Food may be wasted due to new threats to yield.

#### 1.1.d.2 Economic and Physical Access to Food

Food may be wasted due to demand being tempered by price.

Food may be wasted due to distance from location.

#### 1.1.d.3 Food Utilisation

Food may be wasted due to imbalanced diet requirement

#### 1.1.d.4 Stability of the other three dimensions over time

Food may be wasted due to relationships between measures.

#### 1.1.d.1 Physical Availability of Food

There has been discussion recently which suggested we currently supply enough food. 30-50% of all food is wasted . But volume alone does not immediately indicate we produce sufficient amounts of food.

a) Food may be wasted due to batch nature of food production and shelf life.

Many food groups are seasonal. The hunger season aside, food is produced according to calendar and therefore even in a good year, the perishable nature of food may mean food is not available over the entire year.

Supply chain performance is assessed by on time delivery, quality as measured by customer loyalty and time to replenish. Economies of scale often call for economic order quantities which can impact performance.

Recommendation:

Quality systems requires data to analysis system capability and system performance.

Quantity of supply should be analysed by month or quarter rather than per annum. Even a small window of waiting may lead to distress. In order to do this, nutrient value of individual foods eg proteins, macro and micro nutrients, should be confirmed with nutrition guidelines and mapped against food groups. Individual raw material availability should then be mapped on a gantt chart, with substitute options noted.

Availability of food should be matched against the needs of people. The measure should indicate number of people/days that could be fed rather volumes alone to create context.

Food may be wasted due to cultural and quality standards.

As Tristram Stuart has campaigned, vegetables considered too ugly for shop-shelves is unnecessary food wastage. There are also other quality standards to consider. Expiration dates, portion sizes, lack of adequate storage or refrigeration also impact on perception. Customer attributes of quality include speed to market, quality and value.

“The right to have regular, permanent and unrestricted access, either directly or by means of financial purchases, to quantitatively and qualitatively adequate and sufficient food corresponding to the cultural traditions of the people to which the consumer belongs, and which ensure a physical and mental, individual and collective, fulfilling and dignified life free of fear.”

Food must be presented according to cultural tradition. It is therefore possible that some food may not meet this requirement. While groups exist like Second Bite(Australia), retrieving food not saleable does need consideration.

#### Recommendation

As well as non government organisations that work to feed the poor with excess, there needs to be NGO's that assist farmers to find markets, and create networks to make best use of production.

Food may be wasted due to distance from supplier.

Food transport needs to consider the perishable nature when planning distribution. Time is normally measured by cycle time but also includes rework. Traditionally, to ensure cost effectiveness and supply targets, economic order quantity is supported by inventory.

Inventory is managed using an ABC Inventory Management prioritisation schedule whereby highly perishable /highest economic value items are given highest priority. Despite this, reports suggest waste may be as high as 40%.Just in time approaches result in problems being brought to the surface.

While systems are designed to promote low cost in mature markets, these superior processes while durable, do not currently have flexibility . Overburden, inconsistency and dealing with waste itself leads to system failure. There are 7 wastes, unnecessary motion, waiting for work and materials, transportation, overproduction, processing, inventories including unnecessary work in progress quantity, and corrective operations.

#### Recommendation

A sustainable balanced diet consistent with the period quantity supply should be used to determined resource planning requirements. While this may indicate where the free market is failing to supply product, the true benefits are providing solutions to waste:

Unnecessary motion,

Output required by period by region can drive planting, harvest and transport planning. Inventory movement is a significant issue especially when purchased by consumer. Purchasing to dietary plan would allow food to be reallocated.

Also, innovation may support review of processes to remove unnecessary motion. TRIZ inventive principles may allow brainstorming to reduce waste. While an attempt is made here to demonstrate the principle, FAO should crowdsource ideas on each theme from industry and academia as an ongoing dialogue.

#### a)Segmentation

In some cases, products are processed before needed. Segmentation of components allows recovering of components should one ingredient fail.

The concept also may be applied to space in storage. In refrigeration, positioning in a fridge will keep milk cold, vegetables crisp by allowing cold airflow. Meats and fish are stored low to prevent contamination with foods below.

Eggs have a short shelf life so cooks buy separated egg whites which can be stored in freezers.

b)Extraction

It is advisable to remove components that are likely to fail if an alternative can be sourced. While typically a concept applying to cakes where cream is only applied prior to serving, it may have other potential examples.

c)Local Quality

Purpose built packaging to maintain quality. Sometimes in manufacturing, raising specifications can increase yield of finished production. For example, particle size and moisture content may impact of fines produced and discarded. Quality of wheat may predetermine whether bread will rise. While there will be other examples, quality tends to be reported with a silo view whereas performance of the whole system may produce a different understanding.

Sometimes though this concept recognises what works, like mushrooms in brown paper bags.

d)Asymmetry

This principle is recognising fault prior and reinforcing standards around the weak point. Wrapping individual fruit in protective packaging is an example. The principal is sometimes employed by travellers who wrap breakables in clothes to cushion impact.

We might also know that onions and potatoes cannot be stored together. Apples stored with potatoes prevent them from sprouting.

e) Combining

In World War One, the ANZAC biscuit which combines oats, butter, golden syrup, coconut, takes basic food stuffs and allows more efficient transport. On location, they could either be eaten as is, or with hot water to form a porridge. In dry form, they have a long shelf life.

Often culinary skills are used to combine ingredients which alone may not be a food choice, especially for children. Spinach for example, is combined with ricotta cheese in cannelloni, or with eggs and flour in hot cakes. Vegetables, meats and grains may be also cooked as soups or broths. Masking these foods means they are consumed. Some restaurants will use bread rolls as a bowl allowing the entire meal, plate and all to be consumed.

Sometimes government and media use packaging to promote campaigns consistent with the foods. Packaging also may double as drinking glasses allowing more robust designs. Recent examples of combining include Coca Cola Company including medicines in transport packages. Companies of this size have the expertise which can be leveraged.

f) Universality

This principle recognises that food can have many uses. Dried foods and preserved foods can be reconstituted into many forms. Recipe books with “goto meals” based around an ingredient display this principle.

Tomato pastes and sauces can be used as a base in multiple dishes. Lemon can be used as preserver, a cleaner, flavour enhancer and sauce.

#### g )Nesting

Waste may occur due to missing components to consume to cultural taste. By nesting, it ensures consumption. A simple example would be lettuce which includes dressing sachet.

We also may consider nesting to include fortifying vitamins and minerals considered necessary in a balanced diet or fluids in daily requirement.

#### h) Counterweight

The weight of an object may make consumption difficult. For example pouring, whether liquid or solid may spill. Design in packaging may prevent this. Either better pour feature or ability to control flow may offer solution. Better handles or ability to deconstruct may allow manual manipulation to suit.

Flour and sugar are normally stored in airtight container with a scoop to distribute.

The principle also may apply where foods are too spicy(by supplying foods that counter the heat such as yoghurts, sorbets, or breads).

#### i) Prior counter-action

Waste from spoilage may be prevented by sealing precooked in vacuum pack. Other examples might include storing in dark places(eg potatoes), storing in individual sachets, or processing to create more stable form as in a biscuit. Prebooking at restaurants or ordering of perishable foods also works on this principle. Breaking eggs into a cup to confirm quality prior to inclusion in recipe demonstrates the principle best. Hanging meats to put out of the reach of vermin is the historical example.

Cook books also have 'time to prepare' to ensure all foods in a meal can be delivered at the planned time. Meats ,fruits and vegetables are kept whole as long as possible to prevent spoilage.

Removing ethylene emitted by fruits and vegetables can keep them fresh up to 3x longer. Berries also may be soaked in a diluted(1 to10 water) vinegar solution before storage to prevent mould. Similarly, olive oil is may be used as a film over food stored in jars to reduce air contamination. Cheese might also be coated with butter on the cut side to prevent it from drying out. Also putting paper towel at the top of lettuce crispers absorbs moisture keeping the lettuce crisp.

#### j) Prior action

The ability to control waste can come from actions such as cutting before packaging eg cheese slices, or pasteurisation eg longlife milk. We may also buy to a meal plan, preheat ovens to ensure even cooking, or have portions already pre cut to dietary requirements.

Prior action ensures a level of productivity that delivers a more predictable quality. The prior action concept is how lean principles allow us to recognise problems immediately as each part of the process is planned.

k) Cushion in advance

Countermeasures to prevent spoilage have included packaging such as egg cartons, pre-chilling, foil to prevent light. In cooking, we use egg rings to hold in one place, and grease pans to allow food such as pastry to be easily served. The process of storage, cooking and serving has multiple points with waste risks. Over time, we have built in actions to cope with these issues. As we move into a modern world, these need to be rediscovered.

We also only store in clean environments and clean up spills as soon as possible.

l) Equipotentiality

This concept tries to change the working conditions so that an object need not be raised or lowered. A typical example in food is the provision of taps on oil drums or barrels. Pouring would risk injury or spilling contents.

Meals also may be cooked and served in packaging to prevent losses.

m) Inversion

Instead of taking produce to the people, take people to the produce. Food transported just in case someone will need it, risks becoming spoilt. Instead, if people travel to supplier, they can be picked and packed as needed. This happens in peri urban regions and lately has been a phenomenon of urban agriculture. Fruit left on trees, or berries left on bushes offers some favourable taste advantages to refrigeration.

n) Spheroidality

Typically an engineering concept to use balls to push across a surface, balls are also used in cans to mix before opening.

o) Dynamicity

Waste is often avoided through applying flexible parts. Examples include honey or sauce bottles with tops which double as a pourer, biscuits that double as scoops, tetra paks with straws.

Also sachets that allow squeezing to the last drop pick up on this principle. Packaging in a ready made meal world is yet to fully explore the idea, and the ability to mix and prepare without need for cleanout has clear advantage in water scarce environments.

p) Partial or overdone action

If it is difficult to obtain 100% of a desired effect, achieve somewhat more or less to greatly simplify the problem by preparing vacuum packed meals which just need reheating, shred or dice vegetables to ensure maximum usage, even meals delivered complete.

Preparing meals in batches allows more uniform cooking, and makes mealtime a quicker process. Storage may be for longer but quantity will be more uniform and with preparation waste removed.

Asparagus may be stored by cutting stems and placing in a jar of water and covering with a plastic bag.

q) Moving to a new dimension

To reduce waste, packaging contains multi-layered packets to keep food fresh. As food deteriorates on opening, portion size packets makes sense from a nutrition and wastage point of view.

Food may be dehydrated for storage with water added in cooking. We might also pulp to make into a soup or sauce. The new dimension should give us greater ability to yield output, taste, manufacturability and for this benefit we may incur costs. Food may be frozen and stored in plastic bottles. Shallots, spring onions and herbs are particularly suitable as is ginger.

r) Mechanical vibration

In order to remove air while preserving, tapping the lid brings air to the surface. Air increases the risk of spoilage. Popcorn machines also use air to gently vibrate heated corn. These methods do not require contact or additional oils or butter which may be scarce.

s) Periodic action

Similar to other discussions about batch processing, periodic action recognises greater quality control opportunity. Daily preparation may risk not having skilled labour, energy or even equipment. Greater amounts also may allow better control when using key ingredients like spices.

Taking temperature periodically may also give the process greater attention. We might also produce smaller amounts if likely to risk quality such as when preparing pastries, custards or delicacies. Also the saying one bad apple spoils the bunch is true so regular checking is vital.

t) Continuity of a useful action

Food cooked in pots that hold heat and can be used as serving bowls recognises the value of heat and storage. Also, using clear pyrex allows storage of leftovers with users about to see and therefore plan reuse.

u) Rushing through

Harmful or hazardous operations that can be performed at very high speed include heating using microwaves, chopping in a blender, par boiling to speed up roasting of vegetables.

v) Convert harm into benefit

Some waste is inevitable. Rather than sending this waste to landfill, food scraps can be converted into compost and creates food for plants. We might also place plates on warming trays to ensure food is served at the correct temperature

w) Feedback

Food systems have developed many feedback options. Whether it is colour, temperature, size weight, time etc, measurement of change shows progress to a standardised form.

x) Mediator

This principle uses an intermediary object to transfer or carry out an action so as a warming tray, an ice bucket, a blanching pot, or a cooling rack. To enable quality to be achieved without compromise, recipes often call for the provision of easy to remove items that offer uniform results.

y) Self-service

This principle works on a principle where the object service itself carries out supplementary and repair operations. AN example may be in cheeses where the outer layer forms a protective cover, moulds grow to cover the whole. While in nature repair comes from spreading seeds or forming sap, designing foods that would have corrective ph levels, or remove oxygen or ethylene gases or form solids to prevent consumption if not to appropriate temperature or quality should be explored.

z) Copying

Copying is often employed by the food industry. For example, cherries might be replaced with flavouring and pumpkin in confectionary. Standards also assume that by repeating agreed processes, quality will remain consistent over time. Our homes are filled with gadgets which replicate famous kitchens, and our fridges are stocked with generic shopping lists. Copying does reduce waste but at risk of reducing variety and other parameters like health.

aa) Inexpensive, short-lived object for expensive, durable one

Products have been designed to replace an expensive object by a collection of inexpensive ones, foregoing properties (e.g. longevity). Plastic wrap may be used to replace containers, or paper moulds may be used to replace tins. While a brown paper bag wrap over a bread to allow transportation and storage, for centuries we did without.

In a throwaway society, this has resulted in an unsustainable process and needs to be reconsidered.

ab) Replacement of a mechanical system

Our food system has become dependent on mechanical and technical aids. In some ways, the productivity gained has increased the volume produced. A blender for example can chop more than we can consume, a bamix can stir the biggest pot. While labour saving devices, they have also changed the way we think about food.

Our 5 senses can give greater control if given our full attention.

ac) Pneumatic or hydraulic construction

The example often cited for this principle is when shipping fragile products, air bubble envelopes or foam-like materials are used. Rather than applying solid support, vibration can be distorted and produce a better outcome.

ad) Flexible membranes or thin film

Covering food prevents contamination but also can extend shelf life. Storage ideas include hanging onions in panyhose, or sealing apples in a film of wax.

ae) Use of porous material

By adding porous elements to the cooking process, we can allow transfers to occur in the conversion process. Lids on cooking bowls and pots may be porous to allow slow transfer of steam. Lids on jars may be porous may allow gases to be released.

af) Changing the colour

Colour can be used to confirm changes. We might employ white backgrounds or translucency on glass to make things more visible . By changing surroundings, we gain greater control through visual feedback. While light can deteriorate a product, employing colours may change the light spectrum. Colour also may be employed to identify a batch or day of the week, or recipe employed.

ag) Homogeneity

The principle of homogeneity recognises that quality can be impacted if concepts employed in proximity do not have the same characteristics. Similarly to storing similar dairy items in a fridge, or breads in a hamper, as well as contamination, the interactions with other materials can be abrasive or degenerative.

By identifying common characteristics, we can adopt management of these properties over multiple items simultaneously.

ah) Rejecting and regenerating parts

In order to deliver consistent quality, we often discard the nonconforming parts. Crusts and crumbs are discarded, edges and non perfect parts removed. Instead, alternative uses may be found such as bread crumbs in stuffing, or leftovers in bubble and squeak. Reuse recipes need to be determined for each foodstuff to ensure maximum yield.

ai) Transformation of the physical and chemical states of an object

Some items like butter keep their state by keeping cold, and removing the cold allows them to be processed more effectively. Blending or pulverising may providing better consistency for cooking in vegetables and meats. Freezing also allows longer storage.

aj) Phase transformation

Oily herbs, onions and some meats are traditionally hung in a dark dry environment. Cheese and some foods also benefit from cellaring. Meat is also rested after cooking to allow meat to cook through and remain tender.

Some root vegetables also benefit from par boiling prior to roasting.

ak) Thermal expansion

Applying heat can expand materials. In pies, trapped air can raise pastry, so often a small incision is made. Cake and bread tins also expand allowing them to be released prior to cooling.

al) Use strong oxidizers

To obtain more heat from a torch used in caramel, oxygen is fed to the torch instead of atmospheric air . Principle works on applying appropriate standards which may differ from standard equipment.

am) Inert environment

Storing systems like Fowlers Vaccola, use a vacuum to control contamination and bacteria. Flavours are often transferred using this process such brandy in peaches and curries in stored meals. The process cooks and preserves the contents for a later date.

an) Composite materials

Replace a homogeneous material with a composite one although hard to find examples.

Recommendation:

Cultural practices that deliver yield and quality should be explored. Given food technology is available in universities and government bodies, a twitter account should be employed to maintain dialogue and capture current thinking and stories about waste.

Waiting for work and materials,

Resource Planning also delivers forecasts that drive timing other elements of Gantt charts allow redeployment or expedition of resources. Each inventory point creates opportunity for rejection reducing later workflow so this needs care.

Recommendation:

Process flow diagrams and Gantt charts need to be compared globally to determine the similarity and difference between cultures.

Transportation,

Quantity forecasts may help ensure that transport is applied considering the greatest efficiency. Reallocations allow greater appreciation of potential glut and allow consideration for other markets. In theory feasible, but in reality, small quantities and barriers to entry into markets are likely issues.

Recommendation:

Creation of skunkworks with stakeholders and specialists that regularly discusses performance by industry would allow exploration of common cause variations and options to control/maintain and improve systems.

Overproduction,

The Quantity overproduced has a bill of materials that leads to additional costs as well as opportunity cost to deploy to other activity. Excess dumping can have the twofold effect of processing, inventories including unnecessary work in progress quantity, and corrective operations including quality control on stored items.

Each system needs quality analysis This should include process flow diagrams These charts contain raw materials, product output, job design, processing steps, management control, equipment and suppliers. Process capability is assessed to determine probability of meeting specification with existing methods. Cause and effect diagrams and pareto(Ishakawa) allows prioritisation of opportunity against importance to overall performance. Control Charts are used to confirm quality is performing to acceptable limits.

Food may be wasted due to failing to produce (opportunity cost)

Opportunity cost typically involves comparison of mutually exclusive alternatives. System improvement may benefit from Cost of Quality analysis.

Recommendation

Prevention, appraisal, internal failure(scrap, rework,downgrades,retesting and downtime), and External failure(warranty, replacement,complaints,allowances,concessions) costs should be matched against benefits to confirm opportunity for improvement in economic terms.

Food may be wasted due to new threats to yield.

Food is increasingly being subjected to climate change, pathogens, virus, and all variety of pests and diseases. Whether it is Colony Collapse Disorder in bee colonies, or wheat rust, or other, existing issues continue to challenge production. Climate impacts such as ground level ozone, increasing temperature ,CO2 levels in the atmosphere and declining precipitation also are expected to impact on yields.

Food produced under changed climatic conditions will result in altered use of pesticides, fertilizers and irrigation water, and may lead to new crop and livestock species and altered means of production. There may be increases in food prices that will lead to the consumption of food with lower nutritional quality.

Recommendation:

As well as skunkworks, bodies should also seek to explore new challenges and assess priority and importance when allocating resources.

1.1.d.2 Economic and Physical Access to Food

Food may be wasted due to demand being tempered by price.

While food may be available, there is recognition that poverty can prevent access as either it is costly to get to shops/markets, or the food price means people cannot purchase. Food not purchased deteriorates thus becoming waste. While often markets discount to move stock, cost of living can have a significant influence.

Recommendation:

League tables comparisons for food budget compared to the poverty line should be constructed by region. Waste should be compared to see whether trends are correlated.

Food may be wasted due to distance from location.

As some food can only be grown in certain climates and our diets have expanded to include variety, food travels over long distances. Location is beginning to drive decision making with fossil fuel and other energy price rises but has always been a consideration due to waste. In Lean terms, each stage offers potential for waste, and although processes improve over time, it is unlikely to be consistent in all regions.

Recommendation

Research into benchmarking and best practice should be compared with process capability and normal variation to assess potential for improvement.

#### 1.1.d.3 Food Utilisation

Food may be wasted due to sustainably imbalanced diet requirement. While the food pyramid and Barillas Double Pyramid seek to offer insight into the choices, there is not an efficient matching of supply and demand. While we have substitutes, there is not a clear understanding of our requirements and this is likely to lead to poor choices. We are going to have to consider alternative plans.

Currently supermarkets are the defacto managers although their purpose is profit so waste may not be at the forefront. Examples include Australian growers producing quantities of fruit only for the market price making them not viable. Decisions should be made based on supply yet can become overwhelmed by cost. Currency movement should not be deciding the sustainable balanced diet when the natural world is becoming increasingly under pressure.

Recommendation

Regions should produce standard meal plans and communicate to suppliers so that a more coordinated dialogue can occur.

#### 1.1.d.4 Stability of the other three dimensions over time

Food may be wasted due to relationships between measures. Availability, access, and utilisation concepts must also consider reliability of the system to perform. Fear of famine is destructive with reports such as MIT suggesting food is leading to rioting.

Reliability must consider a holistic approach including economics, social and environment. Economics can include impacts of foreign exchange, access to finance and other broader aspects which are difficult to mitigate in the long term. While variable, farms are forced to consider pulling out existing infrastructure and agricultural assets. Our history includes episodes of farming lead protests leading to blocking of supply.

The removal of an abattoir on King Island challenged the viability of the brand as well as impacted on the quality of the product. While efforts are being made to reinstate facilities, time lost can put financial strain on farmers, as well as create supply measures in the short term. In regions with irrigation, declining water supply would have the same effect. Loss of feedstock even for a short term leads to changes. Soul Food farm in San Francisco was a leading supplier of free range eggs. Droughts leading to price spikes in stock feed forced them to cull and change to non food production permanently.

#### Conclusion

Brainstorming and quality systems thinking offer an opportunity to continuously improve our processes. Cultures that have had famine in their history tend to have included practices that ensure food yields as much as possible. In some cases, after generations of abundance, these concepts become lost. There are many opportunities in business and in our homes to adapt to best practice or develop improvements to reduce waste.

Waste at a time when people are hungry is unethical, especially when it would seem cost effective options are available to rectify the problems. I hope the current dialogue is only the beginning of food technology discussions and is complemented by nutrition and sustainable balanced diets.

System thinking is consistent with improvement in productivity as well as respect for the natural world. By considering food as a process rather than a resource, we can ensure quality is repeatable and build feedback and education into our society.

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## 77. Lisa Kitinoja, The Postharvest Education Foundation, United States of America

Dear moderators,

I have been following this online discussion (Food losses and waste in the context of sustainable food systems ) during the past few months, and it is good to see input and ideas coming in from many countries and types of organizations.

A few years ago I led a postharvest food losses study for the Gates Foundation, and we took a look back at 12 "agricultural development projects" funded by the World Bank, USAID , USDA, JICA, etc. to see what had worked or did not work in terms of helping smallholders in developing countries to reduce food losses. More than 45 scientists from a dozen countries participated in 2 years of field research including face to face interviews of past project beneficiaries and managers in 6 countries (Egypt, Kenya, Ghana, Indonesia, India and Rwanda).

The report summary can be found online here:

BMGF      Appropriate      Postharvest      Technologies      project      (WFLO      2009-10)  
<http://ucce.ucdavis.edu/files/datastore/234-1848.pdf>      (slide      deck)  
<http://ucce.ucdavis.edu/files/datastore/234-1847.pdf> (full report)

The key recommendations are as follow:

### Building on Lessons Learned

Future projects should incorporate the major lessons learned from the 12 projects that were revisited by our WFLO/UC Davis postharvest teams, and the results of our 30 commodity systems assessments and 24 postharvest losses and quality assessments.

#### 1) Focus on the Beneficiaries

Many of our assessments pointed to the need to advocate agri-business skills, attitudes and aspirations.

- Treat farmers as agri-business people rather than just as farmers. Rural youth are especially interested in developing business and entrepreneurial skills.
- Ask smallholder farmers to consider issues beyond their farm plots – address the entire value chain, take more responsibilities in return for additional opportunities for profit making

- Deliver targeted training or agricultural extension services that help improve the quality of produce, postharvest handling and marketing linkages.
- Provide training in local languages, incorporate audio-visual training aids
- Aim to be not only more productive but more profitable.

Many of the most successful past projects assisted farmers to become active marketers, rather than passively waiting for a trader to arrive at their farm gate and offer a price. When farmers were willing to take on more responsibility for their crops and become direct marketers, by learning how to grade, pack, handle and sell their produce directly to the retailer, they also gained more of the financial rewards.

## 2) Work through Groups

Whether via informal groups, co-operatives or formal associations, it is vital to work with groups to impact policy and reach large numbers of people.

Groups are the key to:

- Improving communication in order to strengthen marketing capacity and market linkages
- Assessing local needs, facilitating targeted training, introducing new crops and technologies
- Managing contracts and sales beyond capacity of individuals.
- Gathering and incorporating farmer feedback to assist in measuring the effectiveness of interventions
- Building privatization efforts (moving from project provided services to community provided services)
- Development of financing opportunities (micro-credit, creative schemes)
- Designing appropriate, cost effective innovation delivery systems (providing people with the information and skills they need, when and where and in a way they can best understand and use it).

The CSA process we used to gather information on commodity systems during this planning project can be inexpensively and effectively applied to reassess the progress of farmer groups as they try out and adopt or reject new postharvest technologies.

Recent grants from the Bill & Melinda Gates Foundation for micro-finance (\$38m) will allow 18 institutions to expand their portfolios, and reach more smallholder farmers.

## 3) Women's issues remain important

Access of women to credit, training and extension services remain lower than that of men. Ideas for improvements include:

- Increasing the number and percentage of women hired and trained as extension workers
- Holding training programs and extension meetings close to the homes of women so they can attend more easily
- Holding meetings/trainings in the afternoon since women have a lot of household and farm work to take care of in the mornings
- Offering trainings via video, posters, discussions, role playing, etc (to increase accessibility and relevance for those who are non-literate).

Many of these issues were recently highlighted by a report from the World Food Programme (2009).

4) Postharvest best practices should be incorporated early on in projects.

Identifying appropriate interventions is the first step key, since barriers affecting adoption of postharvest interventions include complexity, availability and perceived costs versus benefits. Having a year round supply of vegetables could improve the nutritional status of rural families, and especially for young children and their mothers.

The World Bank estimates that 20–25% of the global disease burden for children is due to under-nutrition (World Bank, 1993). Postharvest technology is an important part of achieving food security. According to the UN, Food security is typically subdivided into three components: (i) availability, or the existence of an adequate and stable supply of food; (ii) access, or the ability to obtain (physically or economically) appropriate and nutritious food; and (iii) utilization, or the ability to consume and benefit from nutritious foods (UN, 1996).

Postharvest best practices include:

- Clean and efficient sorting, grading, packing, cooling, storage
- These topics should be addressed via agricultural extension and related to infrastructure development and technology improvements
- Past project assessments revealed that most of the postharvest activities implemented in the assessed projects were too few and too late.

Work is on-going by our economic team members to develop an "expert system" for decision making regarding when to use which postharvest technology for what crops. Key decision making inputs include how the technology can affect postharvest losses, shelf life and market value for a specific crop, and what the technology will cost in a specific location.

5) Invest wisely in postharvest infrastructure

- Make investments early in the project (on the farms, at packinghouses, for transport or storage, as well as in the markets).
- Develop the infrastructure to enhance their agri-business (consider location, access, costs, etc).
- Match the facilities (cost, size, scope) to local needs and management capabilities.
- Develop and enhance horticultural value chains by improving communication
- Deliver training to ensure that infrastructure is utilized and maintained properly.
- Build in sustainability by using rational business models for providing businesses services (fee for service)

Training in postharvest horticulture increases readiness and willingness to make changes, but if postharvest infrastructure and marketing support is not there for participants, the results of training can be frustration. Similarly, providing infrastructure without training can be a disaster waiting to happen— successful postharvest management requires complex knowledge and skills.

Improving communication regarding pertinent information (i.e. expected weather changes, availability and prices of postharvest supplies, consumer demands, changes in the needs of traders

and market prices) will require outreach efforts via accessible methods such as local radio, inexpensive mobile phones, internet kiosks or via visual means (for example daily updated whiteboards posting market prices).

#### 6) Build local capacity (strengthen institutions, human resources, community services)

Training should leave behind a cadre of local trainers and support service businesses to continue the work that is started by a development project. Capacity building includes:

- Postharvest technical and educational program development, especially targeting women and rural youths
- combining lab research with adaptive on-farm or market based fieldwork
- training of master trainers
- network creation (helping members of the value chain meet and get to know each other)
- resource identification and strengthening of support services (local postharvest suppliers, repair services, engineers, credit)
- Building functional local capacity seems to have a strong relationship to sustainability
- Designing appropriate innovation delivery systems depends upon first developing this local capacity.

We recommend that future projects include Commodity Systems Assessment (CSA) as a methodology for training extension workers— the CSA process requires them to work as a team, learn by doing, study all the details on the local commodity system, meet key players, decision makers, producers, postharvest handlers, processors, marketers, and understand the value chain from field to fork. The original CSAM manual is available online from the UN FAO inPHo website (LaGra, 1990).

Several of our consultants recommended that future projects include the methodology for mapping and influencing dynamic agrifood markets (includes Value Chain Mapping) as one of the first steps of any new development project. The manual is available online from [www.regoverningmarkets.org](http://www.regoverningmarkets.org) <<http://www.regoverningmarkets.org/>> (Vermeulen et al, 2008).

Hall and Devereau (2000), when studying low cost storage for sweet potatoes in Uganda, found that a combination of lab research centered at modern institutions and a adaptive research fieldwork based approach could be used to improve results and speed the technology validation process.

#### 7) Projects should have a longer term focus

- A longer project cycle (7 to 10 years) would increase the likelihood of sustainable results.
- Projects that follow up on evaluation based recommendations (such as those provided in this report) can achieve good results.
- Horticultural development project plans should be flexible enough to allow for adjustments during implementation

#### 8) Promote an Integrated Postharvest Management System

Our final recommendation is to promote an integrated postharvest management system beginning with "training of master postharvest trainers".

One of the unplanned side effects of this planning project has been to raise the expectation of potential target groups, since once they learned a little bit about how postharvest technology can help improve their livelihoods they actively have been seeking more information and requesting future training. Direct requests have already been made for:

- Training in the establishment of cool chain management for horticultural crops (Rwanda, India).
- Installation of cool chambers and training of farmers (Rwanda, Ghana).
- Training on simple village level food processing methods (India, Nepal, Benin)
- Training of postharvest trainers (Nigeria, Ghana, Senegal, Cameroon, Kenya, Zimbabwe, India, Rwanda, Sri Lanka, Bangladesh)

The following steps would be required:

- Smallholder farmers could then be locally trained to begin with improving quality on the farm (using maturity indices, gentle handling, pre-sorting, protective packages, and shade)
- Training of master trainers in each target country – includes training in technical knowledge in horticulture, appropriate postharvest technology, business development skills, cost/benefit analyses, improved teaching/training practices. Master trainers serve to leverage any future training efforts by having a multiplier effect.
- Farmers could be encouraged to learn about direct marketing and the many new responsibilities it entails
- Postharvest tools and supplies should be made available for sale at rural postharvest shops (make it easier for farmers to try any new technology)
- Smallholder farmers could be trained to develop decision making skills for utilizing when appropriate, some form of cooling, storage or processing in order to further enhance the market value of their horticultural crops.
- Micro-credit or rent-to own models should be integrated into any outreach efforts.

Initially, the focus of any new development project should be to provide basic information and demonstrations of these simple practices that can reduce postharvest losses. The longer term goal should be to promote the use of cooling and cool or cold storage and transport practices that can protect the investment of the farmers and can further reduce losses. Globally, investments in the cold chain often have been shown to repay themselves in a short period of time (Kitinoja, 2008)—hence the existence of an enormous number of companies around the world that offer services in cooling, cold storage and transport for a fee that is willingly paid by the owner of the produce— and this reduction in waste theoretically allows for three positive outcomes. The grower can receive more for their crops, while the middlemen or marketers lose less during handling and transport, and the consumer gets a better quality product at the same or lower price. By making an investment in appropriate scale postharvest technologies we can therefore achieve a win/win/win situation, where everyone involved in the value chain will benefit. The cool chain simply protects the food supply as it moves along the value chain—so we can end up with more food, of better quality, safer and more nutritious to eat, and at a lower price because we have reduced the level of waste.

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## 78. Switzerland

Swiss Comments on the HLPE study “Food losses and waste in the context of sustainable food systems”

- We commend the HLPE for the clear outline of this study, which needs to bring added value to existing scientific literature and policy recommendations on these complex and relevant topics, as for other HLPE reports.
- We recommend to give additional attention to the critical issue of “knowledge” in its various dimensions (knowledge generation / knowledge sharing / capitalization, etc.) in the recommendations : knowledge is a critical and necessary condition to technology adoption and to behavioral changes which are simultaneously required for addressing food losses and waste in the context of sustainable food systems.
- In our opinion, the report should focus on producing recommendations that benefit in priority to food insecure populations. Therefore, we invite the HLPE to look in more depth into food losses in staple food crops rather than in cold chains for vegetables and flowers in developing countries.
- It would be advisable to have an universally valid definition as well as a uniform approach to measure food losses and waste : we would therefore appreciate that the HLPE considers making a recommendation on both the definition and the way to measure food losses and waste.
- We would also welcome an explicit research focus on the gender dimension of food losses and waste to improve food and nutrition security in the context of sustainable food systems: men and women are differently impacted by food losses and waste, which they face with differentiated capacities, assets and support (public policies).

## 79. Federica Marra, Leiden University, Netherlands

Dear HLPE Steering Committee, Project Team and all,

It is a pleasure to be able to participate to the discussion with my contribution, which I hope can be of help.

I am currently in the process of writing my Masters dissertation on how food waste has been addressed in Japan, that, although is not among the countries on which international attention has been conventionally drawn upon, could offer some useful insights as far as context-related analyses are concerned.

Food waste in Japan is entering the public scenario only in the last few years, but this is happening in a context in which it gained specific legal attention with the Food Recycling Law in 2001 within a general discourse on garbage. That law, among the successful results of environmental policies, allowed the food industry to shift from 45% of commercial and industrial food waste recycled in 2002 to 82% in 2010 (with a prevalent conversion into feed for animals). Apart from the environmental

footprint, one of the underlying concerns for its enactment was Japan's food security, given that the nation's self sufficiency rate has long been the lowest among industrialized countries (less than 40% on a calorie basis). This shed light on its high dependence on imports and future fluctuations of the global food availability and prices. Therefore, better resource efficiency (with a sharp progress in technology for recycling) and food availability (concerns about the nation's future supplies) were the environmental and economic dimensions that shaped Japan's first approach to the problem, with an initial enlarged perspective to food-related waste that gained relevant commitment of the academia and the institutions.

Except for the food banking activity (essentially starting in 2000), the national questioning to the intrinsic structure of the food line started in 2012, with a collaboration between the food industry and the ministries discussing common commercial practices that most easily result in food waste in terms of returned or early discarded food (e.g. the "1/3 rule", mandating the delivery of a food product to the retailer to be made within the first one third of its shelf life, and the sales period to be limited to the first two-thirds of the shelf-life; arbitrary best-before dates that in some cases are shorter than abroad). These practices, not regulated by any law, emerged as a result of marketing strategies aiming at being "the most effective" for the Japanese consumer.

What indeed seems to be one of the most important and complicated issues to address currently, which had not been reflected in what we could refer to as the economical modernization of the country up to now, is the national consumer culture. This is regarded as one of the most attached to high food quality and standards, drawing high attention to freshness, appearance, labelling and to food nutritional value. It results in a general low-self-responsibility attitude and a high propensity to avoid risk. Although consumer behaviour has been included in national food and nutritional education and domestic sciences, reference to food waste have not been directly included in the nation's practical political agenda until last year (despite some local governments' individual initiatives). Moreover, there is very little study connection between waste-related food consumption (i.e. waste composition, reasons for disposing) and a diachronic analysis of consumer behaviour, which could shed light on how and why waste-related patterns developed through time. This could be of relevance in that the current disposition to food fads and scandal-driven panic-oriented behaviour could be traced back to a logical out-growth of historical concerns. These have been connecting traditional cultural values placed to eating and health to the shift of the focus from food security (scarcity after the war), to taste (Gourmet Boom of the 80s), to safety (food scandals), to function (food faddism). High-quality demands by consumers, that are indirectly shaping the entire system at present, could also have been induced in turn by the same construction of it over time, since the concept of freshness had a complete different connotation before the appearance of supermarkets.

Non-sustainable consumption and production patterns regarding food waste (economic constraints and social consequences) should be therefore analyzed together and from a diachronic point of view. Their interactions in time could serve to achieve an integrated insight on the vectors of food waste fighting that are likely to occur in a specific national context, as well as on specific and culture-bound interconnections between social and political actors.

## 80. Adèle Irénée Grembo, France

Mon intervention s'oriente vers les pertes au cours du transport et du stockage en République Centrafricaine.

### Transport des produits agricoles:

Les pertes post-récoltes sont accrues lors du transport. En République Centrafricaine (RCA), il existe un important flux des produits agricoles des zones de production en milieu rural vers les centres de consommation dans les grands centres urbains. Mais le circuit de commercialisation est affecté par de multiples problèmes parmi lesquels, on note un faible développement des moyens de transport causé par la dégradation des routes et pistes rurales. Le réseau routier de la RCA est estimé à 25600 km, dont 15000km de pistes rurales et environ 10000km de routes nationales et régionales. La RCA dispose d'un espace rural enclavé avec plus de 90% du réseau routier rural en mauvais état ou impraticable et seulement 700 km des routes sont bitumés. Les moyens de transport des produits sont inadéquats. Ce qui limite l'accès à des produits locaux frais sur les marchés. Les camions transportent à la fois des passagers et des produits agricoles frais et secs. A destination, la plupart de ces produits sont hors d'usage. Surtout les produits périssables tels que les fruits et légumes. Ces pertes diminuent la marge bénéficiaire des acteurs et les qualités hygiénique et nutritionnelle des produits.

### Modes de stockage des produits

Les structures de stockage sont traditionnelles et construites en matériaux végétaux, rudimentaires. La performance de ces structures est limitée avec une faible capacité à protéger les produits contre l'humidité, les insectes et les microorganismes. Les structures sont adaptées qu'à une production de subsistance pour une campagne agricole.

### Solutions

-Développement du réseau routier (bitumage de toutes les routes nationales et secondaires, entretien des pistes rurales)

- -Amélioration des moyens de transport
- -Promotion de l'artisanat agroalimentaire

Adèle Irénée GREMBOMBO

Consultante en Nutrition

### 81. Rahul Goswami, National Agriculture Innovation Project, India

Dear HLPE and FSN Forum,

In considering the matter of food losses and food waste, the request by the CFS seeks a broad understanding of the issues that contribute to loss and waste. This understanding may be gained by applying the sustainability perspective with its three dimensions. It is also useful to apply perspectives that are held outside the sphere of the FAO and allied inter-governmental and multi-lateral agencies. These perspectives do much to link this topic with cultural approaches to food and cultivation, with the relevance of natural justice, or with the many limitations of current economic models when faced with the need for equity.

The guidance note has said: "Their global reduction [of food losses and food waste] is now presented as essential to improve food security (HLPE 2011, FAO 2012ab) and to reduce the environmental footprint of food systems (HLPE 2012, FAO 2012ab, UNEP 2012ab)." References have been made to the Rio+20 Conference and the Zero Hunger Challenge.

1. Connecting food insecurity (and hunger and malnutrition) directly with food losses and food waste is an area of policy that is woefully scarce of study and evidence. In part, this is because the accepted definitions of food losses (post-harvest and en route market aggregators) and food waste (within the retailing and processing cycles, in households and wherever food is prepared and sold) are seen as lacking essentially technological and institutional inputs that can bring in 'efficiency' and help change consumer behaviour.

The guidance note has also said that "food losses and waste can be first seen as a reduction of food availability for the poor and hungry" and that "by reducing the amount of food available, they [losses and waste] also have an impact on prices and thus on access to food". This is not as pervasive as is being made out. In most countries - and now the usual distinctions of 'developed' and 'developing' ought to be discarded, because the rate of adoption of 'food chains' and retail organising is so high - food losses occur because of the institutionalised pattern of food flow, from producing districts and counties to cities and urbanising regions that demand primary food crops. Rodale showed in 1981 that the average distance food travels from farm to consumer's home is 2,080 kilometres. The HLPE and CFS would do us a considerable service by, for example, mobilising in a collaborative manner the Food Security Network to seek and provide evidence of lower (negligible or recyclable) food losses in societies where the infrastructure-retail connection is weak or absent, and indeed for all those who continue to pursue fieldwork, such communities abound, and their food economics (and ecological grounding) is quite different. By the same token, food waste is to be found - and there is much new evidence on the subject - rising where urbanisation is increasing and where the agricultural models of the 1970s have, with technical booster shots, with monetary inducements linked to opportunistic policy, mutated into the 'chain'-based food and processed food delivery systems of this decade and the last one.

2. There is in the guidance note a concern raised about the energy required to grow food (as also to move it and transform it) and of that energy being lost because of food waste and loss. Hence, "reducing food losses and waste would also reduce the pressure on natural resources" said the guidance note and invokes "better resource efficiency".

This is indeed an exceptionally important point. Energy has become fundamental to the modern system of cultivation, collection, movement, processing, packaging, retail, distribution, sale and disposal. There are in general different levels of energy intensity to be found in meats (livestock, fish and poultry) as compared with cereals on the one hand and vegetables and fruit on the other. Noble announcements and promises notwithstanding (these are made by UN member states at the usual round of large gatherings every year, they are made during the G8 and G20 meetings, during the multitude of economic summits such as the World Economic Forum), neither the food industry nor governments (central or provincial) is in practice recognising (let alone curbing) the energy intensity of the modern food system.

If we look at some evidence from the USA (no doubt similar studies exist in the EU) between 1992 and 2002 the total energy use grew by 3.3% and food-related energy use by 22.4% (studied by Canning and others, 2010). Indeed, the US Department of Agriculture's (USDA) Economic Research

Service analysis of food system energy use indicated that while total per capita energy consumption fell by about 1% between 2002 and 2007, food-related per capita energy use grew nearly 8%.

Now counterpose this startling food-energy overshoot with the following complaint: "In industrialised regions, almost half of the total food squandered, around 300 million tonnes annually, occurs because producers, retailers and consumers discard food that is still fit for consumption. This is more than the total net food production of Sub-Saharan Africa, and would be sufficient to feed the estimated 870 million people hungry in the world." The complainant was the Director-General of FAO, when the FAO together with the UN Environment Programme (UNEP) began a campaign to encourage simple actions by consumers and food retailers to cut the 1.3 billion tonnes of food lost or wasted every year.

The imperative couldn't be more clear, but the energy (and therefore resource use, and the attendant methods used to extract those resources, from forests and rangelands, from the Arctic to under coral reefs) quotient of industrialised food is touched upon even more infrequently in what we today call 'emerging' and 'transition' 'economies' (emerging from what, to where, transitioning out of what, and why 'economies' when 'countries' or 'nations' served us perfectly well, such is the insidious nature of the market vocabulary). The race to commodify primary crop and food produce in South, East and South-East Asia has made it very difficult to assess the energy sunk into the industrial-commercial food systems these countries have adopted (P R China, India, Indonesia, South Korea, Malaysia, Thailand), a difficulty that is usually accompanied by the inappropriateness of questioning such costs in the face of hunger, malnutrition and food insecurity in a number of these countries. But we ought not to attempt outrunning energy limits to be respected - if FAO has showed (a 2012 report) that in the 'developed world' the consumption stage of the food chain is the least energy-efficient of all, we need also to recognise that the food systems that enabled such profligacy have been eagerly built (and are multiplying) in Asia.

If the 2010 study referred to above showed that food processing and consumption together accounted for about 60% of total 2002 food-related energy flows in the USA, a rise of 5% from 1997, then energy poverty (an awkward term, as it usually refers to grid power, and which tends to ignore energy thrift and ingenuity that can allow communities to live full lives with little or no dependence on fossil fuels) must be a backdrop. According to the International Energy Agency, about 1.4 billion people lack access to electricity (of the measureable, distributable kind) and about 2.7 billion people rely on biomass (as did their ancestors through the ages) for cooking and for light. Cooking energy can represent a significant part of the income of poor families. If in South Africa, the average low-income home spends 25% of its income on energy (compared with 2% for wealthier homes) then in South Asia such energy may reserve an equal proportion of income; after 60% of the total income is spent on food, that expense, together with the cost of buying firewood, coal or kerosene for cooking, leaves precious little for medical expenses, for education, topping up a mobile phone account, being able to buy one fruit a week.

3. The costs of that packet of pasta, that tetrapak (the 'xerox' of food packaging) of juice, that sachet of condiments, that plastic cup of ready-to-eat noodles. "Food waste at the consumer level in developed and in some developing countries is also emblematic of non-sustainable consumption patterns," said the guidance note which has added, "reducing food waste appears as a way to raise awareness more generally on sustainable consumption as a driver of sustainable food systems". Not I think in the face of a macro-economics that incentivises reckless practices from cultivation, to movement, to processing and packaging, to shaping consumer behaviour using advertising and aspiration - an alarming waste is built into such an approach, because the way in which national

accounts are calculated, costs of such waste to environment and living habitats and to communities are externalised, anonymised.

And so we have in 2013 two generations (the younger one begins at an age of less than ten) of food consumers who have little or no community memory passed to them about food scarcity, or about famine. Whether in Mumbai, India or in Los Angeles, USA or in Sao Paulo, Brazil they have grown used to demanding and expecting the fulfilment of certain tastes (alien to their local cultures only 50 years ago) at whim, for these are accessible through a multitude of 'food service' outlets (which contribute to the global homogenisation of tastes and trends). Such behaviours are encouraged, and are the bitter glue that binds our concern about food losses and food waste, and these came to be global early, when for example canning became common, or when the rice cooker became an object of desire in middle class homes (how much resource inefficiency was represented by that device, a mixture of 'cheap' electronics, the supply of electricity, timed 'convenience', and at the end of it rice in ten minutes that required industrial processing which removed all the nutrients from the grain), or the takeaway styrofoam cup of coffee, a trend-status liquid that retails for about USD 3 for an average blend, a price that, measure for measure, is about 80 times what the smallholder farmer of arabica earns.

If we have a CFS that is wise about food systems - that they "encompass the ecosystem and all activities that relate to the production, processing, distribution, preparation and consumption of food" - then we can ask also for a CFS that recognises the extra-industrial world (see FAO's profoundly inspirational [Globally Important Agricultural Heritage Systems \(GIAHS\)](#)) in which such 'losses' and 'waste' are concerns rendered much smaller because food continues to be treated as the basis of human life, with respect, with spirituality.

Yours sincerely, Rahul Goswami

## 82. Australia

Australian Contribution to the High Level Panel of Experts for Food Security and Nutrition (HLPE) scoping note on the role of Food losses and waste in the context of sustainable food systems

### General Comments

Australia supports the proposed scope of the HLPE report on food losses and waste in the context of sustainable food systems. We consider food loss and wastage as a key issue affecting long term global food security.

As the issue of food losses and waste is being explored in a range of multilateral fora, we recommend the HLPE consider all activities in this space to ensure there is no duplication of effort. For example, Chinese Taipei is leading a significant 3 year project in the Asia Pacific Economic Cooperation (APEC) on addressing food losses. It is important to look at both activities (CFS/HLPE and APEC) together and to assess how the APEC project can benefit from the CFS (and other) work already done internationally on food waste. We recommend a similar process be undertaken for other food loss and waste projects. This will ensure the HLPE report adds maximum value and has concrete outcomes.

We support the report examining ways to address over nutrition and food being diverted for non-food uses. We also recommend that the report disaggregates results from the perspective of developed, developing and BRIC countries. The report should identify realistic goals in the short to medium term that mitigate against food security risks. For example, zero loss and waste is a laudable goal but unlikely to be achieved on anything less than a generational timescale. It will be important for the HLPE report to identify achievable short to medium term outcomes.

Australia considers that a very important part of the global response will be the incentives in the market and put forward by individual governments that contribute to food loss and wastage, including trade protections and bio-fuel policies. Australia is seeking improved global food security by supporting a rules-based multilateral trading system and open markets, supported by appropriate economic and trade policies and good governance practices at global, regional and national levels. Food loss and waste can be addressed by reducing the use of agricultural subsidies so that resulting overproduction does not discourage production in developing countries. Removing import and export trade barriers so that food can move more freely to where it is needed most will also assist in addressing food loss and waste. We suggest the report examines the positive role open trade can have in this space.

#### Concluding Comments

The Australian Government thanks the HLPE for developing a scoping note for their report on food losses and waste in the context of sustainable food systems. Australia is happy to engage with the HLPE to provide comment on future documents and draft reports.

### 83. Ulrika Franke, Swedish Board of Agriculture, Sweden

The Swedish Board of Agriculture has worked on a food waste project and found that definition of food waste and food loss is of high importance. In order to be able to compare figures between countries and over years, we need to use the same definitions. There is an ongoing project in the EU, called FUSIONS, working with this matter. The Nordic Council of Ministers are currently initiating a Nordic project and one issue is to work on definitions alongside with FUSIONS.

We have also found that we need more data on food waste and food loss from all parts of the food chain. Swedish Ministry for Rural Affairs is initiating a national project where one issue is data collection where data is currently missing.

In both the Nordic and the national project, we also want to investigate what policies and standards give us unnecessary food waste. We also want to see if there are any differences between the Nordic countries in terms of interpretation etc.

We have also identified a need to connect food waste to other food issues, such as food safety, health but also to food "experience". In other words to work both on enjoying food and taking care of food, alongside with safety and health aspects.

### 84. Betty Bugusu, USA

It's my pleasure to contribute to this e-consultation.

I agree with the previous contributors that there is a great need to define and differentiate waste (prevalent in industrialized nations) from loss (prevalent in developing countries) in order to design the right interventions to address each one of them. In my opinion, the issue of waste can be addressed fairly readily through education programs.

My comments are focused on addressing food losses as they have a great impact in areas of highest food insecurity. Much of the loss in these areas is caused by the following:

1. Lack of markets and limited access to markets. Lack of markets is the biggest hindrance; characterized by lack of demand in the areas of production (rural) and lack of value –added products for areas of demand (urban). Since many of the local crops are consumed locally on the farm, they have had minimum to no penetration into markets. Furthermore, the highly perishable crops such as roots and tubers, fruits and vegetables always require immediate processing to enhance shelf-life. The problem is exacerbated by limited access to markets due to poor infrastructure and lack of distribution channels for their raw commodities
2. Limited access to improved post-harvest technologies. Majority of the local farmers and processors often have no access to improved and end up with poor quality products that do not meet the market standards
3. Limited linkage to the private sector for sustainability of the whole supply chain system. Not much effort has been put into development of high-quality, value-added products (food and non-food) that are attractive to entrepreneurs.

The conglomeration of these issues results in high losses after harvest and low motivation for farmers to produce more.

My recommendations:

The current focus on increasing agricultural productivity is not enough to improve food security, especially as it is already constrained by diminishing natural resources (land, water, and energy) and climate change. Investment in downstream post-harvest activities is necessary. An effective value chain approach that emphasizes linking farmers to markets is essential. This can be achieved through development of technologies and policies that support investment in market and trade opportunities.

### **Technology recommendations**

1. There is need to identify, develop, and share appropriate technologies in the post-harvest segment of the value chain including storage, processing, marketing, and distribution. For example, technologies to transform raw commodities into value-added products market expansion. The work of Dr. Philip Nelson (Purdue University) in food loss reduction that earned him the World Food Prize (WFP) is proof of the importance of technology development. Dr. Nelson designed the bulk aseptic processing technology which reduced food losses of fruits by processing them to a shelf-stable form for local, regional, and international markets, and trade.  
([http://www.worldfoodprize.org/en/laureates/20002009\\_laureates/2007\\_nelson/](http://www.worldfoodprize.org/en/laureates/20002009_laureates/2007_nelson/))
2. Effective technology dissemination mechanisms and platforms are needed to ensure the technologies reach the end users.

## Policy recommendations

1. Increased investment in post-harvest research, development and capacity building.
2. Establishment of appropriate financing models for the implementation of successful post-harvest technologies. Many of the technologies require financing beyond micro-finance that is prevalent in developing countries.
3. Deliberate efforts for the public sector to engage private sector for enhancement and scale up of successful interventions
  1. Implementation of trade agreements (national, regional and international) and harmonization of standards.
  2. Improved linkages among government agencies responsible for agriculture, agribusiness and agro-industries

## Suggested next steps

This consultation is a good first step to initiate a formal dialogue among leading experts and stakeholders on food waste and losses. Lately, several initiatives have been established by different organizations to help reduce losses. There is need to integrate the initiatives in order to maximize use of resources, avoid redundancy in programs, and encourage cooperation.

1. Create a platform for continuous engagement by stakeholders to provide research and information updates for policy development around the issue of food losses.
2. Develop a strategic roadmap on prioritized challenges and opportunities relative to food loss post-harvest and market development issues for use by stakeholders, funding institutions, and policymakers working in food security and economic development.

## 85. Divine Nije, FAO, Italy

Our work at the Agro-food Industries Group of FAO has centered on promoting and disseminating diverse technologies and strategies which contribute to reducing post-harvest food losses, adding value (including to food waste and food-related waste) and linking small producers and processors to markets. This has been combined with quality management, logistics and infrastructure systems in order to increase efficiency in a host of food value chains and returns to chain actors in member countries. As an example, we have supported the metallic silo grain storage technology in dozens of developing countries over the last decade, thereby generating information which can be drawn upon to inform the proposed study on such issues as: South-South technology transfer and adaptation; technology integration within value-chain and systemic contexts; and public sector actions to facilitate adoption of technologies and foster their sustainability. Re-alignment of our intervention strategy, from disjointed, single-point actions to systemic interventions, has been spurred by the changes taking place in global food systems.

Recent appraisal studies and stakeholder consultations we conducted in sub Saharan Africa and Latin America confirmed the importance of cold chain and logistics systems in the efficient functioning of food supply chains and the prevention of food losses and waste, especially of highly perishable commodities like milk, fruits and vegetables. An issue flagged in these studies and consultations which the proposed study could explore further is public and private sector roles in governance, especially as regards the regulatory framework, coordination, infrastructure development and financial support. The proposed study may also seek to understand the critical components and

characteristics of these systems in so far as food losses and waste are concerned, the relationship between inadequacy in these systems and the extent of losses and waste, and the contribution of these systems to the sustainability of actions to reduce food losses and waste.

A recent workshop organized in partnership with the World Bank<sup>1</sup> and surveys conducted among post-harvest practitioners revealed that the lack of a Community of Practice (CoP) is a key gap in efforts to reduce losses in developing countries. If it existed such a CoP would facilitate evaluation of innovations, sharing of field-based lessons and scaling up of practical lessons and good practices. To address this gap, a global CoP is being set up within the framework of a Swiss Agency for Development and Cooperation (SDC) funded project whose formulation is being led by us. The project shall be implemented jointly by FAO, IFAD and WFP beginning in 2013, and shall pilot the CoP in Burkina Faso, Democratic Republic of Congo and Uganda. It is envisaged that the CoP would inform policy processes not only at national and regional levels, but also global-level mechanisms such as the CFS.

The above mentioned workshop and surveys also underscored the need to promote collaboration and synergy. In this regard, we have recently initiated work to form a network of partners within the framework of the “zero waste or loss of food” pillar of the UN Secretary General’s Zero Hunger Challenge. In order to make information on post-harvest management and value addition technologies and operations more easily accessible to member countries we are reinforcing and modernizing the well-known INPhO2 web platform.

The Agro-food Industries Group technical officers include: Anthony Bennett, Djibril Drame, Jorge Fonseca, Danilo Mejia, Joseph Mpagalile, Divine Njie (Group Leader) and Robert van Otterdijk. Further information on the Group’s activities can be found at: <http://www.fao.org/ag/ags/>, or through contacting the following e-mail address: [Divine.Njie@fao.org](mailto:Divine.Njie@fao.org).

<sup>1</sup>Report available at:

[http://typo3.fao.org/fileadmin/user\\_upload/ags/publications/FAO\\_WB\\_ph\\_web.pdf](http://typo3.fao.org/fileadmin/user_upload/ags/publications/FAO_WB_ph_web.pdf)

<sup>2</sup>Located at: <http://www.fao.org/inpho/en/>

## 86. Camelia Bucatariu, FAO, Italy

Dear HLPE,

I would like to share my personal comments:

Within the human right to food, prevention and reduction of food losses and food waste could support food and nutrition security for all -- through agricultural and food systems innovations and optimizations that may work at different levels of intervention and with different levels of governance and dynamism in rural, urban, and peri-urban areas.

The Policy and regulatory framework would consequently require a coherent, comprehensive and integrated approach; taking into consideration areas such as: agriculture, fisheries, forestry, taxation / market based instruments, competition, health and education, trade, standards, safety and quality, agro-industry, investment, services, energy, environment, security and justice. Experience and data, involving both private and public sector, that may support the work could be sourced from - to name

just a couple - EU (e.g. EC, MS, EESC, EP, and FP7s: FUSIONS, FOODSECURE), OECD, FAO regional offices.

Additionally, the High-level consultation on Post-2015 development agenda identified prevention and reduction of food waste and loss as a priority within *Sustainable and resilient food production and consumption* (<http://www.fao.org/fsnforum/post2015/sites/post2015/files/files/Synthesis%20document%204th%20April.pdf>) The role that countries would play is essential.

Could the study provide guidance on:

- capacity (both institutional and human) and knowledge opportunities and challenges that would enable or impede dynamic and multi-layered governance and engagement for sustainable change?
- ex ante and ex post impact assessment of policy/ regulations (recommendations and concrete implementation) on all four dimension of food and nutrition security?

Could the study provide facilitation tools for identification and engagement of key stakeholders and prioritization of interventions at local, country, regional level? Would coordination challenges and opportunities between stakeholders be also addressed?

How could SAVE FOOD: Global initiative on food losses and food waste reduction (<http://www.fao.org/save-food/en/http://www.fao.org/save-food/en/>) contribute to the process? SAVE FOOD is a public-private initiative (FAO, Messe Düsseldorf GmbH, UN agencies e.g. UNEP with the partnership on *Think.Eat.Save* campaign, civil society) that works on: awareness raising, coordination and collaboration (e.g. definition of food loss and waste and assessment of food losses methodology), policy/ strategy and programme development, and investments formulation and implementation.

Best regards,

Camelia Bucatariu

## 87. France and GISA

Dear hlpe secretariat,

Please find enclosed the comments of France and GISA (interdepartmental group on food security) on the terms of reference of the 2014 HLPE study "*losses and waste in the context of sustainable food systems.*"

Best regards,

Marine RENAUDIN

Chargée de mission Sécurité alimentaire - Stratégies internationales de développement

Bureau du développement et des organisations internationales

SRI / DGPAAT / MAAF

Paris

[Original contribution in French]

## Commentaires FRANCE / GISA

<http://www.gisafrance.fr/>

### **Pertes et gaspillages dans un contexte de système alimentaire durable : consultation du papier d'orientation du HLPE**

Le papier d'orientation proposé constitue une bonne base de travail. Il appelle les remarques suivantes de la France :

- Comme précisé dans le document d'orientation, la question principale à laquelle le rapport devra répondre est : « *what can be contributions of a reduction in food losses and waste to improve food and nutrition security in the context of sustainable food systems* ».
- Le papier gagnerait à être plus clair sur l'objectif, les moyens et le contexte de l'étude. L'objectif est bien le renforcement de la sécurité alimentaire, le moyen ici étudié est la réduction des pertes et des gaspillages, et la contrainte/contexte à considérer tout au long de l'étude est la durabilité des systèmes alimentaires. La rédaction laisse penser, notamment au premier paragraphe, que le système alimentaire durable est un objectif en soi.
- Le lien avec la sécurité alimentaire pourrait être davantage explicité dans la première partie du papier. Il ne s'agit pas d'étudier les moyens pour réduire les pertes et les gaspillages pour rendre les systèmes alimentaires plus durables, mais plutôt de s'interroger sur la corrélation entre la réduction des pertes et des gaspillages et l'augmentation de la sécurité alimentaire.
- Le document d'orientation est assez restrictif sur les pertes, alors que ces dernières sont majoritaires (par rapport au gaspillage, cf. étude FAO « save food ») dans les pays confrontés à l'insécurité alimentaire. Il sera important de développer les différentes causes de ces pertes et de proposer des recommandations adéquates à l'attention des politiques pour les réduire.
- Le plan de l'étude ne ressort pas clairement du document, il nous semble que les points suivants devraient être traités :

(1) Caractériser les systèmes alimentaires au regard de leur durabilité et notamment de la proportion de pertes et de gaspillages qu'ils génèrent. Il sera nécessaire ici d'avoir une analyse holistique, de la production à la consommation, et tous les stades intermédiaires de la transformation à la distribution, afin d'identifier les pertes et les gaspillages aux différents stades de la chaîne alimentaire. Cette première partie pourra permettre d'identifier les critères permettant de caractériser l'efficacité des systèmes alimentaires (production consommée / ressources utilisées) et proposer une méthodologie adéquate.

2) Évaluer les coûts et les bénéfices des pertes et gaspillages dans les différents systèmes alimentaires au regard de la sécurité alimentaire. La deuxième partie du papier aborde cette question sous l'angle « quels sont les impacts de la réduction des pertes et gaspillages ? ». Alors que certaines pertes sont liées à un manque d'infrastructure avérée, d'autres peuvent jouer un rôle important sur les prix (stabilisation des prix, ou maintien des prix élevés ...), sur la stabilité de l'offre, sur la qualité sanitaire qu'il sera important d'évaluer

(3) Identifier les moyens pour réduire les pertes et les gaspillages de façon durable afin de renforcer la sécurité alimentaire. Après la caractérisation des systèmes alimentaires puis l'évaluation des coûts et des bénéfices des pertes et gaspillages dans les différents systèmes alimentaires, l'étude pourra proposer des moyens/pistes pour appuyer les décideurs politiques à réduire les pertes et les gaspillages dans l'objectif de renforcer la sécurité alimentaire.

En conclusion, il conviendrait de proposer aux décideurs politiques

- (1) une méthodologie d'analyse des systèmes alimentaires permettant de caractériser les systèmes alimentaires au regard de leur durabilité (prenant en compte notamment les pertes et les gaspillages), et de la sécurité alimentaire.
- (2) des outils d'aide à la décision pour établir une politique de réduction des pertes et des gaspillages dans l'objectif de renforcer la sécurité alimentaire.

[English translation]

#### FRANCE/GISA Comments

<http://www.gisafrance.fr/>

#### Food losses and waste in the context of sustainable food systems: E-Consultation to set the track of the study

The orientation paper is a good working basis. It calls for the following remarks from France:

- As stated in the orientation document, the main question that the report will need to address is: « *what can be the contributions of a reduction in food losses and waste to improve food and nutrition security in the context of sustainable food systems* ».
- The paper would benefit from being clearer about the objective, the means and the context of the study. Surely, the objective is the reinforcement of food security, the means here under study is the reduction of food losses and waste, and the constraint/context to be considered throughout the study is the sustainability of the food systems. The drafting leads one to think, especially in the first paragraph, that the sustainability of the food system is in itself an objective.
- The link with food security could be more explicit in the first part of the paper. It is not about studying the means to reduce the food losses and waste to make food systems more sustainable, but instead to question the link between the reduction of food losses and waste and increased food security.
- The orientation document is rather meager on the food losses, whereas these are the larger factor (compared to waste, cf. FAO study « save food ») in the countries facing food insecurity. It will be important to expand on the different causes of these food losses and to propose adequate recommendations for consideration in the policies to reduce them.
- The plan of the study does not emerge clearly from the document, and it seems to us that the following points should be dealt with:

(1) Characterize food systems by reference to their sustainability and in particular to the proportion of food losses and waste generated. This will be require a holistic analysis, from production to consumption, and all the intermediate stages from transformation to distribution, with the objective of identifying the food losses and waste in the different stages of the food chain. This first part could facilitate the identification of the criteria used in the characterization of the efficiency of food systems (production consumed/resources used) and propose a suitable methodology.

2) Evaluate the costs and benefits of food losses and waste in the different food systems in the light of food security. The second part of the paper tackles this question from the angle of what might be the impact of reducing food losses and waste. While some food losses are linked to the lack of suitable infrastructure, other losses could play an important role that should be evaluated in pricing (price stability, or keeping high prices...), on steady availability, and on health aspects.

(3) Identify the means to reduce food losses and waste in a sustainable way with the objective of reinforcing food security. Following the characterization of food systems and then the assessment of costs and benefits of food losses and waste in the different food systems, the study could propose the means/routes to be followed to support the political decision makers in the reduction of food losses and waste with the objective of reinforcing food security.

In conclusion, it would be appropriate to propose to the political decision makers

- (1) a methodology for analysis of the food systems that will enable the characterization of food systems based on their sustainability (taking into account in particular food losses and waste), and their food security.
- (2) tools to facilitate the decision to establish a policy for reduction of food losses and waste with the objective of reinforcing food security.

### 88. Rosana Perrotti, Brazil

Dear all,

Hope you are doing fine.

I'd like to contribute with this subject, by presenting a **sustainable solution to avoid food losses and waste** and, to **participate in the Project Team for this report**.

Let me please introduce myself. I have about 20 years experience with the food sector (Agriculture, Food Industry & Supermarkets), in Brazil and Europe and, during the last five years, I have organized a group of very qualified people (also available), interested on finding sustainable solutions to avoid wasting food and to attend the critical issue with hunger, starvation and malnutrition, at the same time. The solution found was entitled as a benchmarking of green economy, by ICC - International Chamber of Commerce, during the Rio+20 event in Brazil, last year. Please see page 129 of the attached file: ICC-Green economy and a presentation of the Project.

In my opinion, the food industry has no means to forecast their sales with 100% of accuracy. Therefore, very difficult to avoid food waste as part of the whole process of commercializing food, specially in countries with geographical dimensions, as Brazil.

The limited period of commercialization is one of the reasons of food waste (which applies to different laws in different countries): In Brazil, in order to avoid the penalties of selling products after the expiration date, the food products are taken out of the shelves days or even weeks before the expiration. From the shelves, they go for the incineration or landfills most of them, still in good quality. So, the solution we are presenting is to act before the food deteriorates. Through this solution, we are able to extend the shelf life up to two years, by introducing innovative technologies. The good news about this process is that it's economically viable since we can convert the cost of discarding into cost of benefiting food and, at the end we have a very high quality food to combat hunger.

I'd be delighted to be part of your team and to present this solution to your audience.

I am including further information [here](#) and [here](#).

Many thanks to your attention.

Kind regards,

Rosana Perrotti  
Founder of Plataforma SINERGIA  
BRAZIL

## 89. Argentina

[Original contribution in Spanish]

### COMENTARIO GENERAL

La Argentina apoya el desarrollo de iniciativas que tengan por objeto disminuir las pérdidas y desperdicios de alimentos.

Al respecto, cabe señalar que se trata de un tema con aristas multidisciplinarias en el que impacta no solo la infraestructura de almacenamiento, sino también el transporte, el estado de los caminos, la capacidad y conocimiento de los trabajadores rurales, la capacidad de mantener una adecuada cadena de frío en la industria, la comercialización y la educación de los consumidores.

### COMENTARIOS ESPECÍFICOS

- En la orientación propuesta para el estudio se hace referencia a los resultados de Rio+20. Al respecto, se recuerda que el párrafo 110 del documento final de Rio+20 dice (subrayado agregado):

*“Observando la diversidad de condiciones y sistemas agrícolas, resolvemos aumentar la producción agrícola sostenible y la productividad a nivel mundial, en particular mejorando el funcionamiento de los mercados y los sistemas de comercio y fortaleciendo la cooperación internacional, sobre todo en favor de los países en desarrollo, mediante el incremento de la inversión pública y privada en la agricultura sostenible, la ordenación de la tierra y el desarrollo rural. Las principales esferas que requieren inversión y servicios de apoyo son las prácticas agrícolas sostenibles; la infraestructura rural, la capacidad de almacenamiento y las tecnologías conexas; las actividades de investigación y desarrollo en materia de tecnologías agrícolas sostenibles; el fomento de las cooperativas y las cadenas de valor agrícolas fuertes; y el fortalecimiento de los vínculos entre los medios urbano y rural. También reconocemos que es necesario reducir considerablemente las pérdidas posteriores a la cosecha y otras pérdidas y desperdicios de alimentos en toda la cadena de suministro de alimentos.”*

Se destaca que no se hace referencia en dicho caso a “sistemas alimentarios sostenibles”.

Asimismo, no se cuenta con una definición de dicho término y, por lo tanto, debería utilizarse terminología sobre la cual se cuenta con definiciones acordadas a nivel internacional.

- No es apropiado que se amplíe la noción de “residuos de alimentos” - definida en el documento como aquellos alimentos comestibles que se podrían haber comido y fueron

desperdiciados - a las partes no comestibles de los alimentos que podrían usarse con otros fines no comestibles. El tema excede el ámbito de este trabajo y por tal razón no debería ser tratado en esta oportunidad.

- Al enunciar las causas de las pérdidas y el desperdicio de alimentos, se hace mención a los aspectos biofísicos. En este sentido, sería importante brindar una idea más adecuada del alcance de este término. Asimismo, se debería mencionar otros aspectos que no han sido adecuadamente tomados en consideración, tales como las cuestiones estructurales que impactan sobre la infraestructura; comunicacionales; la educación de los actores al respecto; incorporación de nuevas tecnologías, etc.
- Se comparte la idea de que al examinar los costos económicos de cualquier mejora se deberían evaluar conjuntamente con los costos económicos que ocasionan la pérdida y los desperdicios, pues es la mejor manera de poder dimensionar los problemas. No obstante, se debe tener en cuenta que esta dinámica requiere de datos que muchas veces se estiman sobre la base de cálculos inciertos y de indicadores que en ocasiones no se encuentran disponibles o que han sido elaborados en función de contextos existentes en países desarrollados y que no pueden ser utilizados en países en desarrollo, principalmente por la falta de datos locales.
- La utilización de la noción de “uso excesivo de alimentos” excedería el ámbito específico del tema que aborda el estudio y podría desvirtuar los objetivos básicos del trabajo que se pretende llevar adelante, que es la pérdida en la poscosecha y el desperdicio de alimentos “que no se consumen”, y no aquellos consumidos en exceso por determinados grupos de personas.

[English translation]

#### **GENERAL COMMENT**

Argentina supports the development of initiatives that aim to reduce food losses and waste

In this regard, it shall be noted that this is a multidisciplinary topic, not only affected by the storage infrastructure, but also by other factors like transport, road conditions, capacity and knowledge of rural workers, ability to maintain an adequate cold chain in the industry, and marketing and consumer education.

#### **SPECIFIC COMMENTS**

- In the suggested guidelines for the study, a reference is made to the outcomes of Rio +20. In this sense, it shall be remembered that paragraph 110 of Rio +20 final document states (last sentence has been underlined with respect to the original text):

*“Noting the diversity of agricultural conditions and systems, we resolve to increase sustainable agricultural production and productivity globally, including through improving the functioning of markets and trading systems and strengthening international cooperation, particularly for developing countries, by increasing public and private investment in sustainable agriculture, land management and rural development. Key areas for investment and support include sustainable agricultural practices; rural infrastructure, storage capacities*

*and related technologies; research and development on sustainable agricultural technologies; developing strong agricultural cooperatives and value chains; and strengthening urban-rural linkages. We also recognize the need to significantly reduce post-harvest and other food losses and waste throughout the food supply chain".*

It shall be highlighted that no reference is made in this case to "sustainable food systems". Additionally, no definition of this term is available and, therefore, a terminology with internationally agreed definitions should be used.

- Extending the concept of "food waste" -defined in the document as the edible food which could have been eaten and has been wasted- to non-edible parts of food that could be used for other inedible purposes is not considered to be appropriate. This topic is beyond the scope of this work and therefore should not be addressed on this occasion.
- When listing the causes of food losses and waste, biophysical aspects are mentioned. In this sense, better specifying the scope of this term would be important. Furthermore, other aspects that have not been adequately considered, such as structural and communication aspects impacting the infrastructure; education of stakeholders; incorporation of new technologies; etc. should also be mentioned
- Jointly assessing the economic impact of food losses and waste when analysing the costs of any potential improvement is regarded as appropriate, as it is the best approach to determine the magnitude of related issues. However, it shall be noted that this procedure requires data often estimated on the basis of uncertain calculations and occasionally indicators that are unavailable or prepared according to contexts existing in developed countries that cannot be extrapolated to developing countries, mainly due to the lack of local data.
- The utilization of the "food overuse" concept would exceed the specific scope of the study and could distort the basic targets of the proposed work: post-harvest losses and "non-consumed" food waste, rather than food consumed in excess by certain groups of people.