



Food and Agriculture
Organization of the
United Nations



Zimbabwe Government



NORWEGIAN MINISTRY
OF FOREIGN AFFAIRS

PROCEEDINGS OF THE REGIONAL VALIDATION WORKSHOP ON FOOD LOSS REDUCTION STRATEGY DEVELOPMENT IN FAVOUR OF SMALLHOLDER PRODUCERS IN AFRICA – HARARE, ZIMBABWE

15-17 MARCH 2016



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ACRONYMNS

CAADP	Comprehensive Africa Agriculture Development Program
CoP	Community of Practice
EU	European Union
FAO	Food Agriculture Organization of the United Nations
FLR	Food Loss Reduction
GoZ	Government of Zimbabwe
IFAD	International Fund for Agricultural Development
LGB	Large Grain Borer
MOA	Ministry of Agriculture
PHL	Post Harvest Losses
SDC	Swiss Agency for Development and Cooperation
UNEP	United Nations Environment Program
WFP	World Food Program

Introduction

In 2015, FAO undertook assessments of the extent and causes of losses along selected food supply chains in a number of African countries. The studies were undertaken under the mandate of the regional project '*Food loss reduction strategy development in favour of smallholder producers in Africa*' funded by the Government of Norway, with support from the Swiss Agency for Development and Cooperation (SDC).

The aim of these studies is to contribute to a broader understanding of the causes of losses, their magnitude and socio-economic impact. The workshop was meant to identify strategies and practical solutions to reduce losses, with the aim of increasing efficiency of key food supply chains and improving food security. The identified strategies and solutions would form the basis of a proposal for a second phase of the project aimed at reducing losses in prioritized food supply chains.

This approach contributes to the achievement of the Malabo Declaration's Accelerated Agricultural Growth and Transformation Goals, specifically commitment 3: Ending Hunger in Africa by 2025, through the halving of post-harvest losses from their current levels. The delegation from the participating countries comprised a member of the team who conducted the assessment, a government representative, a representative from the private sector and an officer from the FAO country office. In addition, FAO invited delegates from some non-participating countries to learn from those who had undertaken the assessments.

The findings of these studies were presented at the regional workshop held in Harare, Zimbabwe from the 15th to 17th March, 2016. There were about 110 participants from the following countries: Botswana, Ethiopia, Kenya, Malawi, Mozambique, Namibia, Rwanda, South Africa, Swaziland, Tanzania, Uganda, Zambia and Zimbabwe at the three-day workshop.

A workshop evaluation was provided at the end of the workshop and responses are in Annex 2 of this report.

Workshop objectives

The objectives of the workshop were to:

- Broaden understanding of the causes and magnitude of food losses;
- Identify strategies and practical solutions to reduce food losses;
- Agree on the next steps to develop a programme on food loss reduction.

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## OPENING CEREMONY

### **Representative Mr. Reto Wieser: Regional Director, Swiss Agency for Development and Cooperation (SDC)**

Effects of food losses beyond agricultural production have already been reported in Zimbabwe such as price inflation or decreased school attendance which will have far reaching consequences for the children's future. Addressing food losses is important as it starts immediately after harvesting and each kilogram that can be saved is relevant for smallholder farmers, hence the importance of this regional workshop.

In Sub-Saharan Africa, an estimated 30% of grain produced annually is lost representing over 20 million tons of grain, valued at over \$4 billion. This would be enough to meet the needs of an additional 48 million people. While in the Eastern and Southern Africa it has been suggested that the value of food losses amount to \$1.6 billion dollars, which is about 40% of the losses in the whole of Sub-Saharan Africa. The annual food losses by far exceed the total of international food aid provided to Sub-Saharan Africa.

95% of all research investments in the past 30 years have focused on increasing farming productivity, with only 5% going towards reducing post-harvest losses. While increasing farmer productivity is critical, evidence suggests that priority must also be given to improving handling and storage practices at farm level in order to improve food security at that level. Food losses represent a waste of resources used upfront in production such as land, water, energy, labour and inputs, while at the same time increasing the greenhouse gas emissions. Both quantity and quality losses put a strain on the already over-burdened economies of the Sub-Saharan Africa countries, resulting in high food prices.

Post-harvest loss reduction offers the particular advantage of increasing food availability without requiring additional land, water, labour and agricultural inputs for additional production. In light of this, the SDC has since the 1980s, been promoting food loss reduction solutions. Its initial programs were in Central America. An assessment of SDC activities was conducted in 2015 and reported that over 600,000 families had been able to reduce food losses using the metal silos technology.

Such large-scale improvements can be achieved over time elsewhere in the world, particularly in Africa. Besides a series of food loss reduction projects in Africa - Ethiopia, Benin, Mozambique, Tanzania, Malawi, Kenya, Zambia, Zimbabwe, SDC has partnered with FAO/IFAD/WFP as a Convener, since 2011, to bring momentum and increase the community of stakeholders engaging in food loss and waste reduction.

In parallel to this, SDC co-finances the Community of Practice (CoP) at FAO's Save Food website. The CoP is a forum to learn and share experiences and knowledge, partnering and mainstreaming food loss and waste reduction in projects. It strives at providing

evidence of promising approaches and practices at field level into the efforts for improved post-harvest management at macro level.

Such interventions respond to the African Union Malabo Declaration to reduce post-harvest losses at least by half by year 2025 and the SDC has collaborated with the AU Commission (Department of Rural Economy and Agriculture) to participate in related technical/political discussions at continental and Regional Economic Community levels.

In conclusion, Mr. Weiser mentioned that more innovation was needed for suitable postharvest management solutions in Africa. Experience in Central America, for example, had shown that market-based solutions were necessary as other forms of subsidies would never be sufficient to reach masses of farm families.

The SDC recognizes that postharvest management is neither a purely technical nor exclusively economic issue. At household/farm level, for example, postharvest management has strong cultural and gender dimensions in respect to distribution of roles and also in accessing the harvest for both domestic and market purposes.

Finally, postharvest management at household level is closely linked to the cost of the technology promoted. For households with surplus grain to sell, it is also linked to the pricing policies and market preferences for the stored grains. Thus, if the quality of stored grain is not acknowledged by the market, investments in improved technologies tend to be non-economical. An approach to postharvest management that looks at all the stages of the value chain should be promoted.

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IFAD Remarks: Robert Delve, Agronomist, Policy & Advisory Division, IFAD

For IFAD, the focus has focused been on rural poverty reduction in developing countries to eliminate poverty, hunger and malnutrition; raise productivity and incomes; and improve the quality of lives. The Fund also seeks to influence policy in an effort to minimize negative effects of global trends whilst increasing incentives and opportunities for the rural poor. In the policy area, with the active involvement of civil-society organizations, IFAD has supported agricultural research, rural financial services, decentralization policies and practices and market-based agrarian reform.

Mr. Delve explained the recently collaboration by IFAD, FAO and WFP in a joint project financed by the Swiss Agency for Development Cooperation, to tackle the global problem of food loss. The three-year project focuses on reducing losses of grains and pulses such as maize, rice, beans and cow peas – staple foods that play a significant role in global food security and have a major impact on the livelihoods of smallholder farmers. The project will also identify critical points for losses in pulse and grain supply chains in three African pilot countries – Burkina Faso, the Democratic Republic of the Congo and Uganda – and identify and test potential solutions to issues such as ineffective harvesting and

handling, storage moisture levels and attacks by pests. In conclusion, Robert welcomed the collaboration IFAD has had with other Rome based UN agencies in the Zero Hunger Challenge launched by the UN Secretary General.



FAO Remarks: Sub-Regional Coordinator for Southern Africa and Zimbabwe Representative: Dr Chimimba David Phiri

Dr. Phiri explained that the Workshop was being held at a time when the problem of food losses and waste had become a global concern thus calling for Global Action. The report released by FAO in 2011, and the summary statement that one third of the food produced for human consumption is lost or wasted, had triggered a considerable number of reactions in the global arena resulting in many initiatives and research on this issue.

The High Level Panel of Experts on Food Security and Nutrition in its 2014 report noted the extent of food losses and waste impacts on food security and nutrition and the need to be reduced to ensure sustainability of food systems. At the Global level, Zero losses and waste is one of the pillars of the Zero Hunger Challenge launched by the Secretary General Ban Ki Moon in Rio+20. FAO, UNEP and UNIDO are now the co-chairs of this element of the Zero Hunger Challenge.

Global Action means action at all levels, and especially, the mobilization of all actors, along food value chains, from production to consumption. It also means that action has to be tailored to regional and national specificities and priorities. FAO's involvement in the reduction of food and post-harvest losses is not new. The organization combines extensive technical expertise in the post-harvest sector with long institutional experience of reducing post-harvest losses in sub-Saharan Africa. FAO's systematic involvement in post-harvest losses dates back to the late 1960s with the Freedom from Hunger Campaign. The Organization established the Action Programme for the Prevention of Food Losses (PFL) in 1978 which ran through to the early 1990s and had the objective of assisting developing countries identify post-harvest losses and implement programmes for their reduction at the national level through direct action projects. FAO hosts a repository of post-harvest information available to member countries. Furthermore, several technical divisions in FAO have focused on the commercialization of small-scale agriculture over the past few years, whilst piloting business models that link small producers to agro-industries and commercial markets. This is a key element of PHL reduction. FAO has also been a key partner and contributed its expertise to recent PHL reduction initiatives led by the World Bank and the African Development Bank.

In light of the renewed and global efforts to reduce food losses, FAO has used its technical expertise and experience on postharvest losses, to formulate the Global Initiative on food losses and waste Reduction called the SAVE FOOD Initiative.

The solutions to reduce food losses and waste need to be thoroughly considered and evaluated based on technical feasibility, economic profitability, social and cultural acceptability as well as environmental soundness.

Dr Phiri gave thanks to the Norwegian Ministry of Foreign Affairs for supporting the workshop. He believed the workshop would result in a stronger resolve and increased interest from various African governments, institutions and research organizations to jointly and concretely address food losses and waste, identify actions and enhanced partnerships for effective and sustainable food losses and waste reduction.



Official Opening: Minister of Agriculture, Mechanisation and Irrigation Development, Hon Joseph Made, M.P.

The speech by the Zimbabwe Minister of Agriculture Mechanisation and Irrigation Development was read by the Principal Director Department of Research and Specialist Services Mrs Danisile Hikwa. The Minister noted that the workshop came at an opportune time, as the last few years had seen an unprecedented increase in global awareness and concern on the extent of loss and waste occurring in food supply chains. A report by the World Bank, FAO and the Natural Resources Institute in (2011) estimated that grain losses in sub-Saharan Africa alone were worth USD 4 billion a year – enough to provide minimum food requirement of 48 million people. These levels of loss were unacceptable, especially on the African continent where food and nutrition insecurity remains a major challenge. The Minister was pleased to note that the reduction of food losses is increasingly being recognized as a priority by African leaders and therefore being positioned as an integral component of sustainable food systems. The impetus to reduce post-harvest losses has gained further momentum through the adoption of the Malabo Declaration on Accelerated Agricultural Growth and Transformation by African Heads of State. The Malabo Declaration has adopted seven key commitments including the commitment to Ending Hunger in Africa by 2025.

But to succeed the Minister noted that new strategies and approaches were needed to reduce food losses waste specially, due to the rapidly changing nature of agri-food systems as well as the need to address a variety of inter-related drivers such as:

- a) Global market integration
- b) Increasing influence of the private sector
- c) Urbanization and dietary changes, including greater demand for processed and convenience food
- d) 'Lengthening' of food supply chains, which now cover increasing distances from rural to urban centres and accommodate an increasing number of actors engaged in logistical and value adding initiatives.

In view of these changes, intervention strategies need to focus on systematic improvements to the efficiency and sustainability of the entire supply chain rather than the single point interventions of the past. This requires clear roles for both the public and private sectors as governments cannot by themselves reduce losses. The role of the public sector is to provide

an enabling environment; conducive policies and institutional and regulatory frameworks that will enable private sector actors to develop modern and efficient food supply chains with minimal losses and maximum benefits for all value chain actors.

The Minister noted that much of the post-harvest loss data used for policy making is outdated and not evidenced based. In addition, much of the data collected in the past was quantitative yet qualitative losses are equally important. The private sector has not been fully engaged in the fight against food losses thus strategies to reduce food losses should have a value chain approach. On the issue of gender, the Minister noted that strategies for reducing food losses at community level should take into account the critical role played by women.

The role of institutional and regulatory frameworks in reduction of food losses is often not well appreciated. Measures such as: a) enforcement of food standards; b) well-functioning marketing structures; c) financial institutions favourably disposed to the agricultural sector; d) commodity associations; e) strategic public-private partnerships, and many others, play a critical role in reducing food losses.

The Minister explained that in Zimbabwe, post-harvest management is a relatively new science and most extension staff have not been well trained in this subject. In-service training has been mostly used to build their technical capacity. More needs to be done to build a cadre of staff knowledgeable in post-harvest issues with skills to advise not just farmers, but other value chain actors.



The Global Initiative on Food Losses and Waste- Global Overview: Robert van Otterdijk, FAO

Global food losses and wastage stands at 1.3 billion tonnes. In industrialised countries, food gets lost when production exceeds demand. Therefore this requires more communication and cooperation among farmers. In developing countries however, food gets lost due to poor production planning and premature harvesting. The solution is in improving the efficiency of food supply chains through organizing farmers and diversifying and upscaling production and marketing. New strategies on food losses are being promoted due to:

- growing influence of private sector led enterprises
- global market integration
- urbanization
- growing south-south food trade
- 'lengthening' of food chains

This requires a supply chain approach. The basic pillars of save the food are:

- Awareness raising on the impact of, and solutions for food loss and waste.
- Collaboration and coordination of world-wide initiatives on food loss and waste reduction.
- Policy, strategy and programme development for food loss and waste reduction.
- Support to investment programmes and projects, implemented by private and public sectors.

Key issues of food loss and waste reduction are:

- To increase food availability as food loss and waste reduction is in principle far more efficient than increasing food production.
- Only the Private Sector can reduce food losses at a significant scale.
- The Public Sector does research and provides guidance. It creates the enabling environment for the Private Sector to invest and act.
- Food loss and waste have to be tackled along the whole food supply chains, in the context of sustainable food systems.

Global initiatives on food loss and waste reduction include the UN Secretary General's Zero Hunger Strategy; UNEP Think-Eat-Save Initiative; EU Consortium 'FUSIONS' (food waste in Europe); OECD (policy development); Global FoodBanking Network (GFN); Federation of European Food Banks (FEBA); 'Food for the Cities' programme; Local Governments for Sustainability (ICLEI); Alliance Against Hunger and Malnutrition (AAHM). International Federation of Red Cross/Crescent Societies (IFRC); African Development Bank: *"Post-Harvest Losses Program"* 5-years, US\$1.7 billion and the African Union *"Support to regional capacity building to reduce postharvest losses"*.

The Workshop would discuss the case study approach that was carried out in the various countries which included: Selection of food supply chains and use of Uniform Methodology across countries; Identification of 'Critical Loss Points'; Recognition of 'Good Practices' and holding national validation workshops to help craft national food loss reduction strategies.

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## Food Loss Reduction in Africa – FAO’s Role: Stephanie Gallatova, FAO

Much of the post-harvest loss data used for policy making is out-dated and not evidence based. Most attention has been on quantitative losses but qualitative losses are just as, if not more, important. Focus at farmer level without considering the entire value chain and role of the private sector can distort findings. The Role of policy, institutional and regulatory frameworks has often not been well appreciated. This includes lack of knowledge on post-harvest practices and full consideration of gendered aspects in many communities.

### Strategies for Africa:

Building evidence base on the extent and major causes of losses through loss assessment studies in selected food supply chains. This includes Identifying good practices and solutions to reduce losses. There is also need to identify needs for capacity building at policy and value chain level. This included the development of a programme for reduction of food losses

The Methodology took the following form:

- **Preliminary screening.** Based on secondary data, documentation, reports and consultations with key stakeholders
- **Field Survey.** Interviews/questionnaires with various actors along the supply chains combined with field observations
- **Load tracking and sampling.** For quantitative and qualitative analysis at any step in the supply chain
- **Solution finding.** Development of an intervention programme to reduce food losses based on the assessment

The Current position:

- Loss assessment studies on selected food supply chains have been conducted (or on-going) in 16 African countries
- This workshop aims to bring together the knowledge gained from these studies to initiate development of a programme on food loss reduction.

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Community of Practice on Food Loss Reduction: Mireille Totobesola, FAO

The UN Rome based agencies (RBA) launched a joint project on Mainstreaming Food Reduction Initiatives for Smallholders in food Deficit Areas”. The Impact was to ensure:

improved food security and income generation opportunities through reduction of food losses in supported food grains and pulses value chains. The outcomes of the project are: Good practice options for reducing post harvest losses are compiled, disseminated and scaled up (Community of Practice and E-learning); Improved handling and storage options benefiting smallholder farmers in pilot countries (Burkina Faso, Uganda, the Democratic Republic of Congo); Policy and regulatory framework (policy, standards) on reducing food losses in food supply chains are introduced and implemented at national and regional levels.

In 2012, CoP carried out an assessment in which there was:

- Need for a global convener and an integrator of knowledge related to post-harvest loss (PHL) reduction to facilitate linkages, information & knowledge sharing amongst stakeholders and relevant networks, projects and programs; and coordination
- Design of a dynamic platform – to avail background information, relevant news, events, online discussion fora, resources (online libraries, databases, repositories with relevant materials), and links to partners.

To date there have been collaborations and linkages with relevant networks and platforms Partnering and engaging at different levels now has over 500 members. The Community of Practice has the following available to its members: Resources, forum, expertise, information (trainings, workshops, etc). Awareness raising, visibility, networking. To get involved in the Community of Practice visit: <http://www.fao.org/food-loss-reduction/en/>

Q: How does CoP work who are the end users

A: Registration can be individual or institutional and is used by all as a knowledge sharing platform.

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## **The Role of Institutional and Regulatory Frameworks in Reducing Food Losses: Peter Nyikuli, FAO Consultant**

In the new devolved Agricultural Policy in Kenya, post-harvest loss, value addition and market access challenges have been given considerable weight. This suggest a growing awareness and recognition of Post-harvest loss as one of the challenges in Agriculture. This has brought about a new role of the Ministry of Agriculture in reduction of PHL and it includes: Training of Extension staff; Provision of moisture meters and hand shellers; Training of farmers; Partnering with relevant stakeholders; Investing in community based storage structures; Encouraging value addition at farm level; Facilitating the NCPB in the Warehouse Receipt System.

Also adopted in Kenya is the Thematic Working Groups (TWGs) that are multidisciplinary and multi-sectoral think-tanks to address:

- Legal and Regulatory
- Research and Extension
- Agricultural Inputs and Financial Services
- Food Security and Nutrition Policy
- Agribusiness, Value Addition and Marketing
- Environment, Sustainable Land and Natural Resource Management

Members of TWGs are drawn from both the private and public sectors and are authorities in their fields. They are chaired by a private sector representative and convened by directors from the sector ministries. The Chair and Convenor are experts in the thematic areas they head.

Lessons learnt:

- Need to mainstream PHL reduction in National policy
- Need to prioritize commodities (flagship projects)
- Need for right balance between public and private sector roles
- Need for partnerships with several other ‘non agriculture’ related ministries and stakeholders
- Need for a reliable and solid M&E system (with reliable and harmonized data)
- Food loss reduction interventions should target the most critical points/ actors of the Value Chain
- Capacity building programmes intended to reduce food losses should focus not only on the farmer but also on SME trading enterprises that service farmers
- Need for strong farmer organizations, especially in marketing

**Government Role:**

**Coordination:** The need for partnerships with several other ‘non agriculture’ related ministries and other stakeholders. A sector-wide approach and strong coordination mechanisms is recognized to be instrumental in the success of the strategy.

**Regulatory:** Despite the private sector being more efficient than the public sector, government has a role as the regulator to bring order.

**Value chain approach:** Post harvest reduction interventions should therefore consider the whole value chain and focus where losses are highest. Creating awareness among smallholder is important. This has brought about a harmonized data Monitoring and Evaluation system in Kenya.

*Q: What are the challenges experienced in the devolved system in Kenya?*

A: Shortages of capacities and resources and poor research-extension-farmer linkages.



## **Aflatoxin Control in the Maize Supply Chain: Stanley Kimereh, FAO Kenya**

Crops contaminated with aflatoxins include:

- Cereals (maize, wheat, F. millet, sorghum, barley, rice);
- Nuts (groundnuts, peanuts)
- Pulses (beans, cow peas, green grams)
- Oil cakes (sunflower, cotton seed cakes, soya seed cakes)
- Roots – (Cassava)

In a survey conducted in Kenya it was found out that:

- 15% of maize in upper Eastern Province is safe with aflatoxin level below 10ppb while 85% of the maize is unsafe for human consumption.
- 40% of maize in Lower Eastern is safe with aflatoxin level below 10ppb while 60% of the maize is unsafe for human consumption.
- On average 22% of the maize in Eastern Province is safe (10ppb) for human consumption with 78% going to Food loss and waste due to high level of above 10ppb.

Out of 3 million bags of Maize (90kg each) harvested, 2,340,000 bags of maize needed to be mopped up due to levels of above 10ppb. Total cost of produce and disposal was \$6.3 million.

A Needs assessment was conducted and found the following:

- Lack of awareness and regard for aflatoxin contamination– all stakeholders and consumers
- Evidence of poor agricultural practices
- Poor produce handling practices - storage, packaging, transportation, trading etc.
- Few public health officers and agricultural officer who had adequate training and competence in aflatoxin management.
- Low local capacity for mitigating aflatoxin contamination in Counties – eg, aflatoxin testing, grain dryers, grain grading equipment, moisture testers, shelling, fumigation, storage, bulking, etc.
- Low enforcement of standards.
- Weak collaboration and poor information sharing amongst stakeholders on aflatoxin control - duplication, wastage, confusion and fatigue.
- There was lack of a clear institutional, policy and regulatory framework for aflatoxin, monitoring, surveillance and communication (Responsibility for Agriculture or Health?)

Interventions were in the form of:

- Training of Agricultural and Public Health officers.
- Training of Farmers through producer groups /organizations.
- Conducting awareness and sensitization campaigns.
- Advocacy for policy review / dialogue.
- Strengthening institutional capacity both at the national and county levels.
- Strengthen the national aflatoxin coordination

Appropriate technologies such as Promotion of GAP; Grain drying to 13% Moisture Content; Use of Moisture Meters and Threshing are needed.

Generated Evidence has found the Farming Practices contributing to high aflatoxins:

| <b>Lower aflatoxin levels</b>               | <b>Higher aflatoxin levels</b>             |
|---------------------------------------------|--------------------------------------------|
| <b>Production practices</b>                 |                                            |
| Crop rotation                               | Maize mono cropping                        |
| Maize in mixed cropping                     | Cowpea, peanut or cassava intercrop        |
| Farmers aware of incomplete husk cover      | Maize is damaged in the field              |
| Diammonium phosphate fertilizer             | No fertilizer                              |
| <b>Harvest practices</b>                    |                                            |
| Harvest at crop maturity                    | Delayed harvest                            |
| Harvest of maize with the husk              | Harvest maize in heaps: cobs shelled later |
| Sun drying on platform                      | “Field” drying on the plant                |
| Drying of maize without the husk            | Delayed drying                             |
| Immediate removal of damaged cobs (sorting) | No sorting at harvest                      |
| <b>Storage practices</b>                    |                                            |
| Cleaning of the storage structure           | No preparation of the storage structure    |
| Maize stored for 3-5 months                 | Maize stored for 8-10 months               |
| Smoke or insecticide use                    | No insect control                          |
| Maize stored in aerated stores              | Maize stored in poorly aerated stores      |

Q: *Have aflatoxin incidents increased over time in Kenya?*

A: Monitoring is needed and more clear roles of farmers

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Zimbabwe’s Experiences with the Food Loss Assessment Methodology: Professor Brighton Mvumi

The researchers shared experiences with the Food Loss Assessment Methodology that covered Cereal Food Supply Chain namely Maize and Sorghum and Horticulture Food Supply Chain - Tomatoes, Leafy vegetables and bananas. The five stage methodology included

1. Screening (desk review) and field survey
 - a. Food Supply Chain (FSC) and critical loss points (CLP) identification
 - b. In depth knowledge of food losses
2. Load tracking and sampling
 - a. Measurement of specific losses (quantitative and qualitative) on CLP
3. Data analysis, solution identification and evaluation
4. National Stakeholder Validation Workshop – 26 November 2015
5. Regional validation workshop – 15-17 March 2016

Good points of the methodology

- Having a standard methodology is a noble idea, but there is need to further explore standardization of some tools within the methodology
- Loss estimation at Critical Loss Points – Can help prioritise losses, solution identification and help direct investment
- Methodology allows collects and triangulation of data at different levels
- Methodology is participatory and gives opportunity for stakeholders to contextualise the study and make it more relevant for their planning
- The methodology has more advantages than disadvantages
 - Systematic approaches enable easy comparison of data from different surveys, locations and countries
 - A challenge in synchronizing the farmer activities with the survey
- Although farmers observe the losses, generally difficult for them to quantify the losses.
- The steps suggested in the survey methodology leads to respondent fatigue
 - The need to hold a validation meeting at which key findings are presented to a cross-section of stakeholders before researchers leave the study site or community
 - Load tracking and sampling was not conducted in Zimbabwe on grain as there was no significant movement of grain (for both maize and sorghum) during study period – price and production level issues. The Methodology is only appropriate if there is significant movement of the commodities eg, if farmers are delivering to the Grain Marketing Board or a dynamic market.
- Solution to food losses: Anticipated loss reduction – can over-estimate the benefits or under-estimate the costs
- In some cases no research has been performed to indicate what the PHL would be if farmers adopt the technology
- Budget calculation and the benefit cost methodology needs improvement
- Major assumptions need to be clearly indicated
- In Zimbabwe the small grains value chain is poorly developed. Farmers never thought loss control or estimation is important for a “minor crop” like sorghum. Issue of timing is also important.

Areas of improvement include: Methodology is complex and requires time to unpack and understand it and maybe there is need to regionalize it. For durable commodities, quality loss happens over a period of time, and the methodology needs to take into account how to assess for the quality changes

- Instrumentation - Need *in situ* digital grain moisture meters and aflatoxin measurement kits
- Taking into account country differences, there is need to develop one standardized instrument for collecting qualitative data
 - Such as semi-structured interview guide that can be adapted depending on the commodity
 - The instrument can then be adapted to various country situations and commodities.

- Some of the operations require longitudinal studies to monitor and measure losses in *real time* in order to have more accurate levels on the Value Chain losses
- Possible improvement
 - Train local extension staff in the study sites on the data collection requirements
 - Provide resources and more time for exercise
- Adapt and incorporate visual scale loss assessment methodologies
- Have at least 3 consecutive seasons of loss assessment to capture seasonal variation

Horticulture

Benefits

- Objective, effective and more accurate since unit of analysis is product not actors
- Definitive study population - load
- Involves actors throughout – joint ownership
- Data collection and analysis is fairly simple and easy – user-friendly
- Real time and can be replicated - versatile
- Causes of losses and their respective solutions easily identifiable - effective
- Screening and survey results can be used to cross-check accuracy of load tracking and sampling findings – limited error margins.
- Losses measured at every Critical Loss Point – Can prioritise losses and solutions
- Aggregation of losses possible

Challenges

- Actors too busy with business – divided attention
- Quality assessments difficult at harvesting, grading, sorting and packing, wholesale and retail stages
- Quality scoring requires experience and is subjective
- Is a one moment recording not representative of the entire season, varieties, actors and regions
- Latent defects identifiable after event:
 - mechanical and pathological damages in bananas
 - pathological damages in tomatoes, and
 - inappropriate postharvest temperature management led to overheating and short shelf life.
- Utility and infrastructural development solutions received low solution priority rankings.
- Time constraint – study and FSC cycles
- Temperature recording devices lacking in the tools supplied
- Losses at harvesting stage difficult to measure due to excessive decay and wilting

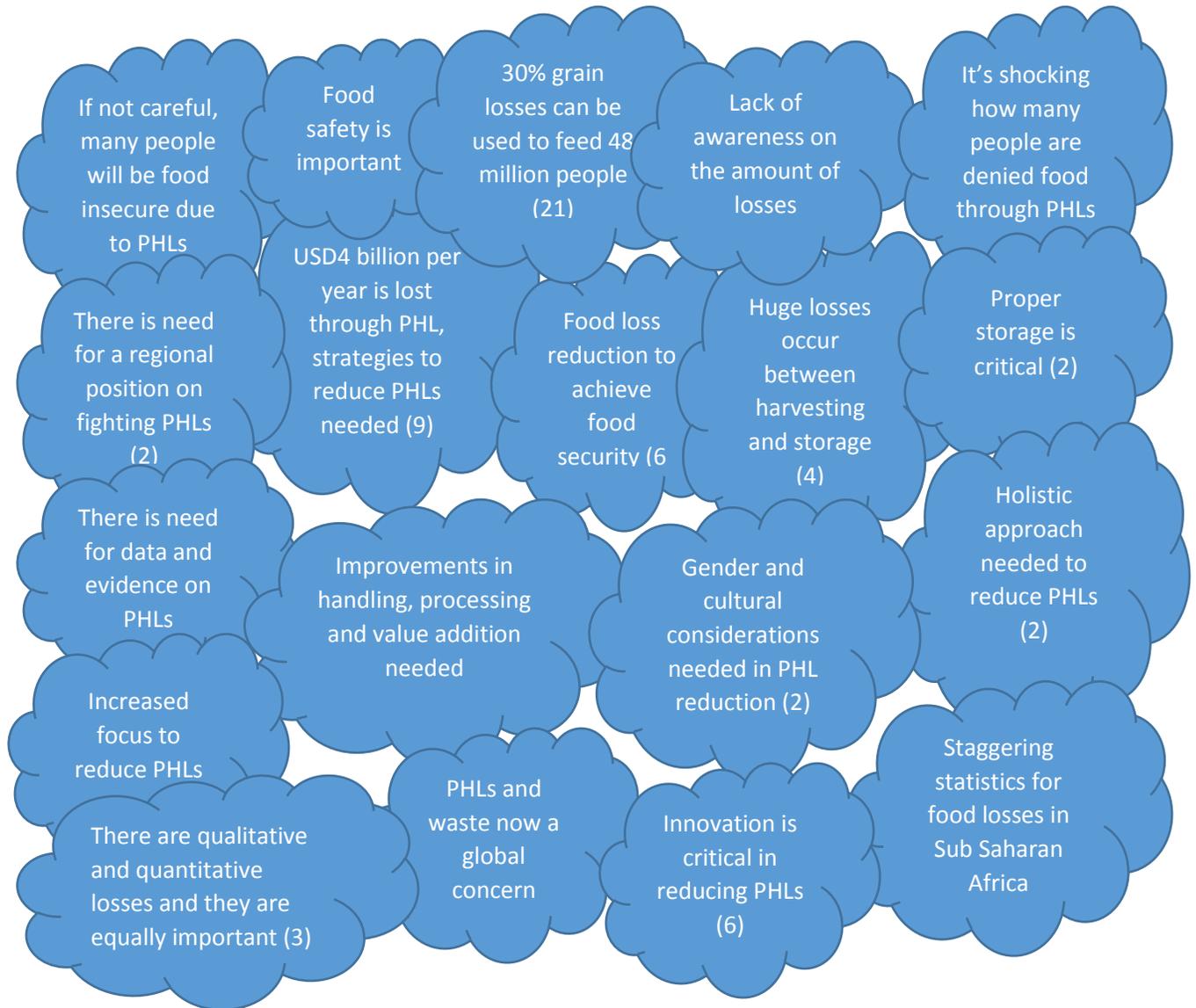
Improvements

- Solutions to be implemented at appropriate FSC stages
- Temperature monitoring records needed for all FSC stages
- Still need detailed survey to verify results
- Replicate to establish trends and cover all scenarios - seasons, agro-ecological zones, actors, varieties, etc
- Calculate qualitative losses at Wholesale and retail stages

Aspects not well covered in methodology

- Consider socio-economic dynamics to enable equitable participation - elderly, women, youth and people with disabilities
- Tools for measuring empowerment of local institutions in Postharvest Management to ensure continuity and sustainability
- Tools for periodic evaluation of PHLs need to be put in place on a longer term basis
- Capture seasonal variations (rainfall, production levels)

Buzz 1 Session: What participants learnt from the Morning session of Day 1



Day 2: Field Visit and Discussions

Workshop participants were divided into 2 groups: one group went to a produce market, Mbare Musika Market and the other went to Brands Fresh, a Private Sector Initiative. On return, participants discussed observations from the two markets and presented to plenary the following:

Group 1

Mbare Market	Brands Fresh
Observations	
<ul style="list-style-type: none"> • The lack of an alternative market as product glut leads to more losses • Poor quality produce and handling methods • Poor market infrastructure • Over crowding • The determination of prices by middlemen • Lack of value addition facilities increases losses 	<ul style="list-style-type: none"> • Farmers need capacity building in order to produce high quality produce • Accessibility challenges due to poor infrastructure in farming communities • Effects of drought had brought about lower produce deliveries • Produce loss due to poor handling by smallholder farmers
Successes	
	<ul style="list-style-type: none"> • The identification of local smallholder farmers whom they work with. • Employment of a resident agronomist is a positive step to obtaining good quality produce. • Strict procurement standards • Good Ripening facility • Packaging done for specific market demands • Separation of fruits from vegetables • Grading is done to enhance further value addition • Presence of a ready market • Product diversification
Challenges	
<ul style="list-style-type: none"> • Ripening facilities are not well developed • Rotting of produce • Variability in quality due to sub-standard facilities • Lack of financing • Poor Post Harvest handling • Absence of a cold chain • Poor Transport • Poor hygiene • The exaggerated role of middlemen “makoronyera” • Long distance to move produce 	<ul style="list-style-type: none"> • Too much extraneous material

Recommendations	
<ul style="list-style-type: none"> • Improve disposal of waste • Improve standard and storage • Train farmers on post-handling methods • Improve cold chain • Improve market infrastructure • Improve knowledge, attitudes and practices 	<ul style="list-style-type: none"> • The company should invest in training government extension staff on food handling • The company should contract farmers • The company should provide transport to farmers • Government should draft a policy on contract farming to avoid side marketing • The company should promote the growing of improved varieties of products

Group 2

Mbare Market	Brands Fresh
Observations	
<ul style="list-style-type: none"> • Farmers trade bananas from distant places • Ethylene is used in ripening bananas • Cabbages and tomatoes are also common products • Some farmers were not aware of the product they use to ripen or the quantity used 	<ul style="list-style-type: none"> • Bananas and potatoes are the key lines • They also handle broccoli, celery, lettuce and other products
Successes	
<ul style="list-style-type: none"> • They are making a living 	<ul style="list-style-type: none"> • Minimal loss and waste (at 2% or less) • Multiple produce is handled • Agronomist based on farms for harvest quality control • Waste is donated to a wildlife park
Challenges	
<ul style="list-style-type: none"> • Storage boxes are damaged • There are no permanent structures • Quality of produce is poor • There is high waste and no secondary use for produce 	<ul style="list-style-type: none"> • Many products have bruises from transportation • Capacity constraints for farmers who are unable to meet demand • They are operating below capacity and have underutilized space
Recommendations	

<ul style="list-style-type: none"> • Overhaul of the management structure • Construction of marketing infrastructure • Provide secondary use for waste such as composting and biogas 	<ul style="list-style-type: none"> • Need to improve marketing information to increase supply • Reduce imported items and substitute them with local products • Improve post-harvest handling to reduce losses
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Group 3

Mbare Market	Brands Fresh
Successes	
<ul style="list-style-type: none"> • Platform for farmers and buyers to meet • Market information centre exists • The retail market is very organized • There are minimal entry barriers 	<ul style="list-style-type: none"> • Minimal post-harvest losses (at 2% or less) • Value addition of off-cuts • Cold storage facilities in situ • Market segmentation where high quality produce goes to supermarkets and low quality for the vendor market • Some good cold chain management through refrigerated trucks • Good procurement team
Challenges	
<ul style="list-style-type: none"> • High post-harvest losses for farmers • There are poor market structures • Poor sanitation facilities for market actors • The market is chaotic and congested • There is high risk of contamination • Limited regulations with some produce visibly overstayed and beginning to rot 	<ul style="list-style-type: none"> • Undersupply and inconsistent suppliers • Higher losses for Honde Valley (mountainous area) produce due to terrain
Recommendations	
<ul style="list-style-type: none"> • Improve infrastructure such as sheds and cold rooms • Improve sanitation facilities • Sectionalise the market layout • Strengthening farmer marketing associations and formation of new ones • Training and awareness in post-handling techniques • Social investor support for market information system 	<ul style="list-style-type: none"> • Increased networking with government extension officers • Consider contracting farmers • Improve containers for handling farmers' produce

Group 4

Mbare Market	Brands Fresh
Successes	
<ul style="list-style-type: none"> • High activity market place gives farmers access to a market place <p>In improved sections of the market:</p> <ul style="list-style-type: none"> • There is packaging • Maintenance of high quality • Higher prices charged • Less losses experienced • Proper stands 	<ul style="list-style-type: none"> • Offering agronomic services to improve product quality • High care line for packaging • Supply organized market players like hotels • Implementing HAACP ISO for standards
Challenges	
<ul style="list-style-type: none"> • No proper storage and handling facilities • Lack of proper technology for the products' value chain • Poor quality products • Lower prices realised • No proper stands – produce on the ground leading to more losses 	<ul style="list-style-type: none"> • Operating below full capacity
Recommendations	
<ul style="list-style-type: none"> • Government and municipalities should intervene through bulk storage and handling facilities • Involvement of stakeholders in facility planning – sheds, concrete floors, cold rooms • More organized production • Sensitize relevant authorities on the extent of losses 	<ul style="list-style-type: none"> • Extend the value chain to include the management of waste

Box 2.1: Reactions from participants on Group presentations

Comment 1: *The Mbare Market needs to be segmented according to product to enable buyers to procure products more easily*

Comment 2: *Record-keeping need to be improved in all markets to enable farmers to quantify food losses rather than to keep guessing. If the Mbare market off-loads at least 7 tonnes of waste daily, they must find alternative uses for that waste such as biogas, stock feed or composting.*

Comment 3: *We need to strengthen Market Information System (MIS) across all markets. Brands Fresh is having a short supply of produce whilst the Mbare Market is having frequent surpluses, which could be minimized with the presence a proper MIS.*

Comment 4: *There are serious health/sanitary issues at Mbare. The Municipality is not doing enough there, there is need for proper sanitation and awareness.*

In response to Comment 4: *A study was done to find out health issues in Harare markets. Mbare was actually safer than other small markets in Harare as those had contamination of Escherichia Coli in their produce as produce is grown around the city. Mbare Market produce is mostly from communal areas in Murehwa, Mutoko, Domboshava and other areas.*

Comment 5: *Women find it very difficult to negotiate their way past the middlemen, locally commonly called 'makoronyera'. Women do not also feel secure to come to the market and the produce ends up being spoiled in the field or sold at give-away prices to get rid of it.*

Comment 6: *There is a strong influence from land barons at Mbare Market, these are outside actors in the value chain and they must be regulated.*

Comment 7: *The municipality needs to look at waste management options.*

Comment 8: *Encourage cooking contests/sharing of recipes/juicing/drying to enable farmers to utilize excess products instead of throwing away*



Day 3: Sharing of Country Experiences

Ethiopia and Kenya Group

Challenges on Methodology	Recommendation
Time and financial consuming	Fine tune the methodology especially the load tracking to match with local conditions and context
Difficult to follow the farmer operations along the supply chain	Select the appropriate timing for data collection in line with farmer operations
Replication of study reliability, season	Replications to capture different seasons Incentives for experts and respondents to cater for time taken in participation
The load tracking part is not friendly to use – from farm to retail is complicated and time consuming	Have clear understanding of the complexity of the methodology at the very initial stages. More time is needed for briefing

Comments from the floor

- Production level losses may not be visible. Poor farming methods leading to lower yields can be attributed to food loss if someone could get a higher yield from the same bundle of resources.
- Can we not blend infected grain and uninfected grain to reduce the level of aflatoxins in grain so that we do not have to throw it away? I think that way we can save food.
- What other grain storage technologies are available for use by smallholder farmers?

Response from the Kenya-Ethiopia Group

- We need to consider the starting point of the value chain. We focus on the food produced already and not on the opportunity cost because there are other projects that focus on productivity.
- There is a plethora of literature on alternative uses of contaminated maize, however, contexts differ and what works in one country may not work in another. If one blends contaminated and uncontaminated maize, there is no reduction in terms of parts per billion of aflatoxins because they build up and the effects of their toxicity can manifest after several years.
- There are various technologies available for grain storage which can be used by smallholder farmers. These include PICS bags and small metal silos.



A participant from Rwanda making a contribution during plenary

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## Namibia and Zimbabwe Grain Group

### Interventions

- All interventions that are recommended should be gender- and age-sensitive  
**Actors: All actors**  
Responsible: Min Gender/Women's Affairs, Min of Agriculture, Development agents.  
FAO to fund the mainstreaming of gender in postharvest management
- **Awareness raising, capacity building (training in good PH practices; business and marketing skills) and organization.**  
**Actors: Farmers, vendors, millers, NGOs, Development agencies,**  
Responsible: Relevant Departments in Agric. Ministries.  
FAO to fund the training and advocacy as well as awareness materials
- **Develop a “National Postharvest Management Strategy and Implementation Plan”**  
**Actors: PH Specialists, Farmers, vendors Millers, academics NGOs, Parastatals**  
Responsible: Ministries of Agric. FAO to support - Field drying and harvesting
- **Timely harvesting**  
**Actors: Farmers**  
Responsible: Farmers; Ministries of Agriculture (Extension)
- Promote use of cribs and raised platforms  
**Actors: Farmers**  
Responsible: Farmers; Ministries of Agriculture (Extension), NGOs
- **Crop breeding for improved varieties (hairy, lodging, improved storability) and integrated pest management**  
**Actors: Researchers, Farmers**  
Responsible: Ministries of Agriculture, International Agencies, Institutions
- Post harvest handling prior to storage  
  
**Mechanization of PH operations for small grains (solar drying; Threshers (PM) and Maize Shellers (hand/pedal; tractor pto, diesel powered).**  
**Actors: Artisans, Farmers, traders, researchers, Development agencies, Farmers' Union**  
Responsible: Private sectors with government's facilitation; Rural Development Centres; WFP
- **Marketing and Financing of appropriate technologies**  
**Actors: Local Financing Institutions, Farmers, Traders, Vendors, NGOs**

Responsible: Farmers, Farmers' Union, Min. of Fin/Trade/Agriculture, Micro-financial Institutions

- Storage  
Timely mobilisation of resources to purchase grain from farmers for strategic reserve  
**Actors: Farmers, GMB, Traders/vendors,**  
Responsible: Ministries of Finance and Agriculture
- Provision of **storage facilities** (GrainPro/PICS bags, Metal/Plastic Silos, Community storage, Cocoons)  
**Actors: PH Specialists, Farmers' Coop, vendors, Millers, academics NGOs, Parastatals**  
Responsible: Ministries of Agriculture, Artisans and local manufacturers,
- Warehouse ticketing  
**Actors: Farmers, Traders/vendors, Millers, Farmers' Union**  
Responsible: Ministry of Agriculture; Financial Institutions

## Loss Assessment Methodologies

- ▶ The design of the methodology was more commodity focused and silent on gender and social aspects.
- ▶ Assessment is comprehensive but resources (time & funds) allocated were insufficient (especially for grain load tracking- need further interrogation)
- ▶ Time of the study didn't coincide with some operations
- ▶ Methodology is costly (may be difficult to integrate into national agric data collection methods) for sustainability

## Comments from the floor

**Comment 1:** When you were talking on post-harvest loses, it sounded as if losses occurred in storage and minimally in transportation can you elaborate on how that was happening and what the cause could be?

**Comment 2:** There were serious gender issues raised in the presentation. Some localities have imposed taboos on what women can or cannot do. One society did not allow women to wear trousers and that poses challenges when dealing with traditional small grains especially at willowing stages. That needs to be looked into when talking practical issues at community level.

**Comment 3:** concerning women, there is need for lower silos that can be accessed and loaded easily. Some cultural practices do not allow women to stand on raised platform. This will complicate their efforts in ensuring zero losses during storage.

**Comment 4:** There are also cases of bedroom storage because of fear of theft, have you encountered such cases in your findings?

### **Responses from the Group panel**

**Response 1:** Storage of grain is usually tricky. Bedroom storage is common amongst smallholders and aflatoxin build up can occur because of higher humidity. On issue of losses by large storage facilities, the focus was on smallholder storage facilities rather than the commercial value chain which involves the Grain Marketing Board.

**Response 2:** Gender aspects really need to be looked into. The study was a bit silent on gender and other social issues. Conditions differ from area to area and hence, what is encountered may also differ.

**Response 3:** Bedroom storage was very common because of incidences of theft of grain. Some households even constructed housing for their silos because of the fear of theft.

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Zimbabwe Horticulture Group

(Presentation in Annex 1)

Comments from the floor

Comment 1: You mentioned quality losses but I believe those are very difficult to quantify without going to laboratories. Nutrient losses cannot be detected without going to scientific laboratories.

Comment 2: What are the quality losses in horticultural products you observed, was it cracking, bruising or something else?

Comment 3: Food losses are not confined to geo-political boundaries. Can we also consider transboundary issues? Losses can happen at borders or in other foreign territories.

Comment 4: I wanted to hear more on loading tracking. Products life cycles are very tricky for grains since they go for longer periods. Horticultural products have shorter cycles. How do you deal with grain product cycles?

Comment 5: You mentioned utilities and facilities; can you elaborate on what that is?

Comment 6: How did you manage the risk of stage managed results? On transport losses, you said tractors can be used as local transport. Are they viable for smallholder communities? Some produce travels 500km or more, how applicable is that proposal?

Responses from the Group panel

Response 1 & 2: Quality has many facets depending on the produce. Generally, bruises, discolorations are common as quality losses because they are perceived by the customer who will eventually buy the product.

Response 3: The scope of the study does not include crossing international boundaries. I believe each country has its own ways of controlling losses. It is however, a good observation which can be looked into.

Response 4: Sometimes the load had to be dumped and another load will be tracked. This has small flaws but it gave us an idea of the nature of losses that are encountered at each stage in the value chain.

Response 5: Facilities and utilities are the infrastructure needed to complete a value chain including grading and sorting shades, transportation, loading and unloading sites and storage.

Response 6: There was no fear of stage managing results. We however, used 3 stage sampling to avoid bias and this is already built-in in the methodology. The tractor issue is a contextual one. The scheme in question had more than 800 farmers with 500 hectares of land. This makes tractors worthy to use because it mimics an ideal farm or estate.

- Safe storage of grain in the house is a key issue because strong aflatoxin build up can happen there.

- Operationalization of the Warehouse Receipt System remains a short to medium term target for many countries including Zimbabwe. This could ease pressure for grain in storage.
- Issues in horticulture value chains are well captured.

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**Uganda and Zambia Group**

**(Presentation in Annex 1)**

**Comment 1:** The impacts of the use of chemicals on the environment is not well articulated and yet they have a part to play in toxicity issues.

**Comment 2:** After analyzing data, make sure that stakeholders are there when you make recommendations so that they can give their input

**Comment 3:** Did you try to track some traditional knowledge systems regarding food losses to capture some cross cutting issues. Communities have been preserving food using traditional methods.

**Group responses from the panel**

**Response 1:** Issues to do with the environment were not part of the assignment. This was therefore not addressed unless there was an effect on food losses.

**Response 2:** Relevant stakeholders were consulted throughout the process and they are aware of issues.

**Response 3:** The use of Indigenous knowledge systems was tracked during the study but using it provide difficult because of the variability of those systems from area to area.

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Southern Africa Group

(presentation in Annex 1)

Specific issues on methodology

- Training on methodology

- Useful: enhanced common understanding amongst the consultants
- Training not comprehensive enough, length proposed should be 1day
- Maintained in the future, and be led by FAO (as designers) with consultants that have used the tool in the past at country level
- **PHL Questionnaire design**
 - Involve the principal researcher from the respective countries at the development stage of the methodology
 - In design and training stage engage other key stakeholders i.e. farmers, extension officers etc
 - Pre-testing to be included within the design
- **Methodology specifics**
 - Load tracking
 - Necessary but unclear within the training on its operationalization
 - Element of timing and being with farmers a challenge, Resources element?
 - Recommendation: capacitate farmers to conduct the load tracking
 - **Questionnaire data**
 - Review of lengthy questionnaire as it results in farmer fatigue
 - Repetitive sections need to be noted as well
 - Some information in the Tables too detailed and not captured by farmers

Response to from Robert van Otterdijk (FAO)

- You have highlighted that there were qualitative losses only, is it true that all the food which gets into the value chain is secured and none is lost? None is rotten? That needs to be addressed.
- You have indicated that the questionnaire is too long; in actual fact, there was no questionnaire in the methodology. A semi-structured interview is ideal where one uses the check list of a few questions to guide you. With this approach, you can skip the grey areas where the farmer has no information to avoid respondent fatigue.
- With this methodology, it cannot be handed over to students or research assistants because they can struggle to differentiate valid responses from invalid ones.

- You also have to be completely honest in your report and avoid misrepresentation of facts to prove a point. Spell out the assumptions and avoid issues that have not been observed to maintain the integrity of the report and the accuracy

Box 2.2: Comments from the floor for Southern Africa Group

Comment 1: *I have a problem with you citing rotting as a cause of food loss because rotting is actually a symptom of an underlying cause. Please identify the actual reason why the produce was rotting. Let us not identify symptoms as causes.*

Comment 2: *I am not comfortable with farmers collecting data because it will have problems of validity. It would be better to capacitate local extension staff to do that. Using farmers for that purpose would be a costly way of cutting back on costs*

Comment 3: *My comment is directed to Robert; there is a very short space of time to do load tracking, can you please look into that.*

Comment 4: *Methodologically, the combination of techniques is good but load tracking is really tricky. There was no sufficient time to do the load tracking accurately. From a gender perspective, it is not very comprehensive, especially on the load tracking aspect. We were supposed to track load from a female headed household and a male headed household and see if there are any differences. The methodology is basically, devoid of the social issues.*

Responses to concerns from Southern Africa Group

- Let us shelve the discussion on load tracking until the final discussion so that we can give space to others to give their experiences
- The methodology requested some information which led to the development of the tables and hence, lengthy questionnaires
- Let us also probe further to find out the social dynamics in load tracking rather than quantities of produce that go bad only.

Buzz 2 Session: Key discussion points from Group presentations

Impacts of PHL have not been given enough attention until recently

Gender dimensions of PHLs (3)

Indigenous good practices to control PHLs

Institutionalization of the PHL methodology (2)

Clarification of load tracking and the methodology

The need for a humanitarian face to PHL control (2)

PHLs is still a great concern in Africa (3)

Umbrella platform on PHLs which is aided by ICTs

Involvement of the public and private sectors in PHL reduction efforts (4)

Capacity building of actors on PHLs reduction

The role of harvesting technology in reducing harvest point losses not covered

Educating the end-consumer on PHLs is also critical

The role of ITK in PHL reduction

The market can be a loss point if there is a glut

Operationalization of the WRS across Africa can reduce PHLs (4)

Nutritional aspects as part of qualitative losses

Appropriate technology critical for food safety

The need for serious engagement with policy makers and private sector

Variations in the interpretation of what 'losses' mean

Need for a shift from post-harvest loss reduction to post-production loss reduction

Who defines losses because farmers may say spillages are not losses but food for ancestors

Critical loss points have been thoroughly discussed

Aflatoxins are a life-threatening issue (3)



Key Messages and Next Steps

- FAO supported studies for more than one commodity in some countries, whilst it supported only one value chain in others. Are there funds for expanding the studies into countries that did one commodity value chain?
- The presentation gave an impression that government is a key player in implementing infrastructure projects at farmers' markets, the issue is government remains a regulator, providing a conducive environment for such investments to happen. Private sector must take the lead.
- We also need to hear the recommended safe methods of disposing hermetic grain bags.
- We must promote simple technologies in drying and other technologies.
- We also need to look at how technologies can be institutionalized so that they can receive buy-in from all stakeholders.
- We may also want to include the role of the media in transferring key messages to communities. These technologies are fairly new but they need coverage and marketing.
- One of the most practical ways of reducing PHL is through use of commodity associations. There are vibrant ones and the government must facilitate their activities.
- Can you tell us the next step after the studies? What's next?
- Extra work needs to be done in future so that we are availed reporting formats in advance. We were now being told to format our reports according to the new format which was provided.
- We also need to address and integrate the socio-economic issues because farmers can side-market produce and destroy the spirit of commodity associations which have the potential to reduce losses.
- There is need to incorporate PHL quantification into our daily science so that we continue to develop it into rigorous methodologies.
- Governments need to incorporate issues of food losses and safety in schools so that students can learn from primary level. There should be curriculum to teach losses and safety issues for animal products as well.
- Let there be coordination so that we don't replicate what others are doing but build on what they have done to avoid wasteful duplication of resources.
- Common methodologies need to be developed across Africa to enable benchmarking and inter-country comparisons. More accurate details of PHLs and trends of losses is required.
- We need to have reference material for extension staff because it seems most staff members in Africa are not aware of methodologies for preventing losses.
- Let there be concretization of research results so that we do not keep estimating the extent of losses.

- Need to promote PHL champions to further reduce food losses and wastages.

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**Closing Remarks: Mr. David Mfote, Deputy Rep FAO Zimbabwe**

Mr. Mfote thanked the Government of Zimbabwe for hosting the workshop. He also thanked the workshop participants for their active participation. He noted that the Global village faces food shortages and Africa was the only hope as it had huge potential to increase productivity and be the world food basket in achieving the SDG 2. Mr. Mfote noted that Phase I of the PHL Study focused on the following:

- a) Building of Evidence based,
- b) Extension of ideas,
- c) Broadened our understanding of PHL especially in targeted value chains.

He was pleased to announce that Tanzania was going to participate in the study. The Phase II would be a Regional programme formulation for Postharvest management in 2<sup>nd</sup> and 3<sup>rd</sup> of 2016. This would involve addressing the key interventions already identified in Phase 1 and share Regional proposal with potential donors in 4<sup>th</sup> quarter of 2016. The next phase would be the Regional Programme implementation in 2017. M. Mfote explained that this required a core team to provide information on improving the Study Methodology working with (Robert van Otterdijk) and the Project headers (Cephas Taruvinga, Stephanie Gallatova).

Mr. Mfote paid tribute to the Swiss Agency for Development and Cooperation (SDC), Norwegian Ministry of Foreign Affairs; and UN Rome Based Agencies (IFAD, WFP and FAO). He also thanked the Country Consultants (individuals and those from Academia), Government Officials and the media. Mr. Mfote explained that a memory stick with all presentations would be provided to participants.

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Annex 1: Country Group presentations

Ethiopia and Kenya Group

Causes of the Losses	Solutions	Responsibility
1. Poor Infrastructure (Storage facilities) and processing methods	Promotion of improved and affordable storage structures and technologies (shellers, dryers, e.t.c)	Government, private sector, farmer, NGO, development partners
2. Inadequate awareness to stakeholders	Training on improved PHM (moisture meters, e.t.c), awareness on appropriate storage & mgnt, create demand for safe and quality maize	Government, private sector, NGO, development partners

Causes of the Losses	Solutions	Responsibility
3. Inadequate technical skills of different stakeholders	Capacity building of all stakeholders along the maize supply chain	Government, private sector, NGO, development partners
4. Inadequate Policy on PHMs	Appropriate policy and institutional arrangement for PHM	Government, private sector and development partners
5. Environment factors (T ^o , Rh)	Increased investment on real-time predictive climatic data for weather forecasts to determine	Government private sector and development partners

Observations: Good methodology

Advantages:

- a) Provides the opportunity to compare estimates by different respondents
- b) Provides opportunity to compare specific segments of the chain
- c) It's a team approach process

Challenges:

- a) Time consuming
- b) Financially demanding
- c) Difficult to follow the farmer operations along the supply chain
- d) Reliability of the data
- e) Monitoring and Evaluation
- f) Replication of the study – season, yearly
- g) Time consuming – several experts are involved and are likely to withdraw

Ease of Use:

- a) The survey part is easy to use – need to adjust to local situations
- b) The load tracking part is not friendly to use – from farm to retail is complicated and time consuming

Recommendations

1. Fine tune the methodology especially the load tracking to match with local conditions and context [some of the tables are different to fill].
2. Select the appropriate timing for data collection in line with farmer operations
3. Replications to capture different seasons
4. Incentives for experts and respondents to cater for time taken in participation
5. Have clear understanding of the complexity of the methodology at the very initial stages. More time is needed for briefing



Zimbabwe Grain:

Loss Points	Types of losses & causes	Recommendations
Field drying & Harvesting (13.9%)	➤ Quantitative - lodging, rodents, termites, Storage insect infestation & wildlife damage	✓ Farmers' training in Good P H management practices-by Ministry of Agriculture

	<ul style="list-style-type: none"> ➤ Qualitative-late rains (not quantified); Storage insect infestation 	<ul style="list-style-type: none"> ✓ Crop breeding to reduce lodging-by Ministry of Agriculture ✓ Government to timely mobilize resources to purchase grain from farmers for strategic reserve that is being administered by GMB. ✓ Mechanization of PH operations for small grains (threshing of small grains, dehullers, threshers and roasters) -by Private sectors with government's facilitation ➤ FAO to fund the training and advocacy as well as awareness materials
Storage (9.4%)	<ul style="list-style-type: none"> ➤ Quantitative-Storage insect pest, theft, termites & rodents 	
Homestead drying (7.2%)	<ul style="list-style-type: none"> ➤ Qualitative-Rotting & Pest (moths & Webbing) ➤ Quantitative-Wildlife & Domestic animals 	
Sorghum (Zimbabwe)		
<ul style="list-style-type: none"> ➤ Harvesting (14.1%) ➤ Threshing (8.7%) ➤ Winnowing & Cleaning (8.2%) ➤ Storage (5.6%) 	<ul style="list-style-type: none"> ➤ Quantitative (birds & shattering) ➤ Qualitative (Animal contamination) ➤ Quantitative (spillage) ➤ Qualitative (Aflatoxin) 	

Namibia (Grain)

Loss Points	Type of losses	Recommendation
Field drying	<ul style="list-style-type: none"> ➤ Quantitative 50-100% - Wildlife; 2-5% - rodents, birds, lodging & termites), Storage insect infestation 	<ul style="list-style-type: none"> ❖ Recruit manpower for Post-Harvest Unit recently created within the Crop Production Division of MAWF
Storage		

<p>Threshing</p>	<ul style="list-style-type: none"> ➤ Quantitative-1%-3% (Insect, rodents, theft) ➤ Qualitative -30% (Insect frass, rodents contamination, fungi & due to long time storage) ➤ Quantitative 1%-3.5% (breakage, lost in the sand (threshing floor) ➤ Qualitative (Mixed with grit) 	<ul style="list-style-type: none"> ❖ Develop a “National Postharvest Management Strategy and Implementation Plan” To include: Advocacy, Awareness Creation, Capacity building (training of Trainers -Government and private Extension Officers, Lead Farmers, Farmers and other actors in the supply chain), and mainstreaming of postharvest issues in curricula of school and training institutes - MAWF, FAO, NGOs, Institutions ❖ Piloting and provision of appropriate post-harvest handling technologies (solar drying; Threshers (PM) and Maize Shellers (hand/pedal; tractor pto, diesel powered); MAWF and RDC for piloting; RDC and PPP for dissemination of Technology with MAWF facilitation, WFP ❖ Provision of storage facilities (GrainPro/PICS bags, Metal/Plastic Silos) by MAWF, RDC, NAB & AMTA, WFP ❖ Research into suitable varieties and integrated (PH) pest management systems – MAWF and Higher Institutions
<p>Pearl Millet (loss points)</p>	<p>Types of losses/causes</p>	<p>Recommendations</p>
<ul style="list-style-type: none"> ➤ Field Drying (5-15%) ➤ Storage (1-5%) ➤ Threshing 	<ul style="list-style-type: none"> ➤ Quantitative (birds, termites 7 rodents) ➤ Qualitative (weather) ➤ Quantitative (Insect, theft) ➤ Qualitative (40%, length storage) 	

	<ul style="list-style-type: none"> ➤ Quantitative 1%-3.5% (breakage, lost in the sand (threshing floor) ➤ Qualitative (Mixed with grit) 	
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Uganda Zambia Group

Critical loss Points:

Critical Loss Points	Causes of Losses	Recommendations
Harvest <ul style="list-style-type: none"> ▪ Pest/Insect damage ▪ Rodent contamination ▪ Aflatoxin contamination ▪ Fungal mould ▪ Broken grain ▪ Discoloration of grain ▪ Weight loss due to moisture loss & spillage ▪ Vermin (rodents) 	<ul style="list-style-type: none"> ▪ Delay in harvesting ▪ Poor harvest management ▪ Varietal susceptibility ▪ Competing demands of labour ▪ Lack of transport 	<ul style="list-style-type: none"> ▪ Awareness building & training for producers on PHH ▪ Provision of simple technologies-to aid transportation and drying of grain ▪ Improve harvest management ▪ Re-tooling extension workers on PH management ▪ Erecting improved storage facilities at lead farmer's households ▪ Provision of low cost credit to farmers to allow for investments in storage facilities ▪ Facilitate group formation (FFS) so farmers can assist each other during harvest periods ▪ Support the Review of agric. policies and strategies
Milling <ul style="list-style-type: none"> ▪ Grain spillage at off-loading, machine feeding, flour spillage, cleaning and blowing. ▪ Contamination due to mixing grain with dirty flour 	<ul style="list-style-type: none"> ▪ Poor conditions of the mill e.g. broken parts of maize mills ▪ Failure/reluctance of the proprietors to carry out regular servicing & maintenance ▪ Milling good quality grain after poor quality ones ▪ Moistening grain on dirty concrete floor in preparation for de-husking 	<ul style="list-style-type: none"> ▪ Ensure mill hygiene ▪ Regular inspection and repair of mills ▪ Enforce standards on mills and milled products by Bureau of standards
Storage <ul style="list-style-type: none"> ▪ Pest/Insect damage ▪ Rodent contamination 	<ul style="list-style-type: none"> ▪ Varietal differences ▪ Poor storage structures 	<ul style="list-style-type: none"> ▪ Training of all actors (producers, millers and traders) on PHH

<ul style="list-style-type: none"> ▪ Aflatoxin contamination ▪ Fungal mould ▪ Broken grain ▪ Discoloration of grain ▪ Weight loss due to moisture loss & spillage ▪ Vermin (rodents) 	<ul style="list-style-type: none"> ▪ Poor storage/packaging containers ▪ Poor treatment and packaging ▪ Poor drying process ▪ Poor threshing ▪ Lack of knowledge on PHH and storage 	<ul style="list-style-type: none"> ▪ Demonstration of improved structures ▪ Provide moisture metres and aflatoxin kits ▪ Provide credit/loans to allow acquisition of improved structures ▪ Streamline policy on marketing and storage by Private and public sector
--	--	---

Observation on Methodology

Advantages

- Different data capture methods enabled triangulation
- Informative-provided background information
- Helped in clear identification of critical loss points

Challenges

- Not easily understandable-esp. the load tracking was not possible to apply as had been recommended.
- Hidden assumptions on structure and organization of value chains
- Some parameters, data was lacking and required to have done a survey to ascertain
- Generic nature of methodology leaves a lot of room for study teams to customize the methodology to their own situation, which however leads to incomparability of the studies.

Ease of use

- Not complicated-easy to use for case study approach so study could be done quickly

Recommendations

- Provide adequate training to enable teams understand the tool and invest time in pre-testing tool
- Load tracking -allow teams to collect data according to localized situation or existent value chain
- Be more specific on the methodology especially the sampling
- The quality score is subjective vs. Ranking and therefore needs to be standardized.
- Improve on clarity of instructions

Area of convergence

- Similar supply chains
- Same critical loss points
- Methods to reduce losses

Divergence

- Losses are highest during harvest in Zambia while in Uganda it was during storage

Good practices

- Harvesting- none
- Storage using chemical methods to control losses

- Use of indigenous method to measure moisture
- Storage in hermetic bags and the use of pallets
- Standardization of storage facilities like the silos
- Milling:- hulling so maize grain is not destroyed by insects



Zimbabwe Horticulture Group

Harvesting Losses

- Quantitative – 6%
- Causes
 - Late harvesting, small sizes, pest and disease damaged, physiological disorders.
- Solutions
 - Improved training on harvesting stages and agronomic practices, improved access to inputs (seed, chemicals, fertilisers, trellising wire, etc) and irrigation.

Grading Losses

- Quantitative –12.5 %
- Causes
 - 6.2 % soft and over-ripe, 5.8 % cracks due to bad handling, 0.4% heliothis bollworm damage
- Solutions
 - Training in improved post-harvest handling, group marketing, acquisition of improved crop handling equipment –packing house, cold room, washing and dipping in benomyl and wax solution, small louvered plastic crates, 3 tractors and trailers. Harvesting at correct ripeness stage

Transport Losses

- Quantitative – 8.7 %
- Qualitative – 7 %
- Causes
 - Quantitative losses: cracks from vibration impact, compression injury, over-packing and poor transport facilities
 - Qualitative losses: dust contamination, mechanical damage from poor transport – minor scratches, bruises
- Solutions
 - Improved rural roads. Use of covered trucks to minimize dust contamination and facilitate cold chain maintenance. Avoid over-packing through training.

Wholesale Losses

- Quantitative – 6.9 %
- Qualitative – 15.6 %
- Causes
 - Quantitative losses: 5.4 % due to cracks from compression and impact injury and 1.5 % due to softness.
 - Qualitative losses: dust contamination, wilting and mechanical damage from poor transport
- Solutions
 - Construction of temperature and humidity controlled storage facilities and sheds: 12 - 22 degrees and 90 - 95% relative humidity.

Retail Losses

- Quantitative – 16.67 %
- Qualitative – 11.67 %
- Causes
 - Quantitative losses: due to softness and water loss from sun heat, short shelf life and mechanical damage.
 - Qualitative losses: wilting and short shelf life.
- Solutions
 - Improved storage and display facilities, and crop handling.

Points of interest

- Improved handling practices adopted if they fit well in FSC and require small steps.
- Encourage actors to learn and take more responsibility about marketing.
- Sustainability of intervention depends on profitability to main actors
- Subsidies to be provided where necessary – bridging finance, cost sharing or grants equitably accessed by women and men.
- Improved linkages with the market – sustain continuous improvement.
- Empowering local institutions through capacity building ensures continuity and sustainability.
- Promote and support meaningful participation of women in decision making of local rural horticulture institutions.
- Study tours and exchange visits for male and female extension workers, farmers and young scientists enhances aspirations.
- Establish crop/scheme focused production and marketing groups – improved advocacy.
- Put mechanisms in place in proposed interventions that ensure equitable access and ownership of post harvest equipment, technology, services, markets and resources.
- Continuous evaluation of interventions by government on a longer term basis.

Areas of Intervention

- Capacity building for smallholders, extension and institutional development
 - Activity : Business skills : record keeping, budgeting, etc
 - Responsibility : Farmer Orgs, dev partners
 - Activity : Post-harvest skills : PH handling
 - Responsibility : Private sector, dev partners
 - Activity : Collective action : aggregation and joint marketing
 - Responsibility : Farmer Orgs, dev partners

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## Southern Africa Group

Group Presentation: Southern Africa team (Botswana, Malawi, South Africa, Swaziland, Zanzibar)

|           |           |        |          |
|-----------|-----------|--------|----------|
| Maize PHL |           |        |          |
|           | Swaziland | Malawi | Botswana |

|                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|--------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>No and types of Supply Chains</b>       | <ul style="list-style-type: none"> <li>Regulated (NMC)</li> <li>Non-regulated</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <ul style="list-style-type: none"> <li>Regulated (NFRA)</li> <li>Non-regulated</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <ul style="list-style-type: none"> <li>Regulated (BAMB)</li> <li>Non-regulated</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Critical Loss Point in Supply Chain</b> | <ul style="list-style-type: none"> <li>Field level</li> <li>Farmers home</li> <li>Milling (comm &amp; commercial)</li> <li>Food preparation</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <ul style="list-style-type: none"> <li>Field</li> <li>Home</li> <li>Storage</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <ul style="list-style-type: none"> <li>Harvesting</li> <li>Threshing</li> <li>Home storage</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Type of losses</b>                      | Qualitative and quantitative                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Qualitative and quantitative                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Qualitative and quantitative                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Causes of loss</b>                      | <ul style="list-style-type: none"> <li>Rodents</li> <li>Spillage</li> <li>Delayed harvesting</li> <li>Grain storage insects pests</li> <li>Wild/stray animals</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <ul style="list-style-type: none"> <li>Stooking</li> <li>Removing from stalks</li> <li>Shelling</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <ul style="list-style-type: none"> <li>Spillage</li> <li>Pests</li> <li>Mould infestation</li> <li>Theft</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Recommended solutions</b>               | <ol style="list-style-type: none"> <li>Strengthen use of biological control pests</li> <li>Establish by-laws on livestock to control the movement</li> <li>Introduce of appropriate and affordable harvesting and storage technologies</li> <li>Intensify establishment of farmer organizations to facilitate technology transfer</li> <li>Provision of credit facility procurement of appropriate and efficient PHL technologies</li> <li>Strengthen the existing legislation on importation and distribution of pesticides</li> <li>Strengthen extension services among farmers on good postharvest management practices</li> <li>Engage private sector to participate in the development of appropriate storage infrastructure and associated technologies/facilities/equipment</li> </ol> | <ol style="list-style-type: none"> <li>Develop comprehensive value chain options for maize</li> <li>Transform current approach and practice of maize farming into a competitive enterprise and de-regulate prices.</li> <li>Develop, build capacity and organize farmers into formal maize grain suppliers</li> <li>Create and open investor options for Farmers at higher levels of the value chains. <ul style="list-style-type: none"> <li>Improved milling technology that mills whole grain to produce maize meal with acceptable culinary and consumer quality attributes.</li> <li>broadening product range .</li> <li>diversification into high value niche ingredient products</li> <li>standardization, grading and quality assure grain and pay premium prices for value-added grain.</li> </ul> </li> <li>Application of quality assurance standards and practices like</li> </ol> | <ol style="list-style-type: none"> <li>Need to incorporate postharvest loss reduction packages alongside production packages.</li> <li>Formulation and Implementation of the Agricultural Act, Policy and Programme PHL Management.</li> <li>Research and Development of Appropriate and efficient PHL Equipment (gender sensitive)</li> <li>Intensify Value-Addition Research at National Food Technology Research Centre (NFTRC)</li> <li>Develop and Maintain a Database as a Reference for Evaluating Threshing Machines</li> </ol> |

|  |                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                               |
|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>9. Improving the transport infrastructure (roads and transport facilities)</p> <p>10. Developing human capacity at different stages of the supply chain</p> | <p>GMPs, ISO and HACCP.</p> <p>6. Establish Reserves for export and as back-up to national requirements.</p> <p>7. Improve earning capacity (hence commercial image) of maize by expanding industrial utilization and application. This can be achieved through:</p> <p>8. Research and development into maize varieties that combine optimum nutritional, food value, gastronomic and culinary, processing, and agronomic properties among others.</p> <p>9. Research and development into more suitable materials for constructing grain storage tanks (non-reactive, durable to resist tearing at seams, less vulnerable to fluctuating temperatures etc.).</p> <p>10. Re-conceptualize, harmonize and re-align policy, trade and regulatory instruments with new paradigm for maize subsector.</p> <p>11. Integrate gender and environmental perspectives at all levels of policy, planning and implementation of strategies</p> | <p>6. Training of farmers / Capacity Building on Postharvest Loss Assessment and Control</p> <p>7. Provision of Community-Based Storage Facility</p> <p>8. Appropriate Storage Structures</p> |
|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

**Horticulture**

|                                      |                                                                                                  |
|--------------------------------------|--------------------------------------------------------------------------------------------------|
|                                      | <b>Swaziland</b>                                                                                 |
| <b>No and types of Supply Chains</b> | <ul style="list-style-type: none"> <li>• Horticulture traders</li> <li>• Supermarkets</li> </ul> |

|                                            |                                                                                                                                                                                                                                                                                                                              |
|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Critical Loss Point in Supply Chain</b> | <ul style="list-style-type: none"> <li>• Sorting and Grading</li> <li>• Transportation</li> <li>• Rural and urban horticultural markets</li> <li>• Supermarkets shelves</li> </ul>                                                                                                                                           |
| <b>Type of losses</b>                      | Qualitative losses                                                                                                                                                                                                                                                                                                           |
| <b>Causes of loss</b>                      | <ul style="list-style-type: none"> <li>• Rotting</li> <li>• Pest Damage</li> <li>• Disease damage</li> <li>• Physical injury</li> </ul>                                                                                                                                                                                      |
| <b>Recommended solutions</b>               | <ul style="list-style-type: none"> <li>• Use of appropriate packaging facilities</li> <li>• Shaded structures at field level</li> <li>• Capacity building of farmers on PHM</li> <li>• Use of refrigerated vehicles</li> <li>• Use of refrigeration for produce in shelves</li> <li>• Use of cold room facilities</li> </ul> |

### Cowpeas

|                                            | <b>Botswana</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>No and types of Supply Chains</b>       | <ul style="list-style-type: none"> <li>• Regulated (BAMB)</li> <li>• Non-regulated</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Critical Loss Point in Supply Chain</b> | <ul style="list-style-type: none"> <li>• Harvesting</li> <li>• Threshing</li> <li>• Storage</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Type of losses</b>                      | Qualitative and quantitative                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Causes of loss</b>                      | <ul style="list-style-type: none"> <li>• Pest infestation</li> <li>• Spillage</li> <li>• Theft</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Recommended solutions</b>               | <ol style="list-style-type: none"> <li>1. Incorporate postharvest loss reduction packages alongside production packages.</li> <li>2. Formulation and Implementation of the Agricultural Act, Policy and Programme PHL Management.</li> <li>3. Research and Development of Appropriate and efficient PHL Equipment (gender sensitive)</li> <li>4. Intensify Value-Addition Research at National Food Technology Research Centre (NFTRC)</li> <li>5. Develop and Maintain a Database as a Reference for Evaluating Threshing Machines</li> <li>6. Training of farmers / Capacity Building on Postharvest Loss Assessment and Control</li> <li>7. Provision of Community-Based Storage Facility</li> <li>8. Appropriate Storage Structures</li> </ol> |

**Part 2:**

**Maize Grain**

| Area of convergence                                                | Incentive                                                                                                                                               | Investment/type intervention                                                                                                                                    | Actors                                                                                                                                         | Responsible                                          |
|--------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|
| In field practices (harvesting, stooking),                         | Increase in quantitative and qualitative value                                                                                                          | <ul style="list-style-type: none"> <li>Capacity building</li> <li>Technology</li> <li>Market linkage</li> </ul>                                                 | <ul style="list-style-type: none"> <li>Development partners</li> <li>Private sector</li> <li>Farmers</li> </ul>                                | Ministry of Agriculture (MOA)                        |
| Primary processing at household level (Drying, handling, shelling) | <ul style="list-style-type: none"> <li>Maximization of the market and food value</li> <li>Increased shelf life</li> <li>Improved food safety</li> </ul> | <ul style="list-style-type: none"> <li>Appropriate processing technology</li> <li>Capacity building</li> </ul>                                                  | <ul style="list-style-type: none"> <li>Research institutions</li> <li>Development partners</li> <li>Private sector</li> <li>Farmers</li> </ul> | MOA and Academic Institutions, Research institutions |
| Storage (farm level)                                               | <ul style="list-style-type: none"> <li>Optimized volumes</li> <li>Assured food security</li> </ul>                                                      | <ul style="list-style-type: none"> <li>Capacity building</li> <li>Appropriate /Efficient storage technologies</li> <li>Proper storage infrastructure</li> </ul> |                                                                                                                                                |                                                      |

**Maize**

| Area of divergence                 | Incentive                                                                                                  | Investment/type intervention                                                                                                                       | Actors                                                                                                                                                                                                                 | Responsible                             |
|------------------------------------|------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|
| Millers (Community and Commercial) | <ul style="list-style-type: none"> <li>Profit maximization</li> <li>Food and nutritional values</li> </ul> | <ul style="list-style-type: none"> <li>Appropriate technology</li> <li>Capacity building for millers</li> <li>Policy development/review</li> </ul> | <ul style="list-style-type: none"> <li>Millers</li> <li>Retailers</li> <li>Consumers</li> <li>MOA</li> <li>Bureau of standards</li> <li>Parastatals</li> <li>Food manufacturers</li> <li>Ministry of Health</li> </ul> | Ministry of Trade and Industry/Commerce |
| Food preparation (household)       | <ul style="list-style-type: none"> <li>Food security</li> </ul>                                            | <ul style="list-style-type: none"> <li>Capacity building</li> </ul>                                                                                | <ul style="list-style-type: none"> <li>Individual households</li> <li>Nutrition Council</li> </ul>                                                                                                                     | MOA-HE Unit                             |

## Horticulture

| CLP                             | Incentive                                                                                                                                                                                                         | Investment/type intervention                                                                                    | Actors                                                                                                                                                                             | Responsible                             |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|
| Sorting and grading(farm level) | Increase in qualitative value                                                                                                                                                                                     | <ul style="list-style-type: none"> <li>Capacity building</li> <li>Technology</li> <li>Market linkage</li> </ul> | <ul style="list-style-type: none"> <li>Development partners</li> <li>Private sector</li> <li>Farmers</li> </ul>                                                                    | Ministry of Agriculture (MOA)           |
| Transportation                  | <ul style="list-style-type: none"> <li>Minimize the damage</li> <li>Maximization of the market and food value</li> <li>Maintain the value</li> <li>Increased shelf life</li> <li>Assured food security</li> </ul> | <ul style="list-style-type: none"> <li>Appropriate transport</li> <li>Capacity building</li> </ul>              | <ul style="list-style-type: none"> <li>Transporters</li> <li>Development partners</li> <li>Private sector</li> <li>Farmers</li> <li>MOA</li> <li>Ministry of Transport</li> </ul>  | Ministry of Commerce, Trade             |
| Markets                         | <ul style="list-style-type: none"> <li>Profit maximization</li> <li>Food and nutritional values</li> </ul>                                                                                                        | <ul style="list-style-type: none"> <li>Appropriate technology</li> <li>Capacity building for traders</li> </ul> | <ul style="list-style-type: none"> <li>Traders</li> <li>Retailers</li> <li>Consumers</li> <li>MOA</li> <li>Bureau of standards</li> <li>Parastatals</li> <li>Processors</li> </ul> | Ministry of Trade and Industry/Commerce |

## Part 3

### Assessment of the PHL Methodology

- **Training on methodology**
  - Useful: enhanced common understanding amongst the consultants
  - Training not comprehensive enough, length proposed should be 1 day
  - Maintained in the future, and be led by FAO (as designers) with consultants that have used the tool in the past at country level
- **PHL Questionnaire design**
  - Involve the principal researcher from the respective countries at the development stage of the methodology
  - In design and training stage engage other key stakeholders i.e. farmers, EOs etc
  - Pre-testing to be included within the design
- **Methodology specifics**
  - **Load tracking**
    - Necessary but unclear within the training on its operationalization
    - Element of timing and being with farmers a challenge, Resources element?
    - Recommendation: capacitate farmer to conduct the load tracking

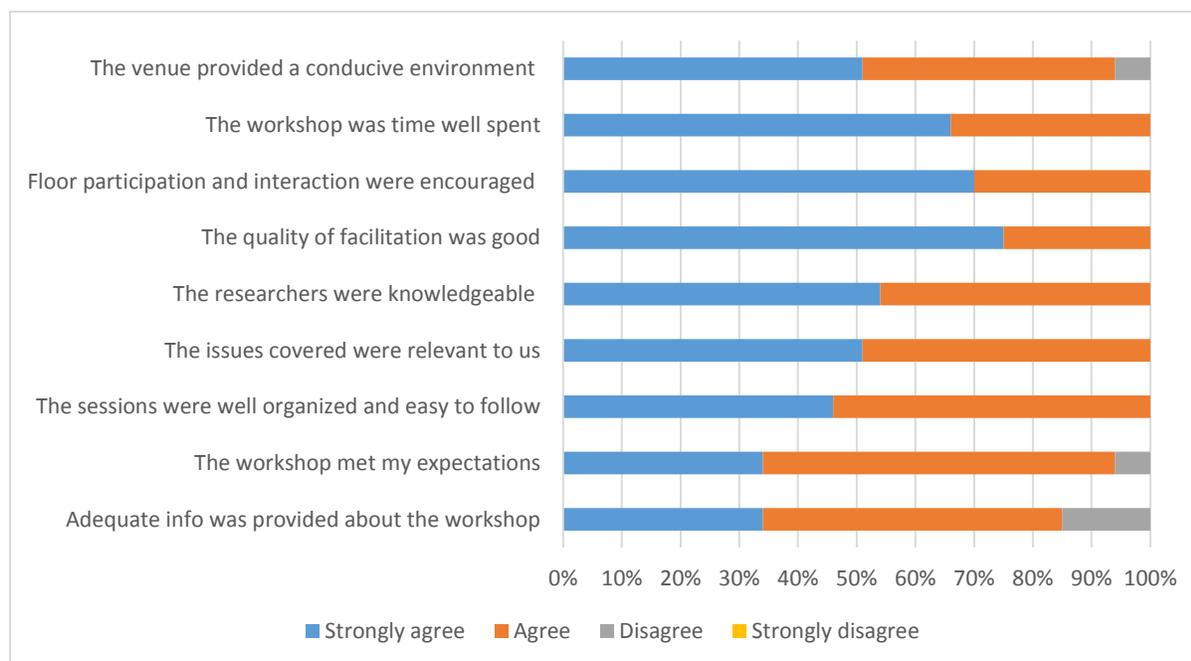
- **Questionnaire data**
  - Review of lengthy questionnaire as it results in farmer fatigue
  - Repetitive sections need to be noted as well
  - Some information in the Tables too detailed and not captured by farmers

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Annex 2: Workshop Evaluation

The participants gave their evaluation of the workshop proceedings and the results are shown in Figure 1.

Figure 1: Participants' evaluation of some workshop elements



34% of the workshop participants strongly agreed that adequate information was provided prior to the workshop whilst 51% agreed. 15% however, disagreed meaning that they came without full information or were invited at the last minute. 94% of the workshop participants at least agreed that the workshop met their expectations; with 34% strongly agreeing that the workshop indeed met their expectations. 51% of the participants strongly agreed that the issues covered in the workshop were relevant whilst 49% agreed.

100% of the participants agreed that the quality of facilitation was good with 75% strongly in agreement. 30% of the participants agreed whilst 70% strongly agreed that floor participation and interaction were encouraged during the course of the workshop. 6% of the participants however, disagreed that the venue was conducive for the workshop because of the disturbances of falling hanging items and a lamp burst which occurred on day 2 of the workshop.

Workshop participants were further probed on the workshop.

1. What did you learn from the workshop?

- The application of FAO PHL methodologies in different contexts
- Strategies for PHL reduction
- Principles of load tracking were new to me

- How to streamline PHL in our farming activities
 - Use of both qualitative and quantitative approaches in PHL methodology
 - Prioritization of PHL reduction
 - Mainstreaming of gender in PHL reduction
 - Effectiveness of PICS bags in reducing PHLs
 - Aflatoxins kill
 - Statistics about food losses
 - Volume of food losses offsets the amount of food aid
- 2. What immediate actions will you take as an individual/organization following this workshop?**
- Raising awareness on PHL
 - Carry out research on PHL
 - Mobilizing communities for action on PHL reduction
 - Engagement of relevant stakeholders in reducing PHL
 - Dissemination of PHL information
 - Improving on current PHL methodologies
 - Information dissemination and further research
 - Concentrate on trying to understand the methodology and what improvements could be done to make it more useful
- 3. What actions/suggestions do you have for future follow-up activities arising from this workshop?**
- National platforms for the coordination of PHL reduction
 - Research into transboundary issues
 - Follow up studies to validate findings
 - Involvement of stakeholders in PHL issues
 - Replica assessments should involve all supply chain actors
 - Country post PHL reduction strategies should be developed immediately
 - Revise and improve the current PHL methodology in use
 - Urgent need to develop project proposals to provide technical support to governments and farmers
 - TCPs need to address problems that cause food losses along the food supply chain
 - Champions are needed to take agenda further
- 4. Any other comments**
- Effective coordination between FAO, Research and other implementing partners
 - This is great work that FAO is doing
 - The workshop was a great eye opener
 - May FAO continue to fund PHL reduction programmes
 - May FAO consider giving local based workshop participants some allowances

- Group discussions on individual country experiences should have been well briefed
- Some key partners were not invited, please consult widely



Zimbabwe Government



Food and Agriculture
Organization of the
United Nations



NORWEGIAN MINISTRY
OF FOREIGN AFFAIRS

Food Loss Reduction Strategy Development in Favour of Smallholder

Producers in Africa

Crowne Plaza Hotel, Harare

15 – 17 March 2016

- Objectives:
1. Broaden understanding of the causes of food losses, their magnitude and Socio-economic impact.
 2. Identification of strategies and practical solutions to reduce food losses
 3. Agreement on next steps to develop a food loss reduction programme

Day 1		
Tuesday 15 March 2016		
Registration		
08.00- 08.30	Registration of participants	
Opening Remarks and Introduction		
08:30-08:40	Norwegian Ministry of Foreign Affairs	
08:40-08:50	Swiss Agency for Development and Cooperation	
08:50-09:00	African Union	
09:00-09:10	International Fund for Agricultural Development	Mr Robert Delve
09:10-09:20	FAO Sub-Regional Coordinator for Southern Africa and Zimbabwe Representative	Dr Chimimba David Phiri
09:20-09:45	Official Opening by Guest of Honour – Government of Zimbabwe	Honourable Dr Joseph Mtakwese Made, The Minister of Agriculture Mechanization and Irrigation Development
09:45-10:00	Group Photo and Interviews	Ted Ogolla
10.00-10.15	Coffee/Tea Break, Group Photo, Interviews	
Global Initiatives of Food Losses and waste		

10:15-11:00	The Global Initiative on Food Losses and Waste - a global overview Food Loss Reduction in Africa – FAO's role Questions and answers	Robert van Otterdijk, FAO Stephanie Gallatova, FAO
Country Experiences		
11:15-11:45	The Community of Practice on food loss reduction <ul style="list-style-type: none"> • How does it work? • How can I benefit from it? 	Mireille Totobesola
11:45-12:45	Kenya – experiences in reducing losses <ul style="list-style-type: none"> • Aflatoxin control in the maize supply chain • The role of institutional and regulatory frameworks in reducing food losses Questions and answers	Stanley Kimereh, FAO Kenya Peter Nyikuli, FAO consultant
13:00-14:00	Lunch	
14:00-14:30	Zimbabwe – experiences with the food loss assessment methodology	Brighton Mvumi Stanley Heri
14:30-15:30	Group work: Participants are organized into country/commodity groups. Terms of Reference will be presented and discussed with the groups.	Facilitator
15:30-16:00	Coffee Break	
16:00-17:30	Group work continues....	Facilitator
17:30	Information and preparation for next day's field visits and Security Brief	FAO Zimbabwe UNDSS
18:30-20:30	Networking cocktail reception	

Day 2		
Wednesday 16 March 2016		
Field visit		
08:30-13:00	Field visits to grain and horticultural food loss reduction facilities Bus from hotel	FAO Zimbabwe
13:00-14:00	Lunch	

Take-away from field visits		
14:00-15:30	Major observations: successes, challenges, recommendations for on-going and future interventions Plenary discussion	Facilitator
15:30-16:00	Coffee Break	
Country Experiences		
16:00-17:30	Group work continues.....	Facilitator
17.30	End of Day 2	

Day 3		
Thursday 17 March 2016		
Sharing of Country Experiences and Proposals		
08:30-10:30	Sharing of country experiences and proposals: presentations by groups of findings Questions and answers	Facilitator
10:30-11:00	Coffee Break	
11:00-12:30	Sharing of country experiences and proposals: presentations by groups of findings Questions and answers	Facilitator
12:30-13:30	Lunch	
Key Messages and Next Steps		
13:30-14:30	Messages based on country/commodity experiences Improvements in the methodology and application for countries Suggested actions for food loss reduction in line with the food loss reduction targets of the Malabo Declaration Questions and answers	Facilitator
14:30-15:00	Concluding remarks and next steps	FAO
15:00	Closure of Workshop	Mr David Mfote
15:30-16:00	Coffee Break	

