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Report of the 2015 Series of International Conferences on Food Loss and Waste Reduction

*Recommendations on Improving
Policies and Strategies for Food Loss
and Waste Reduction*

2015 SERIES OF
INTERNATIONAL
CONFERENCES
ON FOOD LOSS AND WASTE REDUCTION

Global Initiative
on Food Loss and
Waste Reduction



Report of the '2015 Series of International Conferences on Food Loss and Waste Reduction'

Recommendations on Improving Policies and Strategies for Food Loss and Waste Reduction

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The topic of food loss and waste (FLW) has steadily risen onto the international agenda in the last decade. At both the macro and micro level – international forums and in small communities – the interest in developing solutions for mapping and preventing FLW have grown exponentially. As a result of the renewed focus on food loss and waste, as well as its striking significance in global food and nutrition security, SAVE FOOD, an initiative of the Food and Agriculture Organisation and Messe Düsseldorf - food packaging event organizer, was established in 2011. In that same year, SAVE FOOD released a game-changing global study¹ of the extent and causes of food loss and waste carried out in collaboration with The Swedish Institute for Food and Biotechnology (SIK). Its most salient finding has been echoed across both local and international forums innumerable times: roughly a third - or 1.3 billion tons - of all the food produced for human consumption globally each year is either lost or wasted.



This estimate demonstrates not only the disastrous impact of unsustainable consumption and broken and inefficient food systems but also acts as a reminder of the moral imperative for reducing food loss and waste. Food loss and waste represents not only an obstacle to improving global food and nutrition security and feeding the estimated 870 million people still suffering from hunger and malnutrition, but also represents a gross misuse of the planet's limited resources, while contributing to climate change. If food loss and waste could be represented as a country, FAO approximates that it would be the third largest emitter of Green House Gases behind the United States of America and China. In order to contribute to the environmental analysis of food loss and waste and to coordinate and collaborate on activities that address its climate change impact, SAVE FOOD welcomed the United Nations Environmental Programme (UNEP) as a leading partner in 2013.

¹ Global Food Losses and Food Waste, FAO 2011. <http://www.fao.org/docrep/014/mb060e/mb060e.pdf>

The 2015 Series of International Conferences on Food Loss and Waste

Numerous initiatives have been developed world-wide to combat FLW. However, 2015 has the distinction of being one of the most active years in recent memory. Seven international conferences addressing food loss and waste reduction were planned and executed with the support of SAVE FOOD. Taking the opportunity to structure these conferences so that they reinforce each other and lead to substantive outcomes rather than just serving as platforms for discussions, SAVE FOOD worked with its partners to coordinate these events in a sequential manner so that results were complementary, and overlapping - though sometimes inescapable - was reduced. These conferences were promoted under the umbrella of the 2015 Series of International Conferences on Food Loss and Waste Reduction and were attended by over 2,000 participants during the course of 2015. The events were also heavily promoted across the SAVE FOOD platform and among its membership. This report contains the deliberations, findings and recommendations of the conference participants, notably the ideas mentioned and initiatives proposed that can strategically lead to reduced food loss and waste. In the last chapter some conclusions have been formulated by the FAO-Save Food team.

SUMMARY OF CONFERENCES BY TOPIC, LOCATION AND PROFILE OF ATTENDEES

Name of Conference	Topic	Location	Typical profile of attendees
Food Losses and Waste Initiative: From Prevention to Valorisation, GFIA	Food Loss , Food Waste	Abu Dhabi, United Arab Emirates	Technical specialists, International Development Organizations, Private sector
Dresden Nexus Conference	Food Loss , Food Waste	Dresden, Germany	Academia, International Organizations, Public sector
AGRITECH – Facing Challenges in Postharvest Losses	Postharvest loss	Tel Aviv, Israel	Technical specialists, Private sector, Public sector
Annual SAVE FOOD Meeting, 2015	Food Loss , Food Waste	Vevey, Switzerland	Private sector, International Organizations
No More Food to Waste	Food Loss , Food Waste	The Hague, The Netherlands	Technical specialists, Private sector, Public sector, Academia <i>et al.</i>
1 st International Congress on Post-Harvest Loss Prevention	Postharvest loss	Rome, Italy	Academia, technical specialists, International development organizations
Fight Food Waste, Feed the Planet	Food waste	Milan, Italy	Private sector, Public sector, Academia, International development organizations

SUMMARY OF CONFERENCES

FOOD LOSSES AND WASTE INITIATIVE: FROM PREVENTION TO VALORISATION, GLOBAL FORUMS FOR INNOVATION IN AGRICULTURE

Location: Abu Dhabi, United Arab Emirates

Date: 8-12 March 2015

<http://www.innovationsinagriculture.com>



Ren Wang, Assistant Director-General, Agriculture and Consumer Protection Department of the Food and Agriculture Organization of the United Nations (FAO), addresses participants of the Global Forum for Innovations in Agriculture held in Abu Dhabi, United Arab Emirates in March 2015.

The Global Forum on Innovations in Agriculture (GFIA) reportedly attracted over 6,000 agricultural professionals from 100 countries to explore sustainable agricultural innovations. In addition to a large exposition, the event was also the source of a number of conferences spanning pertinent environmental and agricultural issues. GFIA 2015 was home to the **Global Climate Smart Agriculture Summit, Innovation pro-**

gramme, ICTs for Sustainable Agriculture, Edible Cities: Building Resilience in Urban Agriculture and the conference **Food Losses and Waste Initiative: From Prevention to Valorisation.**

The conference, 'Food Losses and Waste Initiative: From Prevention to Valorisation' promoted valorisation as a leading strategy to address food loss and waste while meeting the shortfalls of production and consumption inherent in a flawed food system. The event featured two roundtable discussions, a plenary session, an innovation session and workshop. It also featured a technology pavilion in the GFIA Exhibition area where technologies for harvesting, handling, processing, distributing and others were shared between companies and conference participants. The 2015 second annual staging of GFIA was organized by *Turret Media*, a UAE-based Media Company in cooperation with the *Government of the United Arab Emirates* through significant financial support from the *Abu Dhabi Food Control Authority*. Additionally, The Abu Dhabi Food Control Authority also sponsored 300 buyers from the African continent to take part in the event. Leading agriculture and food science university, Wageningen University & Research Centre, based in The Netherlands also provided technical support to the event.

DRESDEN NEXUS CONFERENCE

Location: Dresden – Germany

Date: 25-27 March 2015

<http://www.dresden-nexus-conference.org/archive/2015/index.html>

350 actors from 65 countries attended the Dresden Nexus Conference (DNC) organized by *United Nations University - FLORES*, the *Technische Universität Dresden* and the *Leibniz Institute for Ecological Urban and Regional Development*. Representatives from United Nations entities, other international organizations, research institutions and technical assistance agencies were joined by members of the German government at federal, state and municipal levels.

The conference aimed to highlight how increasing and unsustainable demands for natural resources drives global environmental change. Under the umbrella “Global Change, SDGs and the Nexus Approach”, each of the three days of the Dresden Nexus Conference were dedicated to a thematic area covering climate change, urbanization and population growth. SAVE FOOD organized the session entitled ‘Environmental Resources and Food Losses and Waste’ which explored the issue of food loss and waste reduction from the perspective of academia and international development organizations.

The conference applied a ‘nexus approach’ to dealing with the sustainable management of soil, water and waste. A crucial element of this approach is to understand systems as a whole and to focus on the interdependencies and linkages that lead to efficient food, water and waste management. The DNC highlighted how adopting a nexus approach may mitigate the growing water, food and energy insecurity from an environmental resources perspective.

The conference provided an update on current approaches to integrated resources management and climate adaptation and mitigation strategies. By providing examples from diverse regions and perspectives it led to some general observations on what is needed to apply and adopt climate-adapted resource-use at scale, ‘i.e. moving from pilot studies to large-scale implementation’.

FACING CHALLENGES IN POSTHARVEST LOSSES, AGRITECH ISRAEL

Location: Tel Aviv – Israel

Date: 28-30 April 2015

<http://www.agritech.org.il/home>

Agritech Israel is a triennial international expo and conference exploring technological solutions and innovations in Agriculture, particularly agro technology. This flagship agricultural event of Israel gathered over 4,000 stakeholders from across the world – notably in sub-Saharan Africa and Southeast Asia.



Exhibitors interact at the Agritech Israel expo in April 2015. The expo also hosted a conference on “Facing Post-harvest losses”.

Agritech Israel 2015 was organized by the *Agricultural Research Organization (ARO) - the Volcani Center*, a leading agricultural research institution along with *Kenes Exhibitions*, international conference organizers. The 2015 conference included keynote lectures by leading international experts in the field of fresh, processed food and grain preservation.

The conference portion of the exhibition focused on postharvest loss reduction with “Facing challenges in postharvest losses” as the general theme. Each of three days were dedicated to sub themes; on day one participants explored the scientific aspects of quality and safety, day two was devoted to agro-industry innovations for reducing food losses (agri-tech orientated) and day three explored food safety from the consumer’s perspective. ‘Facing challenges in postharvest losses’ was attended by leading experts in agricultural and livestock technology, state executives and decision makers, farmers, suppliers and agro-companies. There were calls for a paradigm shift in the conventional approach to reducing postharvest losses, which included examples of micro-biome management and the use of bio-pesticides, and active intelligent packaging such as anti-microbial packaging.

SAVE FOOD ANNUAL GENERAL MEETING

Location: Vevey – Switzerland

Date: 12 May 2015

http://www.save-food.org/cipp/md_ip/lib/pub/tt,oid,43994/lang,2/ticket,g_u_e_s_t/~/Meeting_2015.html

The SAVE FOOD Initiative is a global joint partnership established by *Messe Düsseldorf*, organizers of international packaging and processing fairs, and the *FAO*. The programme has four main goals: raising awareness on food loss and waste; coordinating global activities on food loss and waste reduction resulting in partnerships between different actors; supporting investment programmes and projects on FLW and assisting governments and other actors to develop policies for FLW reduction. In order to inform policy decisions, SAVE FOOD has also undertaken a number of value chain studies and assessments in developing countries.



SAVE FOOD's annual meeting was attended by just under 200 actors from the packaging industry, international development community, academia and research institutions at *Nestlé headquarters* in Vevey, Switzerland. The 2015 meeting focused on two major themes – 'private sector support and involvement' and 'innovations in food packaging technology'.

Bringing together a wide variety of global actors involved in the food sector, the meeting was a platform for members of the SAVE FOOD network to report on their work to reduce food losses, to share experiences and to develop joint solutions. The SAVE FOOD meeting also provided a highly focused environment with a wide field of private and public sector supporters and other interested parties working in the area of food loss and waste prevention in the developed and developing world. Participants proposed a number of national and corporate policy recommendations and strategies to reduce food loss and waste.

NO MORE FOOD TO WASTE, GLOBAL ACTION TO STOP FOOD LOSSES AND FOOD WASTE

Location: The Hague – The Netherlands

Date: 16-20 June 2015

<http://www.nomorefoodtowaste.nl/>

Organized and hosted by the *Ministry of Economic Affairs of the Government of The Netherlands*, in close cooperation with the Government of Viet Nam, FAO, the United Nations Environment Programme (UNEP) and the African Union Commission (AUC), ‘No More Food to Waste, Global Action To Stop Food Losses and Food Waste’ assembled a diverse group of global leaders in The Hague - The Netherlands. The four day conference was attended by roughly 500 participants from ministries of agriculture, UN and other international development organizations as well as business, investment groups, researchers and academia.



Panoramic view of the High Level Roundtable discussions.

The No More Food to Waste Conference was an example of the commitment of the Government of The Netherlands in becoming a leading state in policy dialogue and strategy development in the area of food loss and waste reduction. Participants were grouped into workshops where they were tasked with creating concrete actions that could resolve issues in food loss and waste such as: Information Gaps and Data Collection on Food Loss and Waste, Strategic Actions for Public and Private Policies, Best Practices against Food Loss and Waste as well as sessions on Governance and Partnerships for Finance and Investments.

Tackling the issue of food loss and waste from multi-disciplinary and varied perspectives, the No More Food to Waste Conference was one of the premier opportunities for high level professionals to present and consolidate ideas on a number of critical issues related to FLW reduction in 2015. Partnerships to improve financing for food loss and waste reduction initiatives, building and strengthening coalitions and platforms, sharing scalable and replicable good practices and establishing good governance structures and planning were some of the core objectives of the conference.

1ST INTERNATIONAL CONGRESS ON POST-HARVEST LOSS PREVENTION

Location: Rome – Italy

Date: 4-7 October 2015

<http://phlcongress.illinois.edu/index.html>

Postharvest losses refer to the food losses after harvesting that arise as a result of failures and inefficiencies of the value chains of a given product. These losses can occur during any of the various phases of the postharvest system. Postharvest losses remain very important particularly in sub-Saharan Africa and Southeast Asia, where food losses as a result of poorly functioning food systems are high.

Bringing together what organizers termed as "the community of practice" of actors involved in or concerned with postharvest loss reduction and global food security, the First International Congress on Postharvest Loss Prevention was organized by the *ADM Institute for the Prevention of Postharvest Loss*, University of Illinois – USA, hosting individual actors and organizations from 62 countries across to world to establish a global coalition with the overall goal to develop a roadmap for postharvest loss mitigation.

Participants included experts on postharvest loss and prevention in the technology and research, education and outreach, and food policy fields. Additionally, there were significant representations from funding agencies such as foundations, governments, private industries, international organizations, and non-governmental organizations.

Attendees were given a platform to formulate a plan of action which included policy recommendations, as well as to highlight some of the implementation issues that plague postharvest loss reduction activities in their countries. The goals and purposes of the conference were to:

- raise awareness of the significance of postharvest losses with reference to global hunger issues;
- provide a common platform for the exchange of knowledge and information on the current status of postharvest loss interventions;
- share knowledge, information, and ideas on the adaptability of postharvest loss intervention plans, practices, and policies;
- share success stories and current initiatives from key partners in mitigating postharvest loss issues;
- create a global coalition for elevating and addressing immediate needs to solve postharvest loss problems;
- create partnerships for resource allocation and management for postharvest loss reduction;
- develop action plans for mitigating postharvest losses.

The stakeholders shared a number of national and regional postharvest loss cases and expounded on the policy gaps that result in the underperformance of a number of value chains, eventually giving their recommendations of the policy focus and strategic actions governments and the private sector must take to reduce PHL losses.

FIGHT FOOD WASTE, FEED THE PLANET

Location: Milan – Italy

Date: 15 October 2015

http://ec.europa.eu/dgs/health_food-safety/information_sources/events/20151015_safety_food_waste_en.htm

It is widely held that in the European Union, an estimated 90-100 million tons of food is wasted each year. That number is set to rise beyond 120 million tons by 2020 if direct and immediate action is not taken to curb the trajectory of food waste in the region.

The conference, **Fight Food Waste, Feed the Planet** contributed to the dialogue on both the European and global direction of food waste strategies and policy formulation. The event hosted a wide range of actors including EU policy makers, food sector players from retail to consumer groups, as well researchers and members of international development institutions. Close to 200 stakeholders participated in the event which was organized by the *European Commission's Directorate-General for Health and Food Safety (DG Sante)*.

Fight food waste, Feed the planet, took place on the showground of Expo Milan. There, stakeholders were invited to elaborate on their institutional perspectives on food waste reduction, were involved in sharing robust examples of reducing food waste through promoting good practices, and discussed in plenary sessions the 'role of public authorities in tackling food waste'. There were also discussions on taking a food systems approach to battling food waste in a session named 'taking action to reduce food waste, from farm to fork'. A number of policy recommendations and strategic actions to reduce food waste, particularly at the level of the government and private sector, were shared.

This report organizes the recommendations made in the Conferences in the following format:

Conference recommendations on Food Loss Reduction – These refer to the ideas shared that target the inefficiencies in the food supply chain that result in the unintentional removal of food.

Conference recommendations on Food Waste Reduction – This refers to the ideas shared that target the deliberate removal of edible good food from the food chain or food that is left to spoil due to negligence.

Conference recommendations on General Issues – Ideas shared that cut across both food loss and waste.

Each chapter is divided in topic-related sub-chapters as shown in the table of contents. At the end of each paragraph the specific conference is identified by its host city.

Finally, Chapter 3 – Conclusions – is based on the observations and comments from the participating members of the FAO – Save Food team.

MARKET

1. Increase farmers' market access

- Inadequate market access is a driving cause of food loss in developing countries. The institutions that support market access are an important instrument for poverty alleviation, food and nutrition security and the reduction of postharvest losses. With increased market access, farmers gain the income required to be able to improve food storage, manage postharvest loss issues and have a greater incentive to invest in food loss reduction solutions. Governments and development partners should design appropriate sets of policies that result in effective and efficient market access systems. (The Hague).
- Strategies which connect farmers to markets, particularly to the end consumer, are vital. Through forging professional relationships between farmers and consumers, farmers will better be able to anticipate the demand of consumers, while informing these consumers directly about the availability of produce and its quality, among other necessary information. Mechanisms to connect farmers to markets, including online tools such as applications and websites, could help both farmers and communities gain the greatest financial and quality value. (Abu Dhabi).

2. Use technologies to increase the sharing of market information to farmers and other value chain actors

- Appropriate state and federal policies should ensure that there are alternative sales outlets to farmers beyond middlemen. There were calls for increasing farmer awareness of market prices through information and communication technologies (ICTs). These should include mobile technologies that utilize SMS. As farmers receive more information about markets through the use of ICTs, they become less dependent on traders. More knowledgeable farmers and rural communities would lead to a reduction in pre-mature harvesting and in poor postharvest activities in terms of handling, storage and infestation management. Ultimately, lower rejections of produce will lead to lower food loss and higher profit margins. However, these efforts must also be supported and underpinned by research and development. (Rome).

3. Utilize secondary outlets of agricultural produce

- In order to diversify the income streams of producers and provide a diverse set of markets, secondary outlets such as small restaurants and small and medium agricultural enterprises (SMAEs) need to act as off-takers of the supply once processing plants or outgrower schemes become fully functioning. This will help in strengthening market connections and will provide another blanket of security to small-scale farmers. (Rome).
-

FINANCE AND INVESTMENT

4. Create affordable financial instruments for smallholder farmers

- Access to affordable finance for agricultural investments are often lacking in rural communities. Resultantly, a large number of smallholders, particularly from developing countries, are without access to financial institutions and the instruments they provide. Given the financial meltdown of 2008, lines of credit have become increasingly difficult to obtain, particularly for smallholders even though the need for these instruments has grown more urgent. There is significant need to explore innovative approaches to rural and agricultural finance and affordable financial instruments for farmers and other actors across the value chain. Key partnerships with non-sectoral actors such as insurance companies are also critical in order to develop these financial instruments. (The Hague).
- Without storage and adequate pest management, farmers are forced to sell their produce early to prevent postharvest losses, therefore becoming price takers and losing out on the ability to negotiate higher prices. This ultimately leads to lessened savings and liquidity. Access to credit for smallholder farmers should be improved to enable them to adopt postharvest technologies. Because of the impact of insects and other pests on postharvest losses in sub-Saharan Africa, technologies such as hermetic storage have an increasing importance in farming incomes. Since savings and liquidity factors affect farmers' ability to store grains, credit schemes that are smallholder-friendly, built on public and private partnerships with banks and other bureaus as well as the state, should be replicated and scaled up. (Rome).

5. Enable small financial service providers who promote innovative tools

- An appropriate policy environment (government and private sector) which supports small financial service providers who may establish or adopt innovative financing is required for technology adoption. These policies would then lead to the incubation of new tools and techniques prior to scaling up at the national or regional level. (The Hague).

6. Increase investments in local input and climate resilience

- Greater investments in local input sectors, particularly those related to breeding and research activities, should be prioritized since these investments reduce food losses while increase food production. (The Hague).
- As part of an overall investment in postharvest food losses, climate change resilience in programmes targeting agribusiness development should be increasingly included and the potential contributions to climate change mitigation should also be highlighted. One key strategy is to establish a Postharvest Climate Resilience Agribusiness Grant to cover the incremental cost related to climate risk management. (Rome).

7. Encourage the private sector to invest in research and development programmes for pre-harvest loss reduction

- Research and development, specifically in areas of plant science such as breeding, can enable producers to forgo much of the pre-harvest losses they would ordinarily experience as a result of inferior crop varieties. However, without the capital to invest in research and development, these producers often rely on the varieties available on the market. As such, the private sector, particularly corporations who source from these producers, should also become involved in generating the research and development needed to address pre-harvest losses. With clear benefits for both buyers and suppliers, this research-oriented multi-stakeholder solution can exemplify sustainable corporate action to reduce food losses. Through the implementation of plant science initiatives such as marker assisted breeding to accelerate and improve plant production, corporations can help to reduce cases of pre-harvest losses due to disease or may help strengthen the climate change resilience of a number of crops. (Vevey).

COMMUNITY ENGAGEMENT**1. Promote community-led policy formulation**

- “Policy arrogance” or non-participatory, top-down approaches to policy formulation have led to the neglect of those most affected by the problems that these policies are intended to impact — farmers and rural communities. Multi-stakeholder sensitive policy dialogue needs to be held and innovations that engage farmers (many of whom are not formally educated) in policy dialogue needs to be developed. A leading example was the use of local theatre activities to train rural communities in policy advocacy. In this example, local languages and exercises with social value were utilized to inform and empower smallholder communities. (Abu Dhabi).

2. Expand grower associations at the village level

- Grower associations or cooperatives provide a useful channel through which farmers can engage in group price negotiation and obtain training and other essential services. These associations enable institutions to supply farmers with crucial information concerning technology adoption and capacity building. Lessons from PHL experts indicate that grower associations remain one of the most powerful mediums to engage a rural agricultural population and must be considered in food insecure regions where agriculture is a major source of income. (Rome).

3. Mainstream women and youth in the research agenda

- The losses faced by women and young people — who account for a significant portion of rural communities — and their capacity to self-measure and report on household activities should be taken into account in the creation of national and regional research policy and agendas. (The Hague).

4. Target women in PHL training interventions

- Women play an important role in a number of postharvest loss activities and in some cases they are the main actors beyond the farm gate. Governments should continue to invest in gender-based training, particularly where there are considerable gaps in the capacity of female actors. This should reduce gender-based constraints that limit women’s access to post-harvest technologies, financial services etc., and it will support women’s participation in the food supply chains and increase their abilities to reduce FL. (Rome).

PARTNERSHIP BUILDING

5. Establish and enhance partnerships at different levels for FLW reduction

- In order to break down the silos in the governance of food loss and waste reduction, greater “public-public partnerships” or increased coordination between government institutions, such as trade boards and statistical agencies and ministries, should be promoted. These partnerships would help mainstream food loss interventions throughout the governance structure. (The Hague).
- It is of great importance to create a global understanding and acceptance of the issues of food loss and waste. This global understanding would be achieved through a multi-stakeholder mobilization plan (Figure 1) which engages a wide variety of sectors and institutions including corporations, religious institutions, educational institutions, private and state media, etc. (The Hague).

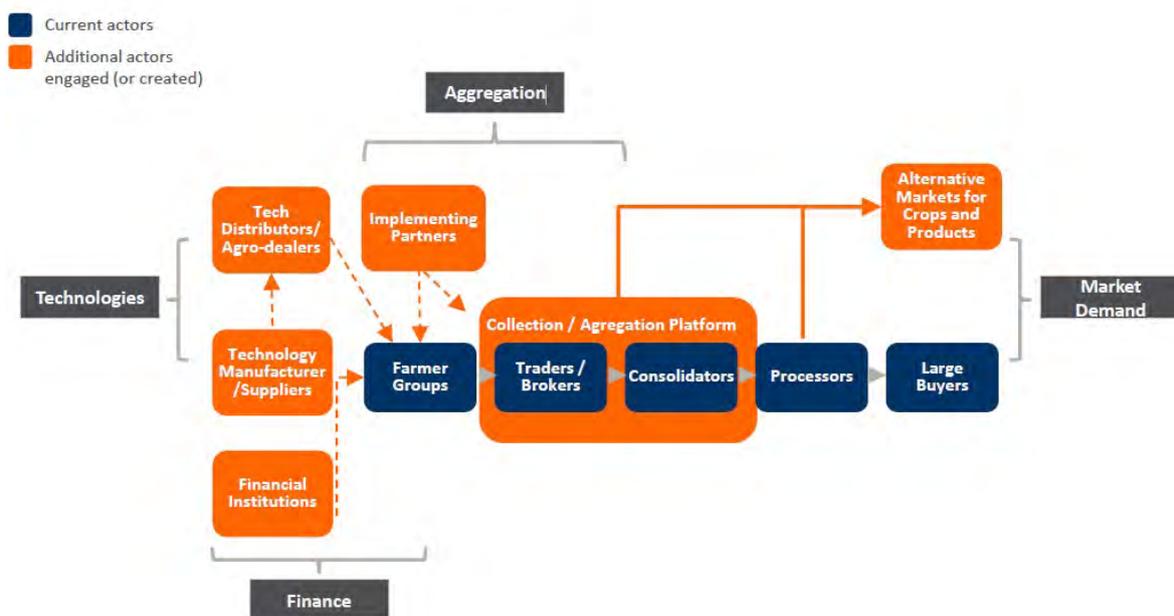


Figure 1: A model of multi-stakeholder partnerships in value chain development

- Private sector inclusion and collaboration on projects and programmes that reduce food loss from their inception is lacking in many developing countries. To meet the need to develop value chains that lead to higher incomes and more sustainable livelihoods, a market-based approach which connects SMAEs (small and medium agro-enterprises) to private sector players would position SMAEs to become more competitive in the marketplace. These joint collaborations should not be seen as “charity” but

should be underscored by mutual benefits to both players, leading to greater market access and sustainable profits. Along with the support of development-orientated institutions and government actors, market-based food loss reduction projects should also initiate distribution channels as well as work towards building production facilities. (Vevey).

6. Enhance public-private partnerships for processing and value addition

- Across many developing countries, processing remains the last frontier in value chain development. High levels of processing is positively correlated with lower levels of PHL and greater value chain development, and wide-scale processing of some kind could be indicative of multi-faceted, well-functioning food industries. The absence of large and medium-sized processing plants in areas of significant food production is often a source of high food losses, particularly in sub-Saharan Africa. This can be attributed to: 1) a lack of government effort or interest in processing to reduce PHL, and 2) a lack of private sector incentive to invest in processing infrastructure. The public sector can motivate private sector actors to establish more processing facilities and then subsequent efforts should be made to address the secondary market issues that would arise.
- This strategy is particularly important when domestic capacity for processing is very high. However, while larger anchor buyers may increase demand, they do not automatically stabilize PHL or lead to higher crop production. (Rome).

7. Promote multi-stakeholder partnerships to engage small-scale traders in post-harvest technology adoption

- The donor community, private banks, public lending agencies and private sector manufacturers should forge partnerships to promote trader adoption of postharvest technologies, specifically through investment programmes and projects. Local traders need to be provided with financing to access postharvest technologies and to make technologies at a size and scale that is appropriate for smaller-scale actors. The outcome of increased technological access can lead to decreased transport costs, increased volume of produce stored, increased safety for produce due to greater pest management, greater flexibility to harvest and choice to sell as well as lower storage fees. With greater access to postharvest technologies, traders will handle greater volumes and have lower costs ultimately. (Abu Dhabi).

CAPACITY BUILDING AND KNOWLEDGE BASE

8. Improve food safety management through training of farmers and other value chain actors

- Food safety issues such as pesticide residues, low water quality, and unhygienic market conditions significantly affect the edibility of food. There is a need for increased training programmes to farmers and other actors in food safety as a strategy to significantly reduce the amount of PHL experienced by these groups while improving the health and nutritional impact on farming communities and the larger society. (Rome).
- Low cost interventions such as those associated with promoting food safety in farming communities, should be accompanied by appropriate training and capacity building of farmers and their cooperatives. (Rome).

9. Provide training to traders in the use of postharvest technologies

- The relatively low levels of skills among traders in the use of PHL technologies is an obstacle to the successful implementation of postharvest technologies, particularly in developing countries. As such, it was suggested that small and medium-scale traders be more consistently trained in postharvest technologies with the support of local advisory and extension departments or units. (Abu Dhabi).

10. Build the capacities and capitalize on the strengths of developing countries' national statistical agencies

- The potential of national statistical agencies is not fully realized and their skills and expertise could be utilized and supported by international agencies in their efforts at global and regional reporting. Local data collection systems can be built and reinforced (via these national institutions) in order to support food loss reduction programmes. Too many global and regional food loss assessments have been performed without data from national institutions, and as a result, the growth of these local institutions and their capacity to take actions at the local level are reduced. (The Hague).

11. Provide locally adaptive training materials for capacity building

- Given the low rates of literacy across the rural areas of many developing countries, educational materials must be adjusted to meet local demands for understanding and adaptability. Outreach and training materials should be developed with support from local experts in languages and modalities that account for the specific contexts and

learning requirements of specific actors in the value chain. These include animations in local languages and training to extension agents to deliver activities in innovative ways that circumvent any problems that may impede the assimilation of knowledge and capacity building. (Rome).

12. Promote wider economic analysis prior to initiating postharvest technologies

- Interventions and technologies are often designed and implemented before a thorough assessment of the economic aspects of the postharvest problem is conducted. Therefore, there is an urgent need for more consistent analyses of the economic dimensions prior to technological design. Technology developers too often look narrowly at solving the PHL problem, later discovering that there is very little interest in the technology they are marketing, or that selling it to industry players is very challenging. Due to a lack of consideration of the economic factors at play, quite a number of useful technological innovations are never brought to scale, even if they can significantly reduce food losses. (Tel Aviv).
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POLICY

13. Create a clear policy distinction between smallholders and commercial holders

- Given the disparity in experiences, particularly concerning liquidity, disposable incomes and food security, smallholder and commercial farmers often require a unique set of policies to address their needs and encourage their growth and productivity. Making the distinction between smallholders and commercial farmers at the state level is essential in designing appropriate interventions and solutions to address each group's unique needs. These policies may be designed or implemented by different departments within the government. This approach results in a greater level of specialization at the ministry level and could facilitate the implementation of subsidized credit schemes that enable the adoption of new farm equipment, tractors, on farm storage, etc. based on factors such as land-size, use of family farming and income earned in off-farm activities. This model could be modified and scaled up for use in other developing countries with similar contexts or scenarios. (Rome).

14. Facilitate the harmonization of regional policies to overcome trade barriers.

- Regional harmonization of trade policies can help to prevent conflict and the creation of contradictory solutions within a region. Increased coordination in the development of regional policies, particularly trade policies, is much needed, so is more collaborative monitoring of cross-border trade flows. (The Hague).

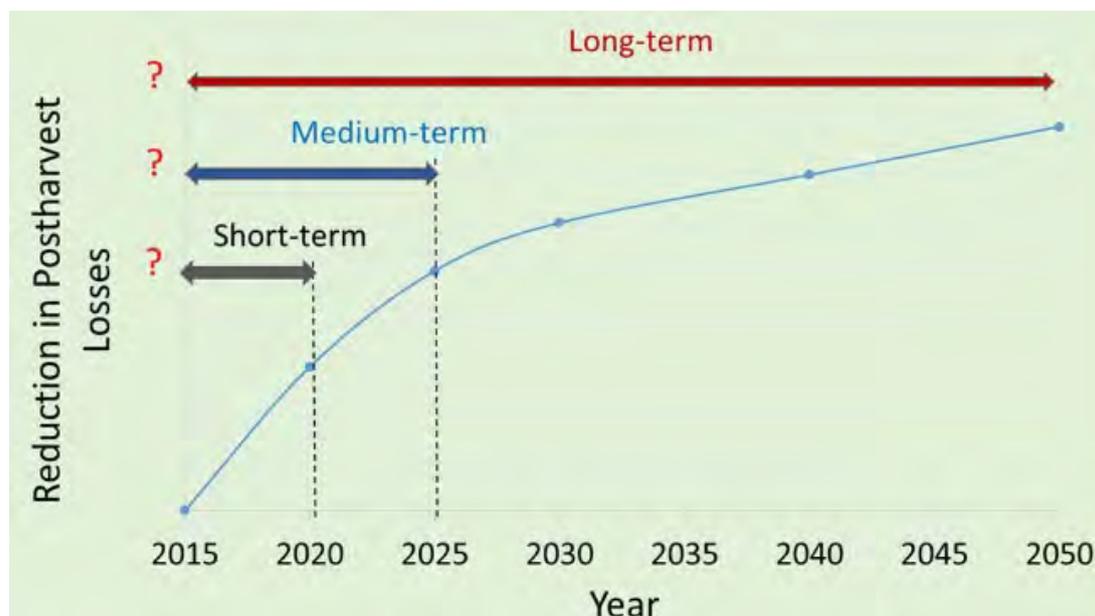


Figure 2: Target and Timeline: how much can be reduced by when

15. Develop a “global roadmap” for PHL prevention

- Taking a value chain approach to map solutions to address PHL would set the stage for the development of a succinct set of targets which will guide stakeholders globally in reducing PHL losses (Figure 2). These targets could then be used as a tool to negotiate with governments and international organizations. (Rome).

16. Promote a clearer understanding and utilization of the food systems approach

- Food loss reduction policies should be underpinned by a food systems approach. FAO defines a food system as all activities related to the production, distribution and consumption of food that affect human nutrition and health. In the food system approach, scenarios are viewed in terms of their relationships and interactions. As such, the food systems approach analyses the impact of agricultural interventions on a number of areas including the health and the overall wellbeing of households and communities. A clearer understanding and utilization of this approach is needed in order to create more sustainable food systems. (The Hague).

17. Focus on urban agriculture

- Given the expected levels of rural-urban migration in upcoming years, the distance between consumers and food production will continue to increase. In many developing countries, longer distances are directly related to high food losses as poor transport networks and storage facilities obstruct this section of the value chain. Increasing levels of rural to urban migration therefore exacerbate the need for shorter distances to transport food and ultimately shorter value chains. An increased focus on promoting urban food production would be key in reducing postharvest losses by shortening the gap and distance between the initial producers and final consumers. (Tel Aviv).

18. Prioritize vegetable value chains in PHL reduction

- Since PHL of vegetables is significant (global estimates are as high as 40%), reducing PHL in vegetables can help smallholder farmers out of poverty and improve their household food security. As a result, specific strategies to address losses in the vegetable value chains should be created. (Rome).

19. Incorporate fisheries sector into strategic policies to reduce food loss

- High levels of quality losses occur in the fisheries sector in regions such as sub-Saharan Africa. There is need to deepen the inclusion of the fisheries and maritime sector in FLW strategic policies and plans at the national, regional and global level. (The Hague).

20. Assess pre-harvest systems

- The impact of pre-harvest failures has not been explored in either global forums or measurements. There are requests for wide-scale assessments of pre-harvest systems, measurements of pre-harvest losses and a greater management and strengthening of pre-harvest systems to increase productivity. Analysis of pre-harvest losses has not been seen as important as PHL despite their transformative potential on food production. (The Hague).

TECHNOLOGY PROMOTION AND MANAGEMENT

21. Assist smallholders in measuring food loss through ic technology transfers

- It is necessary to improve the capacity of smallholders, particularly through cooperatives, to enable these actors to self-report on food losses. Through the transfer and adoption of sustainable technologies to measure food loss, farmers can be assisted in self-reporting mechanisms that can feed into national and regional reporting processes. Either through local initiatives or multi-national projects, farmers may use technologies ranging from low-cost cell phones and solar charges to the GS1 ITC portal developed in collaboration with UN Global Compact. (The Hague).

22. Promote South-South transfers of low-cost emerging ph technologies

- Stimulating South-South cooperation among developing countries, particularly in terms of technology transfers, is of great importance. Innovations to reduce food losses should be distributed or made available across the value chain, with multiple actors given access to these low-cost technological solutions. Some countries of the global South, like China and India, have set good examples. (The Hague).

23. Utilize and scale existing postharvest technology systematically

- Given the high competition for research funding, investments in PHL reduction must be highly selective in nature. A greater scrutiny should be employed in the process of choosing technologies for local adoption. Given the plethora of PH technologies developed and in development, major international development actors advocate for “picking winners off the shelf”, or utilizing or scaling up already existing technologies. A more systematic approach is needed in vetting and utilizing technologies. The technology pipelines, or the process through which technologies are developed and adopted, are not efficient and thus “congested”. Research innovations could take a backseat to scaling up existing technologies in order to maintain resource efficiency, take decisive action at the local level and prevent technology fatigue among actors. Significant investment capital is also required to fund the scaling up of promising technologies and innovative distribution models. (Rome).

24. Provide appropriate food packaging solutions for SMAEs

- The role of food packaging in ensuring global food security and safety cannot be understated. Food packaging not only protects against food loss and food hazards but also encourages national and international trade. Profitable SMAEs benefit national growth, while poor packaging impedes market access. (Vevey).
- It is crucial to develop small-scale packaging solutions that are intended to be more economically viable for less capital-intensive operations. These solutions should be made available in (deep) rural or remote areas where SMAEs' access to packaging solutions is limited. (Vevey).

25. Promote environmentally friendly food packaging options

- The environmental externalities of promoting increased packaging as a means to reduce food loss are worth paying attention to (Figure 3). Experts cautioned against promoting packaging as a panacea for food loss reduction and in turn, called for great accounting measures and monitoring of packaging waste. The creation and promotion of more sustainable packaging solutions that are environmentally friendly (e.g. biodegradable) should be encouraged, particularly in light of recent bans on packaging materials in Africa. (Vevey).

26. Study the impact of food packaging on food loss

- Food packaging is supposed to positively impact food loss reduction levels. However, it is necessary to implement studies to determine if this is truly the case. A greater global understanding of how much food is saved by appropriate packaging is necessary. (Vevey).

27. Introduce PHL technologies at the cottage industry level

- A greater adoption level of PHL technologies and processing equipment needs to be realized in industries at the cottage level. This would be crucial to diversifying the agriculture sector. Financial interventions will be required to facilitate greater access of technologies in the value chain and they should include loans and leasing models. (Rome).

Carbon Footprint (GWP) - The Packaging as Percentage of Total

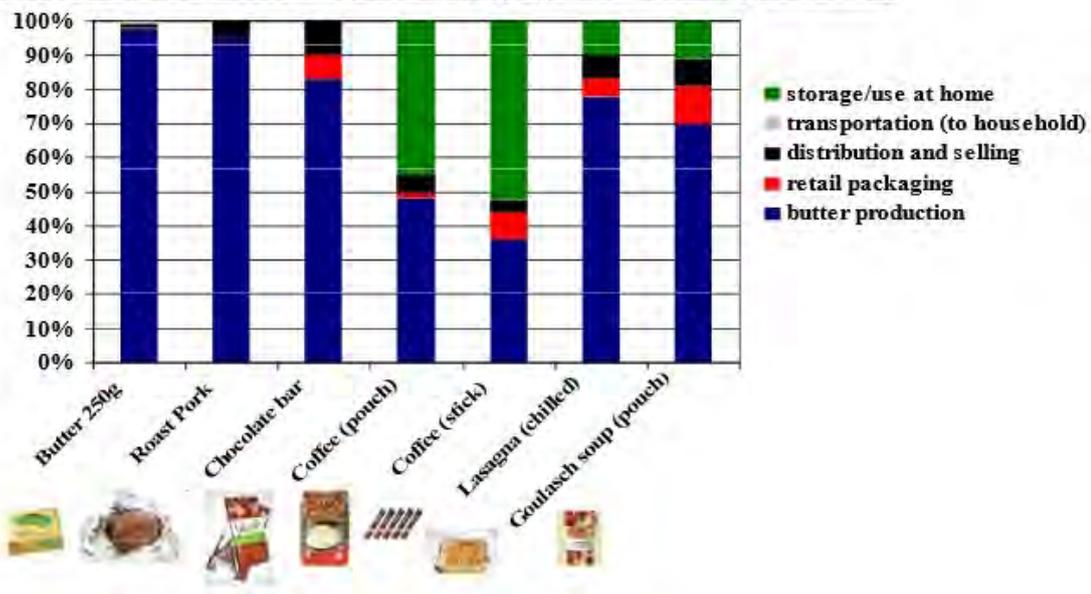


Figure 3: Percentage of total carbon footprint occupied by the steps of supply chains of various foods

28. Increase primary processing at farm and rural level

- In addition to diversifying the income and skills of farmers, primary processing extends the shelf life of raw produce and enables farmers to negotiate prices over a longer period. Processing tools and facilities should be more widely available at the rural/farm level, either through community processing centres or through subsidized support to cooperatives/individual farmers. (Rome).

29. Promote sustainable scientific entrepreneurship with a multi-generational focus

- It is necessary to mentor and promote highly-motivated and entrepreneurially minded scientists from developing countries who may work on commercial postharvest technologies and innovations in their home countries. The financial and socio-political barriers to realizing the potential of entrepreneurial young scientists are quite high in the global South, and infrastructural support and increasing access to capital are crucial prerequisites that must be realized in order for states to receive appropriate levels of output from these scientists. Specific mentorship programmes for young scientists is an urgent requirement in order to develop sustainable postharvest management systems. (Tel Aviv).

30. Shift focus from “low tech” to efficient and appropriate cutting-edge technologies

- There is an urgent need for a paradigm shift in global efforts to address PHL reduction in the developing world. Emphasis should be taken from introducing “low tech” or simpler technological solutions to efficient and appropriate cutting-edge technologies. Based on the example of solar energy, developing countries may be more willing or able to accept innovation. (Tel Aviv).

31. Prioritize low cost tests for toxins and other food safety hazards

- Funding needs to be increased for researches on cost-effective tests for detecting aflatoxin and other food safety hazards. Currently, testing solutions are unaffordable for most of the smallholder farmers. That farmers are unable to test for the safety hazards hampers strategic actions such as adopting technologies like hermetic storage and others (Figure 4). Given the complexity of the global issue of toxins, value chain-wide government support is crucial in lowering the costs of combatting this problem. (Rome).

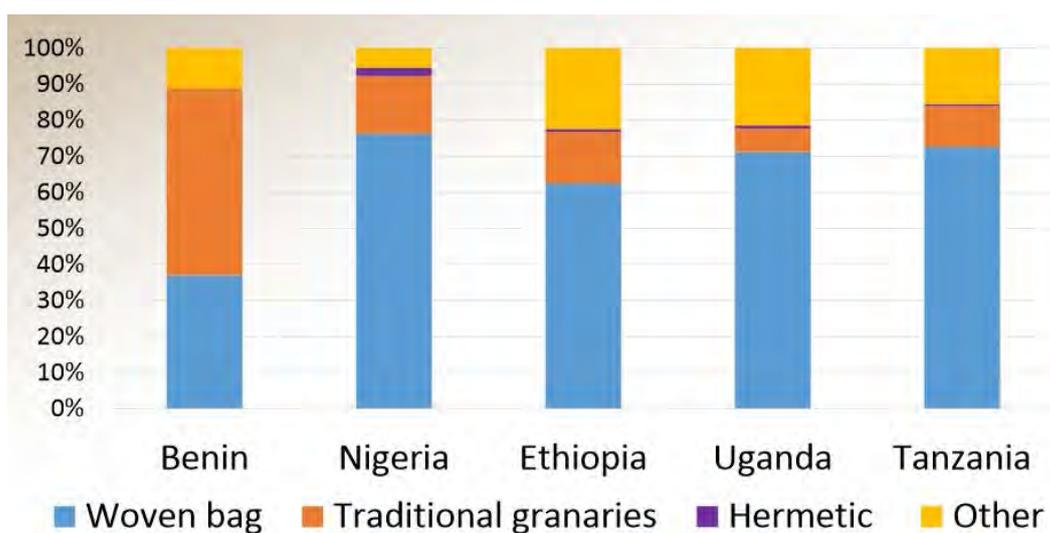


Figure 4: Storage technology use for maize in several African countries

LOCAL AND INDIGENOUS KNOWLEDGE

32. Adapt and utilize indigenous knowledge and practices for sustainable food storage

- Because of the successes and scientific merit of indigenous postharvest management techniques, particularly the use of botanical pesticides as a cost-effective and environmentally friendly alternative to synthetic insecticides, it is necessary to study indigenous practices more and, where applicable, develop their use in a rationalized and

more scientific way. These indigenous methods hold a huge potential for sustainable storage and handling at the farm level, especially with regard to the prevention of insect infestation. (Tel Aviv).

33. Source postharvest technologies locally

- Sourcing postharvest technologies locally has a positive multiplier effect. More projects and activities should consider local sourcing where possible as this will spur the development of the postharvest technology industry and embed technological production and dissemination in existing institutions and market mechanisms. (Vevey).
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LOSS MEASUREMENT

34. Develop a common understanding of food loss definitions

- The need for a common understanding of what food loss means is reiterated frequently. Without a common and widely held understanding of food loss issues, the success of programmes and intervention to curtail food loss will be compromised. A common language that is accepted and understood by all is of vital importance. To this end, the establishment of internationally recognized official glossaries on FLW is absolutely critical. (The Hague).

35. Facilitate the quantification of food loss at the regional level

- Regional action in the quantification of food loss is highly necessary. Regional economic communities such as the East African Community and the Caribbean Common Market should prioritize the quantification of food loss regionally and nationally. Regional bodies such as COMESA and SADC in sub-Saharan Africa should lead the streamlining of data collection in the measurement process. In Africa, the Forum for Agricultural Research in Africa (FARA) may be a potential leader in this area given its new scientific agenda and position in coordinating regional research agendas. (The Hague).

36. Ensure greater direct measurement of food loss

- Food Loss estimations have been shown to vary dramatically across studies and estimations of losses have been found to be problematic in a number of papers. In order to ascertain the benefits of PHL reduction, frame appropriate policies and direct investments more strategically, there is a critical need to develop better estimates of loss across value chains.

- While value chains may be similar in terms of the extent of losses, they may differ in terms of where PHL occurs. Therefore, intervention points may not be similar and this must be taken into account when designing national or regional strategies. It is widely held by PHL experts that current data and research are superficial and do not scratch the surface of loss estimation (Figure 5). Of the major global and regional estimations made over the last twenty years, very few have been direct. Greater direct measurement of food loss must be conducted in order to obtain reliable data. Estimations must be based on direct measurement and these measurement tools must be regarded as reliable by the PHL community. A team at African Postharvest Losses Information System (APHLIS, a network of cereal and grain experts, advocates that the methodology for measurements must be well regarded, open and transparent so that the PHL reduction community can criticize, recommend changes and, where possible, directly make improvements. (Rome).

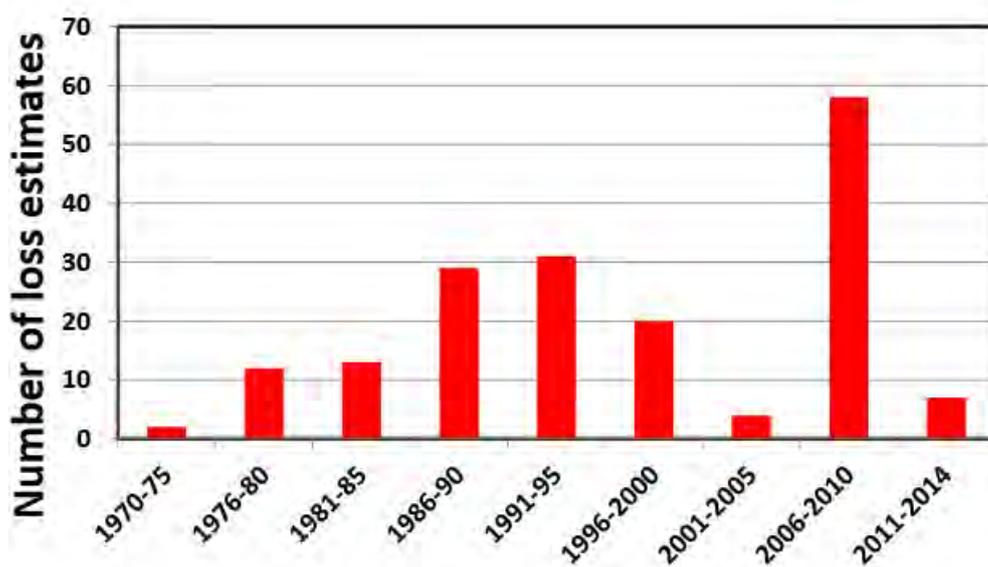


Figure 5: Age range of loss estimate publications used by APHLIS

37. Set realistic goals for food loss estimations in the developing world

- The importance of appropriate measurements for policy action has been widely discussed. There are concerns about an “over emphasis” on data at the expense of policy action. There is a disparity between how developed countries, particularly in North America and Europe, historically enabled PHL reduction and the current “tyranny of

data” expectations of developing countries, particularly those in sub-Saharan Africa. Experts from developing countries note that data expectations on loss estimates are somewhat unrealistic. They also point out that a blueprint for reducing postharvest losses involving intensive technological inputs have already been established by developed countries as a sustainable way to mitigate food loss.

- Conversely, the tools to improve postharvest loss are largely available and ready to be scaled. However, appropriate and reliable data can reduce the difficulty in deciding which tools to use in particular cases. Good measurements and data can enable greater efficiency in an environment with limited financial resources. Resultantly, governments and other actors are therefore able to invest resources based on appropriate data indicators, and investments are made in the most strategic areas and on the right solutions at a particular moment in time. (Rome).

SCIENCE AND TECHNOLOGY

TECHNOLOGIES FOR REDUCING FL

1. Increase access to ecological cooling systems for grains

- Wider adoption and promotion of ecological technologies, particularly grain cooling technologies, is much needed. These ecological grain systems have also been promoted as an appropriate alternative to silos or flexible storages. Since grains are an important resource for food security, greater innovation in ecological storage is critical as a way to promote household and global food security. These technologies may significantly prolong the integrity of grains and thus lead to reduced degradation. Cooling technologies also lower the drying costs, maintain the fresh smell and emancipates farmers and other actors from weather dependency. This technological innovation significantly cuts down on infestation, reduces the need for chemical treatments and increases storage time. (Abu Dhabi).

2. Popularize a multi-system approach to bio-control systems across the value chain

- A number of bacterial and fungal antagonists have been found to effectively control postharvest deterioration in produce. The commercialization of some of these antag-

onists to control postharvest decay of fruits and vegetables has become a feasible solution and presents a safer alternative to potentially dangerous pesticides — particularly dangerous for smallholders without the required training to successfully manage the application of pesticides.

- The characteristics of plant microbiome and how their antagonists contribute to PHL have drawn much attention recently. The microbial population on food surfaces plays a critical role in fruit preservation. By isolating the antagonists and coating the fruit with the microbiome population, the progress that lead to fruit diseases and deterioration may be halted.
- Previously, scientists only used microorganisms to coat the surface of fruits. However, this strategy was criticized and deemed to be inconsistent. Its success rates vary and the users have low levels of control compared to chemical treatments. Instead, a multi-system approach where two or more treatments are combined either with the same purpose or with different purposes could lead to direct or indirect effects on pathogens.
- There is immense innovative potential in utilizing genetic engineering to programme microorganisms to perform bio-control tasks. It is possible to build successful and stable synthetic postharvest bio-control systems. Governments from both developed and developing countries are encouraged to embrace the use of these less toxic and more environmentally friendly means of PHL control in order to protect the environment and prevent the negative impact of improper chemical use. (Tel Aviv).

3. Support the development of novel solutions to extend shelf life

- A crucial component of food loss prevention is the need to develop novel knowledge-based technologies within local food sectors that extend shelf life. Postharvest stressors such as chilling and dehydration are known to modify the normal ripening process and may also cause damages. Therefore, novel innovations that circumvent chilling and dehydration should be supported through research and inter-sector cooperation. Genetic engineering can help control the ripening process.
- PHL of fresh produce are very high worldwide, which result in profound economic losses and limited food supply. The ability to maintain the quality of stored fruits and

vegetables during postharvest storage is highly related to the physiological, biochemical and molecular characteristics of the plant from which they derive. Since these characteristics are genetically determined, they may be amenable to manipulation by genetic breeding or biotechnology. It was also suggested that governments and local institutions collaborate with the private sector to advance the understanding of the processes occurring after harvest as well as develop appropriate country-specific solutions. (Tel Aviv).

FINANCE AND INVESTMENT

1. Incentivize entrepreneurship in the recovery and redistribution of food

- The recovery and redistribution (r&r) of safe and nutritious food for human consumption has, among other actors involved, also entrepreneurs who are on the forefront of valorising food that would otherwise go to waste, and could become significant offtakers of food if supported by the right mix of r&r policies and financial investment. There is critical need for increased financial investments and access to capital for r&r entrepreneurs and their networks. In addition, this support may also include capacity building and donor matching to social entrepreneurs involved in the r&r industry segment. This support should take a “multilevel approach” (local, national and international) targeting small-scale to large-scale enterprises. (Vevey, The Hague).

2. Develop subsidy schemes to promote innovation

- In order to drive innovation in the food system, subsidy schemes need to be developed for entrepreneurs and other private sector actors that create innovations to reduce food waste in their daily business operations as well as among consumers generally. (Milan).

3. Financially discourage actions which lead to greater food waste

- High volume of food waste poses negative externalities of such as the environmental and economic costs that “are not landing in the right place”. These negative externalities should be redistributed for greater efficiency in the food system. To this end, disincentives such as taxes should be introduced to reduce food waste. In the case of food waste in landfills, consistent increases in a landfill tax may be introduced so that the costs of dumping food waste becomes financially unsustainable over time vis-a-vis food waste valorisation. Businesses and the general public should be made more aware of the existence of these externalities in order drive behaviour change regarding food waste. (Milan).

FOOD RECOVERY AND REDISTRIBUTION

1. Prioritize food recovery and redistribution

- Given the strategic importance of recovery and redistribution of food items for human consumption, this practice should be promoted on a wider scale. An appropriate policy environment which encourages recovery and redistribution networks and social enterprises should be established. However, resource efficiency should never be achieved at the expense of human, plant and animal health which should always be a prioritized. (Milan).



2. Create a friendly policy environment for food recovery and redistribution

- It is necessary to revise or remove the policies that restrict the redistribution of safe and nutritious food for human consumption. Food and hygiene policies should be effectively and efficiently implemented in order not to restrain the potential of food to be distributed and accessed. Greater efforts must be made to valorise wasted and lost foods for sustainable energy recovery. (Abu Dhabi).
- Existing legal frameworks often unjustifiably hinder the distribution of cooked food surpluses, thus policies, legislation and procedures should be established and/or strengthened to enable the distribution of consumable cooked surplus food without compromising appropriate food safety standards and regulations. (The Hague).
- The rules for food donation cut across a wide array of policies and regulations. They need to be better clarified in areas such as hygiene and finance for food banks. They also need to be widely shared and promoted among food banking networks and other

institutions involved in food donation. An examination of existing food donation legislations should be conducted on laws that affect food reutilization. Clarification is also required. Lifting these barriers would help to ensure the safe use and reuse of food. However, food safety still needs to be ensured in the assessment and possible revision of these legislations. (Milan).

3. Provide greater technical support to food banks

- Food banks play a critical role in the recovery and redistribution of edible food for human consumption. However, their role in this crucial activity to reduce global food waste was underscored by a lack of training, knowledge and technical expertise in areas such as food safety. In order to enable them to work more efficiently, private sector actors, such as corporations engaged in food waste reduction and the private research community, and public sector actors, such as government agencies and national research institutions, can provide training and mentorship to these organisations, particularly in the area of hygiene and food safety. (Milan).

4. Remove restrictive industry standards for accepting produce

- The cosmetic standards imposed by processors and retailers often lead to high levels waste of produce such as fruit and vegetables. The excessive demand for uniformity in the food sector drives this and must be addressed in order to make a systematic reduction in food waste. Retailers and processors should change their often unnecessarily high standards for accepting produce. This activity can be accompanied by consumer education. (Vevey).

DATE MARKINGS

5. Clarify date marking to reduce food waste

- Companies sometimes utilize date labels arbitrarily, resulting in inconsistent application of these labels to food items. Legislators should formulate clearer, more direct date label languages and promote greater understanding among all actors about what date labels such as “best before date” and “use by date” mean in order to circumvent unnecessary food waste. (The Hague, Vevey).

- The findings of the Eurobarometer research on "food waste and date marking" published by the European Commission confirmed the widely held view that date labels are often sources of confusion for consumers and that greater efforts have to be made to make them more understandable and informative. The importance of date marking is unquestionable but it needs to be better understood and utilized. The misinterpretation of common date markings such as "best before date" and "use by date" calls for a stronger communication with consumers, retailers and suppliers. This would require that these labels are simplified. However, this simplification must directly lead to food waste reduction while meeting consumer needs and maintaining food safety standards. (Milan).
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PARTNERSHIP BUILDING AND SENSITIZATION

6. Create alliances on food waste reduction

- The establishment of alliances or consortia on sustainable food systems is needed. These alliances should facilitate multi-sector dialogue with actors ranging from food service providers to farmers' organizations. These bodies should consistently provide encouragement to their members to reduce food waste as well as initiate plans and activities which are then assimilated by individual members. These alliances should also be developed at the local, national, regional and global levels as participants reaffirmed the need to take multi-sector action at all levels to fight food waste "from farm to fork". (Milan).

7. Develop a public-private sector joint agenda on innovation

- Innovations in the food system are crucial to combat the complex and ever changing social, economic and cultural phenomena that lead to food waste. As such, partnerships between governments and the private sector for innovation development can lead to greater effectiveness in solutions, increased efficiency in the use of resources, improvements in the quality of innovations as well as added scrutiny on investment choices. It is urgent to develop deeper ties between government and business in the area of innovation research and implementation. There have been some scalable examples of a joint agenda on research. (Milan).

8. Develop long-term behaviour change strategies

- In order to change the mind-set of consumers, long-term national and regional behavioural change communication strategy should be developed, with a focus on campaigns. The need for long-term efforts at behaviour change communication calls for initiatives such as an International Year of Food Loss and Waste reduction in order to mobilize efforts and coordinate actors to fight against FLW. (The Hague).

9. Initiate food waste sensitization programmes in the workplace of food industry

- The food sector, particularly retail and production industries, represent some of the largest employers in most economies. Given their unique access to a significant portion of the labour force, these food industry players can become more proactive in engaging their staff on food waste reduction. More employers could educate employees through special communications campaigns. (Vevey).

10. Develop educational campaigns for FW reduction

- Given the social nuances involved in changing attitudes to FW, educational campaigns about FW need to be developed across all academic levels as well as adult training. This would help shape values and attitudes to FW and sustainable food and nutrition security. Through interactive and engaging activities, a well-developed curriculum could help educate children, youth and adults, and thus create the pathway for a greater appreciation of these issues. It was emphasised that these partnerships should be multi-stakeholder and multi-sectoral in nature, particularly as it relates to curriculum development. (The Hague).

11. Utilize food labels as a tool to prevent food waste

- Food processors and retailers are encouraged to utilize food packaging, specifically food labels, as a tool to communicate a number of key messages and actions to reduce food waste to consumers. These included indicating the appropriate portion sizes on labels, providing consumers with meal guidance such as recipes for leftovers, as well as providing storage guidance. With this key information at the fingertips of consumers as well as other consistent initiatives, it is believed that over time there would be a measurable reduction in food waste levels. (Vevey).

12. Support digital social innovations to reduce food waste

- Social media and other digital innovations hold the potential to mobilise large swathes of the general public to act on food waste reduction. Greater support should be made to organizations working on social innovations which utilize information systems and technologies for food waste mitigation. As these innovations can connect stakeholders and facilitate dialogue among a vast range of actors, the European Unions' digital agenda may be used to support social innovation to reduce food waste, particularly targeting start-ups, small and medium sized enterprises and web-based entrepreneurs. (Milan).
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MEASUREMENTS

13. Establish multi-dimensional and cross-sectoral partnerships for food waste measurement

- Multi-dimensional, cross-sectoral partnerships are a key in the design and implementation of a standardized set of food waste metrics. As such, increased partnerships between actors in the food sector, taking a food systems approach must be applied in creating these metrics. (The Hague).

14. Data collection should consider local, cultural nuances of food waste

- The data collection process need to take account of the nuanced nature of food waste including cultural phenomena and seasonal activities. This would create an appropriate framework for FLW assessments. (The Hague).

15. Promote a FLW Protocol

- Given the wide-scale acceptance and promotion of the Greenhouse Gas Protocol, a single protocol for FLW needs to be developed. Current efforts to develop a FLW protocol led by the World Resources Institute (and supported by FAO and several other multinational and international development organizations) is a potential starting point in this process. (The Hague).
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UTILIZATION OF FOOD WASTE

16. Support initiatives on transforming food waste into viable products

- Transforming food waste into viable products offers sustainable and environmentally friendly solutions to the untenable levels of food waste in landfills and its impact on climate change. Greater policy support needs to be provided to initiatives that innovate on closing the nutrition cycle, particularly those which focus on valorising food waste by using it as a substrate for insects, which larvae can be used as animal protein. Experience sharing and collective action are critical for this purpose. (Abu Dhabi).

FINANCE AND INVESTMENT

1. Develop and coordinate funding mechanisms for FLW

- Large-scale funding mechanisms for FLW reduction efforts are lacking, thus the development of these mechanisms is critical to support innovations in FLW reduction, and to develop FLW initiatives, particularly in least developed countries.
- In order for resources of FLW reduction to be more efficiently utilised, a greater coordination is needed in the donor community active in FLW mitigation at all levels of action, from local to global. This coordination could be made through an alliance of donors with the support of international organisations and national governments or regional commissions. This would enable donor groups to create a shared agenda on areas such as PHL reduction or innovations and could significantly reduce the overlap which takes place in projects and programmes on the ground. (The Hague).

2. Explore climate finance and investment opportunities for FLW reduction measures

- The successful experiences of climate finance should be analysed, adopted and adjusted for the investment and finance activities in FLW reduction. Climate finance provides an important and untapped opportunity to mobilize private and public sector capital to FLW interventions that also contribute to climate change mitigation and adaptation. Climate finance and investment opportunities towards building low-emission and resilient food supply chains should therefore be outlined and explored.
- Climate financing instruments and sources provide useful tools and good practices that can be valuable for FLW reduction efforts. Following examples from climate finance, FLW should be embedded in the eligibility criteria of multilateral funds, especially in the area of climate-smart agriculture. An entry point could be building capacity and knowledge of FLW and its importance in the global climate policy debate.
- More attention should be paid to finance and investment for climate-smart agriculture. A potential pathway could be to incorporate food loss reduction into the concept of climate-smart agriculture. Additionally, it is also necessary to align the strategies for climate-smart agriculture with policies and programs for preventing and reducing FLW through cooperation with organizations such as the Global Alliance for Climate-Smart Agriculture. (The Hague).

PARTNERSHIP BUILDING

3. Create a global coalition of actors advocating on food loss and waste reduction

- Establish a coalition named “Champions of 12.3”, to advocate on food loss and waste reduction at national, regional and global levels. Target 12.3 of the UN Sustainable Development Goals calls for a 50% reduction in per capita global food waste at the retail and consumer level by 2030, as well as the reduction of food losses along the supply chains, with a specific focus on the reduction of PHL. Champions 12.3 will be a high-profile, voluntary and inclusive partnership of leading governments (country, state and city), businesses, international organizations, research institutions and civil societies dedicated to inspiring ambition, mobilizing action, and accelerating progress toward achieving SDG Target 12.3 by 2030.
- In order to break down the silos between the donors and other actors in the FLW community such as policymakers, FLW reduction entrepreneurs and non-profit leaders, initiatives must be established to enable dialogues and joint actions among these groups.
- In order to leverage the current interest generated by the sustainable roundtables and forums such as private consortia, increased efforts must be made to mainstream FLW issues in current activities, beginning with sensitizing members of these forums about the issues of FLW. (The Hague).

4. Create networks of research institutions for food loss and waste measurements

- It is recommended to establish a network of academic and research institutions on FLW dedicated and designated as “observatories” for bridging information gaps and collecting data for knowledge sharing at local, regional, national and international scales. These networks need to be interlinked or connected with global mechanisms such as the United Nations and the CGIAR (Figure 6). This would enable these mechanisms to exchange and compare information, data and knowledge and convene periodically to provide updates on the status of FLW in their respective areas of work or geographic spaces. (The Hague).

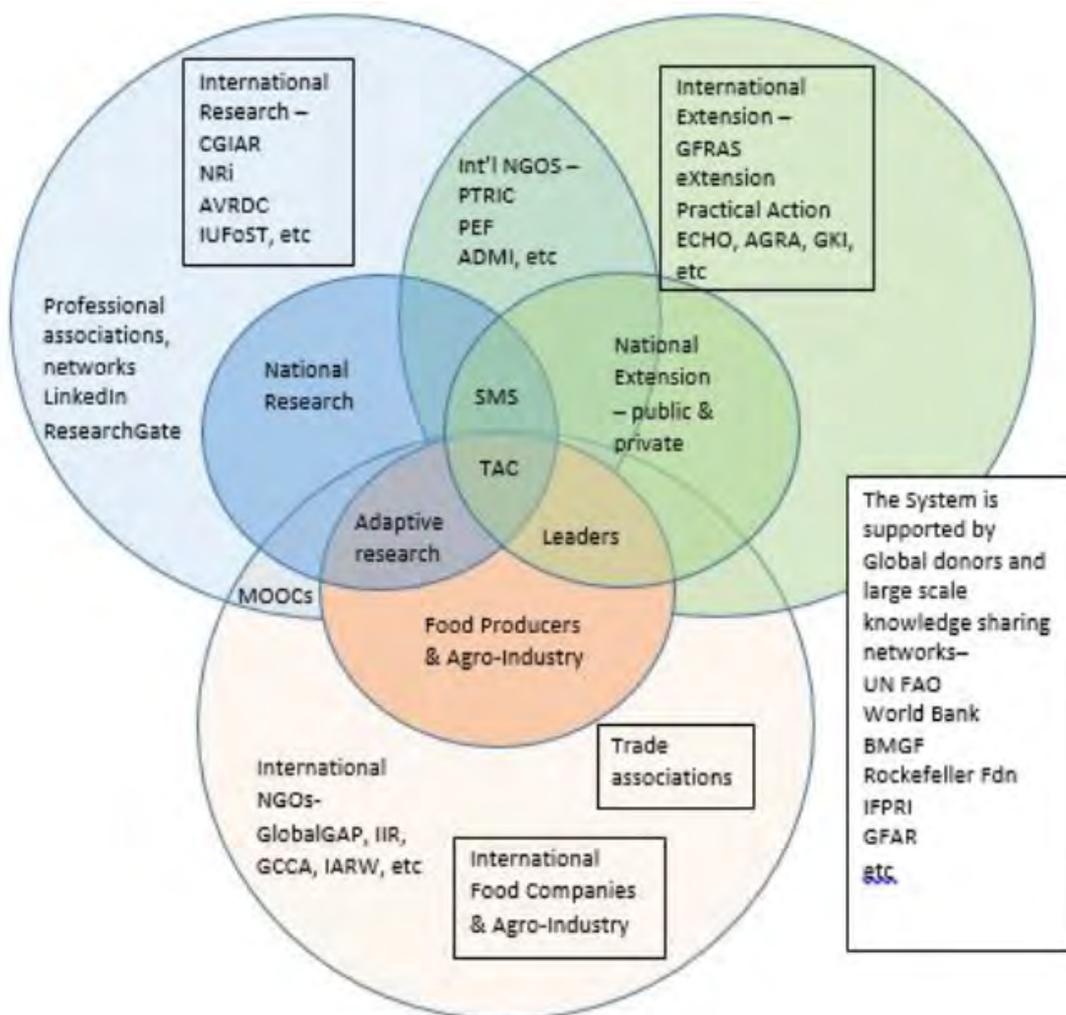


Figure 6: Global model of efficient Research – Extension – Clientele linkages

5. Build synergies, support policy coherence and coordination on FLW

- Multi-stakeholder actions are required to find synergetic solutions for the recycling and recovery of FLW. These actions should include the private sector, social enterprises and research institutions (as well as other relevant actors) in order to scale up technical solutions and business models.
- The coherence and coordination of FLW policies need to be strengthened across sectors and objectives. For example, actors involved in developing sustainable food consumption policies and legislation should be engaged with actors working in other areas such as food safety. This approach should go beyond food products to include non-food products such as biofuels, animal feed and other products related to the agri-food system. (Dresden).

6. Assess the social, economic and environmental costs of FLW concurrently

- In view of the disorganized and arbitrary nature of most food loss assessments, there is a need for multidisciplinary, concurrent assessments of FLW costs, through a number of case studies to examine the economic and socio-environmental costs and advantages while simultaneously outlining the most appropriate and effective investment options (Figure 7).

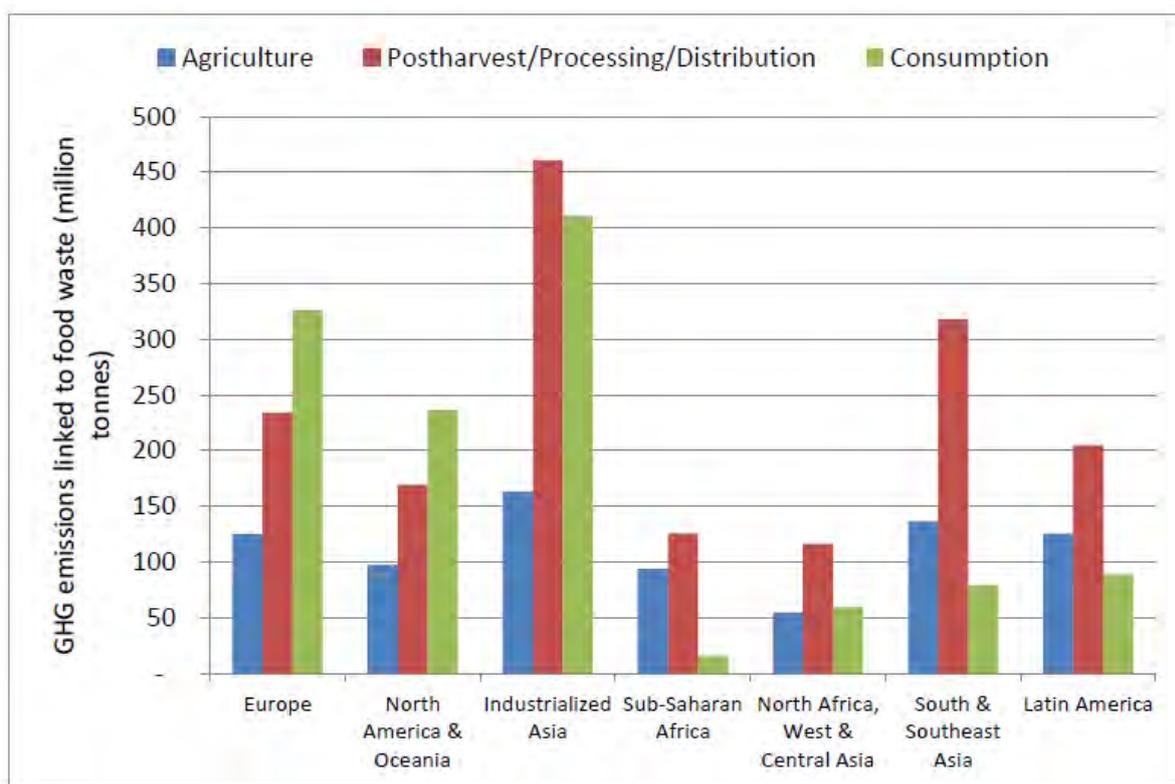


Figure 7: Regional carbon footprint of food waste

- This could lead to the development of a consistent framework that considers the costs and benefits of FLW reductions concurrently so that FLW can be monitored more efficiently. (Dresden).

7. Facilitate access to existing knowledge sharing and capacity building initiatives

- SAVE FOOD plays a crucial role as a platform to coordinate global actors on FLW reduction and facilitate capacity building. To this end, greater support must be provided to the growth and expansion of SAVE FOOD and other existing platforms which connect stakeholders at local and global levels, share good, scalable practices for strengthening FLW knowledge and build up partnerships between public and private sectors, academia and civil society. (The Hague).

BIOMASS

8. Shift definitions from “food loss (and waste)” to “biomass loss”

- Due consideration need to be given to the demand for non-food biomass and the resulting economic, environmental and human development impact, Including the resource competition between food produced and bio energy (such as biofuels).
- The term “biomass loss” should be adopted at the policy level since food no longer fit for human consumption can be transformed into other uses such as fuel, organic manure, animal feed and starch for household consumption, etc., and is as such not ‘lost’. Focusing on “food losses” as a definition does not factor in the multiplicity of re-use possibilities the food bio-energy contains. (Dresden).

9. Promote the biomass-based value web as a more systematic way to contextualize FLW

- The biomass-based value web was promoted as a useful and novel alternative to the value chain. Conventional value chain approaches analysing single value chains were criticized for failing to account for or address the interrelation between different value chains and the opportunities for increased synergy and efficiency in the entire biomass sector.
- A three-step process unique to the biomass-based value web approach was outlined. In the initial phase, a description of the material flows from all the crops is prepared. The actors of the biomass based value web are also identified. In the following stage, the financial flows and opportunities among food chains and sectors are then explored, after which local bottlenecks and opportunities of improving the system productivity and food security in the biomass-based value web are discussed. Finally, an outlook is then given on how the analytical approach of biomass-based value webs can improve the understanding and efficiency of the bio-economy. (Dresden).

CONCLUSIONS

The **2015 Series of International Conferences on Food Loss and Waste Reduction** served not only as a platform for discussions but also as an opportunity to take stock of the key priorities and possible intervention points for FLW reduction. The participants shared a number of local, national and regional FLW scenarios and expounded on the gaps that resulted in the under-performance of value chains.

FLW is a complex issue, so the solutions require synergies among a wide range of stakeholders. Existing networks, platforms and initiatives on FLW must be streamlined and integrated. The conference participants made many individual and institutional recommendations on policy foci and strategic actions that stakeholders such as governments, the private sector, the donor community, research institutions and international development organizations can and should take, proving that *major interventions are required at the governance level*. Accordingly, *national actions plans on FLW need to be prepared*. Their components should include research, partnership building, field projects and investment plans, with support from the international FLW experts.

Some of the key recommendations arising from the conferences related to improving market access for farmers and small and medium agro-enterprises, creating appropriate and targeted research for value chain development and providing financial access to smallholders. The importance to support smallholder farmers, both women and men, in various ways was repeatedly stressed in the conferences.

Food losses in the context of climate change was also a recurrent topic throughout the conferences, particularly regarding *climate finance and investments*. Addressing the food loss challenge presents an important opportunity to enhance climate action with contributions to both mitigation and adaptation objectives. However, the current climate financing architecture along with the supportive policy frameworks remains *an untapped funding source for food loss reduction measures*. There is therefore a strong need for building the capacity of stakeholders for identifying climate-smart solutions to food losses, outlining technology needs and accessing finance for these solutions and needs. At the same time, these approaches must be recognized at policy and cross-sectoral levels and integrated into climate

change strategies. Additionally, as climate change is addressed according to sectors rather than along a supply chain, food loss considerations must be mainstreamed across sectors.

On the technological side, conference contributors keenly highlighted *the role of food packaging* in reducing food loss and enhancing food security and called for new research in this area. The importance of systematic promotion of postharvest technologies and employment of locally adaptive technologies was also frequently mentioned.

Among the recommendations for food waste reduction, government and corporate policies that can facilitate *recovery and redistribution of safe and nutritious food* for human consumption were highlighted. Various community level initiatives, such as gleaning networks, food banks and food pantries and social supermarkets, are being implemented worldwide along supply chains from primary production to end consumer. The dual approach of reducing FLW at source while implementing and monitoring the recovery and redistribution of safe and nutritious food presents challenges and opportunities for all food system actors, including end consumers. In this respect, empirical country-level data are needed together with access to multi-stakeholder dialogue platforms, resource mobilization, appropriate infrastructure and public-private-civil-society partnerships. Tools that ensure food safety and quality (including human nutrition) as well as monitoring and evaluation are required. If feasible for context-specific implementation, recovery and redistribution has been highlighted as an opportunity. However, it cannot substitute efforts to strengthen the availability and accessibility of safe and nutritious food and reduce and prevent FLW at source. Social protection measures must address the underlying poverty and inequality that subsequently generate food and nutrition insecurity.

Other recommendations on food waste reduction generally focused on appropriate date marking behavioral change. Providing incentives to private-civil society activities, especially those focusing on innovation, was referred to as an example of reducing food waste via appropriate financial instruments. Measures aiming to raise awareness and change the behaviours of tomorrow's consumers, such as education campaigns, financial incentives and the development of long-term strategies, were also underlined frequently.

The issue of FLW measurement was prioritized. There were frequent discussions about the reliability of current estimations given that very few global and regional assessment studies have included wide-scale value chain analysis and direct measurement. It was argued that lessons learnt from recent studies on FLW indicate that it is problematic to extrapolate losses, especially from specific loss situations, due to issues such as the low accuracy of loss survey techniques and the highly diverse situations. *A need to harmonize the terminology, definitions and methodologies of FLW measurement* worldwide was stressed repeatedly. The FLW Protocol being developed by the World Resources Institute (WRI) was promoted widely during the conferences and participants were generally enthusiastic about its development. The FAO Global Food Loss Index, an indicator for SDG 12.3, was also underscored. Governments, the private sector and the civil society were encouraged to further explore the means of coordination towards monitoring and reporting on FLW.

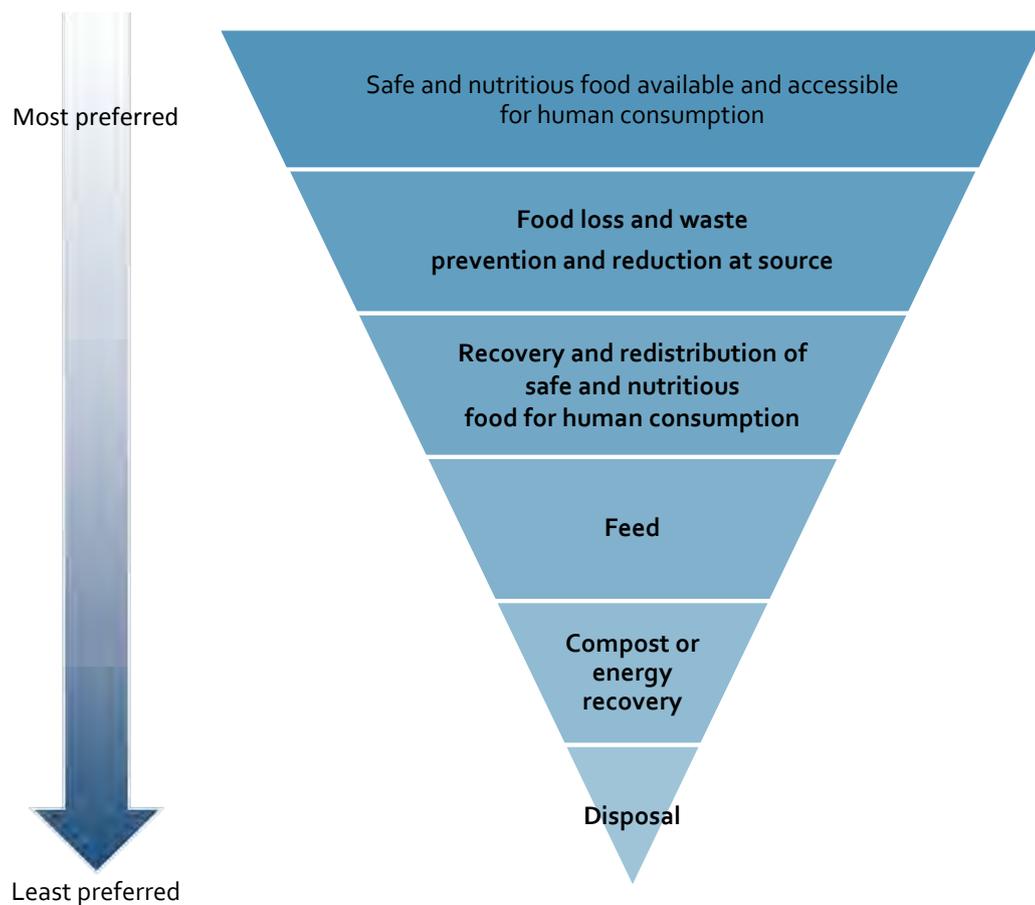


Figure 8: Food-use-not-loss-or-waste hierarchy, adapted from CFS 41 by Bucatariu, C., 2015

The wide support these conferences received by the members of the international development community, national and regional governments, research institutions and academia has demonstrated the high level of sophistication and drive inherent in the global efforts to reduce food loss and waste.

The outcomes from the conferences findings, SAVE FOOD hopes, will provide a record of the state of global priorities in 2015 from the point of view of FLW experts and other key stakeholders from industry and elsewhere. The final conclusions of this report will also help to guide SAVE FOOD's activities in 2016 and beyond, particularly in areas such as supporting sustainable, coherent and coordinated policy formulation at national level and partnership building. In this respect, SAVE FOOD will promote the continuation of the discussion in 2016 *at regional and subregional level*, aiming at the development of national action plans for FLW reduction.



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