



Standing Committee  
for Economic and Commercial Cooperation  
of the Organization of Islamic Cooperation (COMCEC)

# Selected Case Studies from the Member Countries and Recommendations for Reducing Post-harvest Losses

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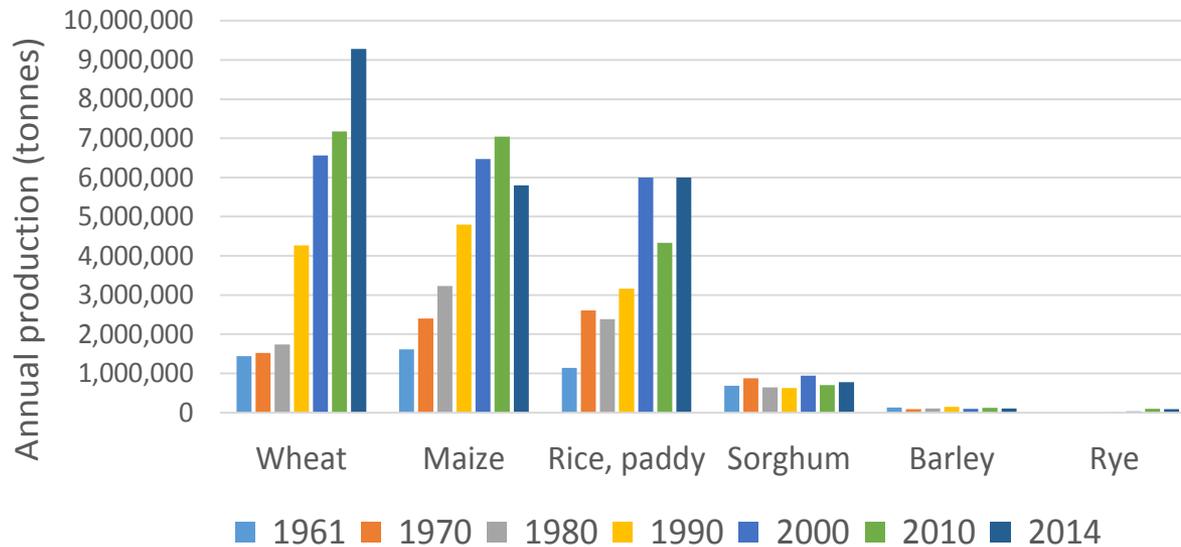
# Structure of 45 min presentation

- Introduce the seven case studies (field trips and desk studies) (5 min)
- Findings for each case study (5 min for each case study). For each case study we will briefly cover:
  - ✓ Status and Importance
  - ✓ Assessment of Postharvest Losses and Economic Burden
  - ✓ Causes of Postharvest Losses
  - ✓ Measures and Strategies Implemented for Postharvest Loss Reduction
  - ✓ Lessons Learned
- Recommendations (5 mins)

# Introduction to the 7 case studies

Commodity group	Commodity focus	Country and Regional Grouping		
		Asian	Arab	African
Cereals	Maize		Egypt	
Roots & tubers	Cassava			Nigeria
Oilseeds & Pulses	Groundnuts			Senegal
Fruit & Vegetables*	Tomato*	Bangladesh*		
Meat & Meat products*	Sheep and goats*		Oman*	
Milk & Dairy	Milk			Uganda
Fish & Seafood*	Artisanal coastal fishery*	Indonesia*		

# Cereals in Egypt Status and Importance



Challenges are importing about 50% of wheat and maize and population is rapidly expanding

Bread is heavily subsidized

Rice is exported but constraint is heavy reliance on water

# Assessment of Postharvest Losses and Economic Burden for Cereals in Egypt

- Limited published literature on postharvest losses in Egypt. Literature from 1970's suggests a range of 16-48%. Elsewhere losses vary from 9-31%.
- Insects and rodents main cause of losses
- APHLIS does not cover North Africa
- No data on economic losses reported
- Authors made a guesstimate for losses. Assuming a 10% postharvest loss of all Egypt's domestically produced and imported wheat, maize and rice would equate to the loss of **3.9 million tons of cereal grains per annum**, equivalent to **USD\$ 1.16 billion/ annum**, or the **annual caloric requirements of at least 15 million people** (at 2,500 kcal per person per day).

# Causes of Postharvest Cereal Losses

Many of the causes of cereal postharvest losses in Egypt commonly occur across the world - poor handling techniques, drying, storage pests, weak monitoring, theft etc.

Egypt faces a number of other less common causes of cereal loss due in part to the various subsidies associated with the cereal (particularly wheat) supply chains.

These include fraud (inclusion of cheaper imported), flour resold on black-market, shouna storage open bag-stack arrangements, complex procurement making management inefficient.

# Measures and Strategies Implemented for Postharvest Loss Reduction of Cereals in Egypt



Causes of postharvest cereal losses can be addressed through

- **Awareness.** Raising greater awareness of the level of losses, where they occur, and causes of the losses.
- **Agricultural Innovations System.** Postharvest systems are complex and dynamic, bringing many different activities, actors, sectors and goals together. **Innovation systems** perspective can help to examine technological and institutional change as a complex process of interactions among diverse actors engaged in generating, exchanging, and using knowledge, and the social and economic institutions that condition their actions and interactions.

# Lessons Learned from case study of Cereals in Egypt

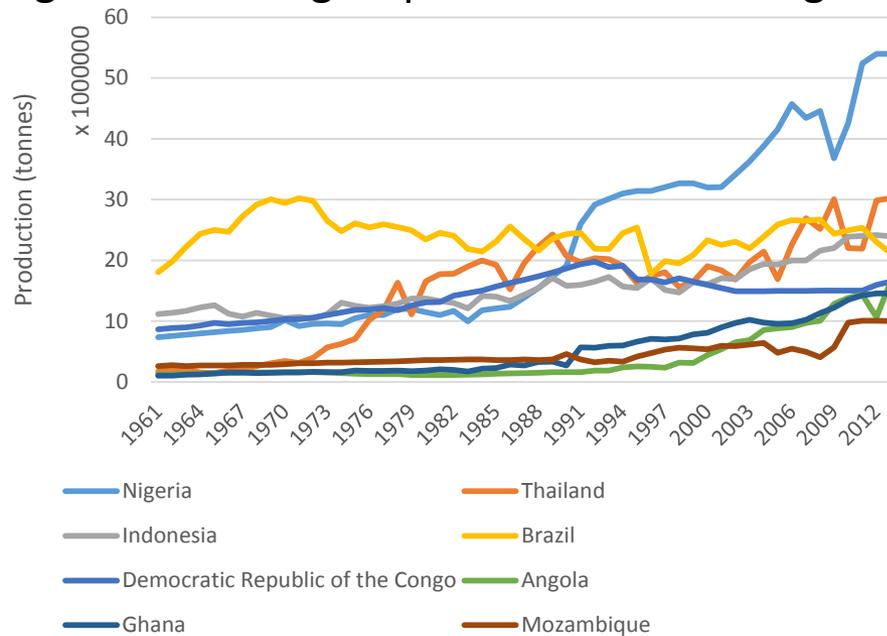
- Need more policy support
- Metrics and postharvest systems
- Capacity strengthening
- Training
- Products to support reduced losses – hermetic bags, pesticides, drying sheets, improve warehouse management systems etc.



# Cassava in Nigeria

## Status and Importance

Nigeria is the largest producer of cassava globally



Cassava has a short shelf life, high water content and bulky to transport

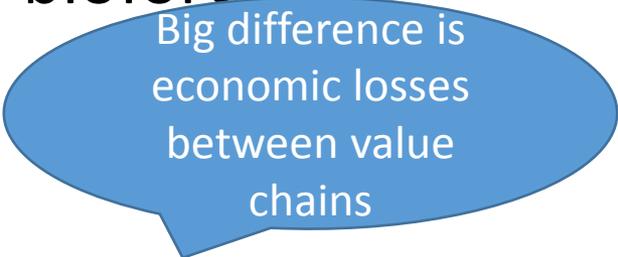


Cassava is mainly for food consumption. Leads to higher price and demand for fresh roots. Most cassava is consumed in the form of a roasted and fermented product called Gari.

The Government of Nigeria is supporting wheat substitution with high quality cassava flour in bread making.

# Assessment of Postharvest Losses and Economic Burden for Cassava in Nigeria

- Few publications
- FAO give general figures of 50% for physical losses but is not specific for Nigeria
- Physical losses reported as between 8% (Naziri et al 2014) and 25% (Oguntade 2013).
- The economic cost varied from US\$20 million (South West only) and US\$900 million (EUR 686 million) (entire country).
- No estimate of nutrition losses but cassava is an important source of calories and does have more protein than potato and yams. New biofortified cassava contain vitamin A.



Big difference is economic losses between value chains

# Causes of Postharvest Cassava losses in Nigeria

- Harvesting and processing are the main sources of losses in Nigeria. Biggest losses are postharvest deterioration and during peeling.
- Losses can be reduced if processing is located close to the farm



Peeling is labour intensive, often done by women and difficult to reduce waste

# Measures and Strategies Implemented for Postharvest Loss Reduction of Cassava in Nigeria

Causes of postharvest losses can be addressed through

- **Awareness.** Raising greater awareness of the level of losses and situations where they occur and the causes of the losses.
- **Postharvest Innovations System.** Postharvest systems are complex and dynamic, bringing many different activities, actors, sectors and goals together.
- **Turn losses into gains.** EU FP7 GRATITUDE project demonstrated peels and stems can be used for mushroom production, can use enzymes to recover starch from peels and access new markets (i.e., gluten free)

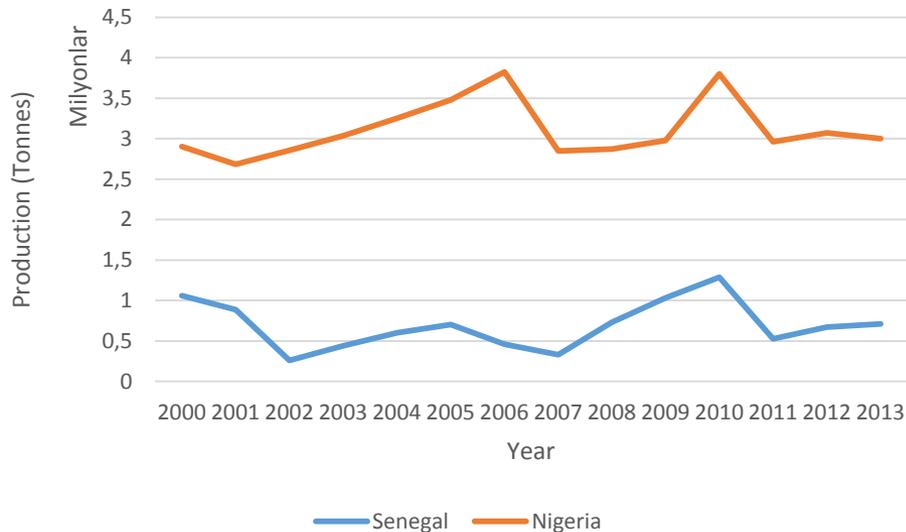
# Lessons Learned from case study of Cassava in Nigeria

- Few published reports on physical and economic losses. More metrics and information is needed.
- Inconsistency in reporting, particularly for economic losses
- A value chain approach is important since different value chains can lead to very different losses, especially economic ones
- Viable business opportunities for reducing waste or turning it into a product of value need to be carefully considered before investing money
- Gender needs to be considered in waste reduction or waste opportunity solutions as women often do the peeling
- Nutrition?

# Groundnuts in Senegal

## Status and Importance

Groundnuts are re-emerging as an important crop in Senegal and production expected to increase to 1.1 million tonnes in 2016/17



Half of the production is exported to China and Vietnam. World Bank is supporting Government of Senegal investments in this sector to support livelihoods of 850,000 farmers.

# Assessment of Postharvest Losses and Economic Burden for Groundnuts in Senegal

- Few publications
- Official estimate of losses is 14.1% or 150,000 tonnes or US\$80 million. Saving this could potentially increase farm household incomes by US\$94 per annum.
- 82% of groundnuts marketed through the informal channels and not subjected to controls by national standards authorities
- Aflatoxin contamination is high with up to 85% of groundnuts contaminated and similar to that found in Togo and Ghana.

# Causes of Postharvest groundnut losses in Senegal

- Shelling, drying, storage, grading, packaging and transportation can lead to significant losses, including quality-related losses.
- Traders under pressure early in season when nuts have not been properly dried
- Informal trade means standards are not met



# Measures and Strategies Implemented for Postharvest Loss Reduction of Groundnuts in Senegal

Few measures and strategies are currently in place.

**Awareness.** Some awareness of Aflatoxin (particularly moulds) and some of its potential health effects. However, traders do not separate the nuts and do not receive a premium for quality nuts.

**Policy and market incentives.** Currently much of the groundnut trade in Senegal is informal. Ways will need to be found to enable standards and regulations to be followed so that the safety and quality can be improved and at the same time reduce losses and realise gains.

# Lessons Learned from case study of Groundnuts in Senegal

- **Training** of farmers
- **Promotion of structured marketing systems** to support the supply chain. **Public-private partnerships** can strengthen market linkages and to make critical investments in infrastructure and technology. Enable producers to scale up export production and to become more competitive
- Facilitate **finance**
- **Policy** to improve and encourage use of **standards**
- **Aflatoxin reduction may be costly.** U.S. producers spend in excess of \$27 million USD annually— and even more during years of drought—to meet aflatoxin standards. Implementing traceability down to the individual farmer level which has allowed the most severe cases of contamination to be identified and preventative measures to be put in place (i.e. discouraging farmers from wetting the peanut shells prior to shelling). Need to improve storage to reduce moisture and humidity.

# Tomatoes in Bangladesh

## Status and Importance

Important as 4<sup>th</sup> in production and 3<sup>rd</sup> in area and 3<sup>rd</sup> largest producer in South Asia

	2009	2010	2011	2012	2013
Production Tonnes (t)	150,720	190,213	232,459	255,430	251,000
Yield (t/ha)	7.4	8.0	9.4	10.0	9.54
Imports (t)	17,004	19,727	23,330	8,800*	21,209
Imports as % of production	11	10	10	3	8
Imports (US\$ million)	3.9	5.0	9.3	2.4	6.1

Production is rapidly increasing (11% per year)

Grown as a winter crop but also have summer crop

Dyke tomatoes are integrated with fish farming



# Assessment of Postharvest Losses and Economic Burden for Tomatoes in Bangladesh

- There is variation in the extent of losses reported and methodology. Total physical losses vary between 3 and 40%.
- Two reports attempt to add a monetary value to the losses (2008-9). US\$9 million at the farm gate price and US\$11.6 million at the retail price in one report and US\$7.7 million in another.
- Leads to higher consumer prices
- Impact of quality / nutrition losses have not been reported

# Causes of Postharvest tomato losses in Bangladesh

- **Poor packaging methods and transport**, particularly from distant production areas to the main wholesale markets in Dhaka.
- **Harvesting methods** on-farm also contributory factors. Tomatoes are harvested at any time of the day and removal of field heat is rarely practiced;
- **Farmers' knowledge** of maturity indices is inadequate - immature and over mature produce are harvested; produce is often piled in heaps which causes bruising.
- **Sorting** is done to remove damaged and disease/insect infested produce based on visual observation.
- Grading is based on size but **most produce is not graded**.
- **Washing** is seldom practiced and there is no regard for **water quality**.
- Damage by rats to harvested tomatoes were mentioned as a cause of loss

# Measures and Strategies Implemented for Postharvest Loss Reduction of Tomatoes in Bangladesh

Researchers and practitioners involved in postharvest activities and produce marketing suggest and promote a number of improved preharvest practices, such as **correct maturity, bird scaring, staking** of tomato plants, as well as a range of improved postharvest practices of which the **use of plastic crates, from the field to the retail market, is particularly encouraged**

Current focus of Department of Agricultural Extension is on increasing production – a focus on reducing losses will support this

Improve coordination between government departments

# Lessons Learned from case study of Tomatoes in Bangladesh

- **Increase awareness** of postharvest losses and improved postharvest technologies.
- **Economic incentive to upgrade their practices** are required - higher prices received for summer tomatoes and the much lower losses achieved indicates that farmers are willing to adopt new practices if a better return can be achieved.
- Increase **interaction between researchers, traders and farmers** - encouraged to use plastic crates instead of baskets and jute bags.
- The **growing market demand for safe, organic food** produced following good agricultural practice, is another indication that people are willing to pay more for premium produce.
- Support to **innovation platforms and uptake of good agricultural practice** and linking actors along the tomato value chain is an area that is not well covered by other projects. The Department of Agricultural Marketing is under-resourced but could be a useful player in translating market needs into practical projects to facilitate marketing, reduce losses and improve returns to producers.

# Milk and Dairy Products in Uganda

## Status and Importance

Product	Quantity (tonnes)
Milk, whole fresh cow	1,207,500
Butter, cow milk	316
Milk, whole condensed	6

- Total milk production estimated to be 1.92 million litres/day (mainly cows)
- Only 12.7% marketed
- Very little processed into value added products
- Average yield per cow = 8.5 litres/week
- Indigenous breeds and smallholder production dominate
- Losses of marketed milk estimated at 21% = USD 23 million pa

# Assessment of Postharvest Losses and Economic Burden for Milk and Dairy Products in Uganda

- Studies suggest losses after farm gate from 10-21%
- High seasonal variability (collection challenges during rainy season)
- Spillage and spoilage in-chain estimated as 18%

Typical milk collection and distribution centre in Kampala

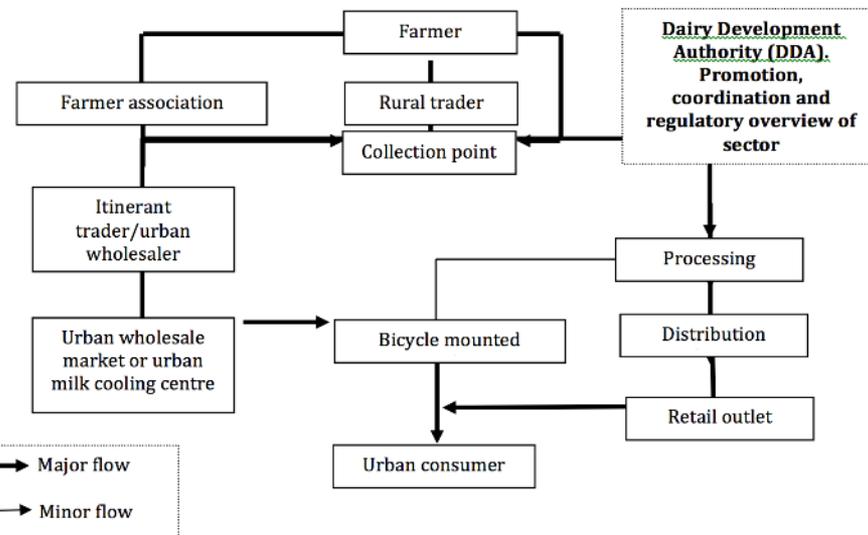


# Causes of Postharvest Milk and Dairy Losses in Uganda

Main causes of loss are:

- Lack of access or uncertain electricity
- Spoilage and spillage in-chain
- Accessibility of farms during rainy season
- Poor quality control & hygiene leading to contamination
- Lack of cooling infrastructure or ineffective preservation

Simple boiling is common



# Measures and Strategies Implemented for Postharvest Loss Reduction of Milk and Dairy Products in Uganda

- National milk and milk production regulations and standards implemented
- Coordination – Uganda National Dairy Traders Association
- Some practices outlawed: boiling milk unhygienically, use of inappropriate containers
- Inspection of milk processing centres initiated
- Registration of milk processors
- Laboratory to test samples from producers now available
- Coordinated national and regional dairy programmes have helped
- Not clear exactly how much impact this has had

Some advanced dairy products are available in Kampala

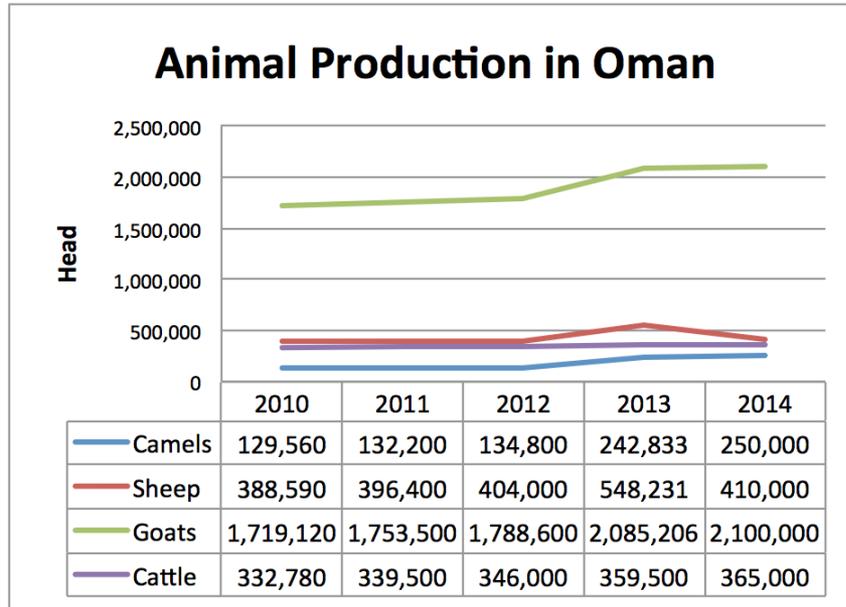


# Lessons Learned from case study of Milk in Uganda

- Donor support helped industry in the past 30 years and had projects to reduce losses and food safety
- Dairy production is seen as a way of reducing poverty, increase household income and improve food security and nutrition.
- Markets are rapidly changing though with competition and standards which pose challenges to the smallholder sector

# Meat and Meat Products in Oman

## Status and Importance of Cereals in Oman



Lives animal imports are important for food and re-export

### Challenges

- Highly distorted domestic agricultural economy
- Severe water limitations increase production costs (especially fodder)
- Oman is the end of a long value chain for oxen, sheep and goats from Djibouti, Kenya, Ethiopia, Eritrea and Somalia
- Also large scale live animal imports from Australia, New Zealand and Iran

# Assessment of Postharvest Losses and Economic Burden for Meat and Meat Products in Oman

- Oman meat sector divided between imported chilled/frozen (almost no losses) and imported/domestic live animals (significant losses identified)
- No research or published material on postharvest losses available
- Estimates from interviews show domestic losses of 25-40% quantitative and up to 49% economic losses – with a total value of >USD6m per annum.
- These figures were higher than Omani Govt expected.

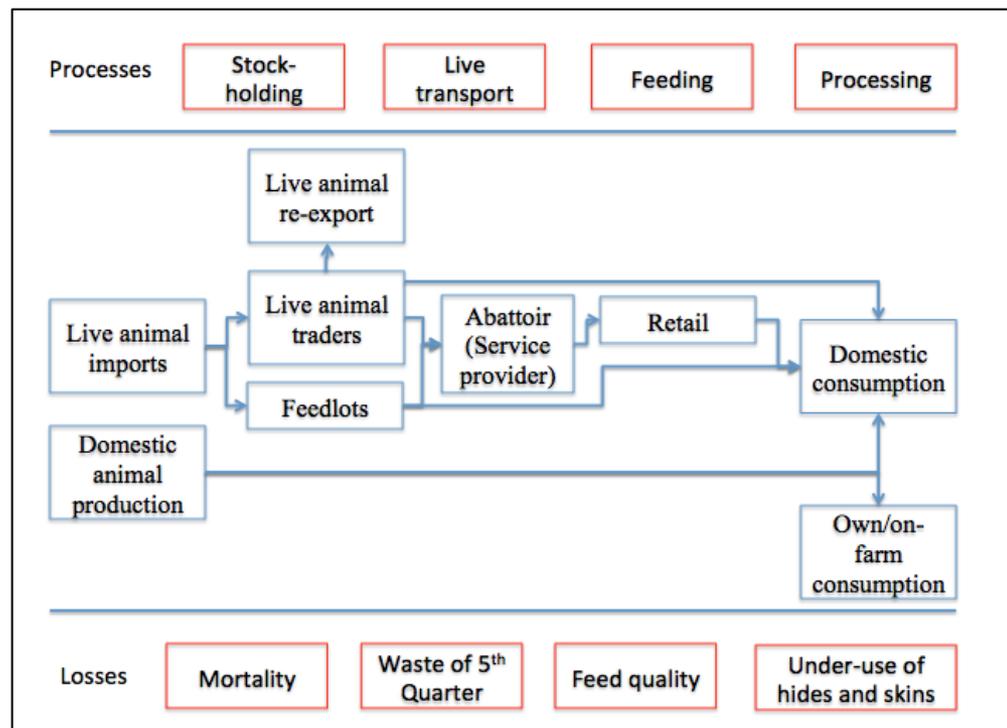


In supermarkets, records are kept of meat waste

# Causes of Postharvest Meat and Meat Product Losses in Oman

Main causes of loss are:

- Domestic slaughter leads to waste of offal, skins, blood etc., environmental costs and possible health costs
- Lack of domestic standard for marketing – all transactions are ‘negotiated’ and nothing is weighed
- Where formal slaughter occurs, most of the by-products are underutilized – e.g., skins and hides exported salted
- Farmers, market agents and manufacturers in Oman are uncoordinated
- Under-feeding is common – expensive feed and no weighing
- Low off-take means extra animal maintenance costs
- Fodder and feed lose quality and weight in store due to high aridity
- Food quality is not strongly regulated – the impact of this is unclear



# Measures and Strategies Implemented for Postharvest Loss Reduction of Meat and Meat Products in Oman

- Oman needs to consider tackling its domestic livestock slaughter policy: this would allow full use of the 5<sup>th</sup> Quarter and improve public hygiene
- Very little is known about postharvest losses in Oman and policies to research, address and implement innovations to locate and reduce losses are not in place.
- More data on losses and their specific locations could allow implementation of policies that promote behaviour change reward loss reduction



# Lessons Learned from case study of Meat and Meat Products in Oman

- No central person/body was identified as taking responsibility for postharvest loss reduction
- Price management means that actors have limited incentive to be more efficient
- Cultural norms are very strong in the livestock sector: so the concept and value and its loss is very hard to explain.
- Meat and meat product losses are probably the least well understood/researched of any commodity sector

Some segments of the goat market are considered 'luxury'



# Fish and Fish Products in Indonesia

## Status and Importance

Fish production 7 million tonnes pa

29kg per person per annum

Capture and aquaculture about 60:40 market share

Three broad scales of production: large, medium and small/backyard

Type	'000 tonnes	% of total
Fish and shellfish	7,453	72%
Beef and buffalo	472	5%
Pig	695	7%
Sheep and goat	114	1%
Poultry	1,566	15%
<b>TOTAL</b>	<b>10,300</b>	<b>100%</b>

## Challenges

Very diverse and complex set of sub-sectors with varying problems, challenges and issues.

Traditional fish processing sector still important

Govt of Indonesia has a strong systematic overview of postharvest losses and how to address them

# Assessment of Postharvest Losses and Economic Burden for Fish in Indonesia

- At a notional 30% postharvest loss, the total value is USD 4.8 billion
- Volume of physical loss potentially huge: 6 million tonnes consumed – 10% loss is 600,000 tonnes
- Particular problems with:
  - Gill net (4 - 15% by-catch and 28 - 50% quality loss)
  - Mini trawlers (3% theft, 5% poor handling, 22% quality loss)

Varying levels of investment and scale



# Causes of Postharvest Fish Losses in Indonesia

Main causes of loss identified by research are:

- Poor quality raw material
- Un-used by-catch
- Long soaking times for long nets
- Poor on-shore handling
- Poor hygiene and sanitation
- At sea discards
- Poor on-board handling

Capture

Culture  
(aquaculture)



Consolidation

Processing

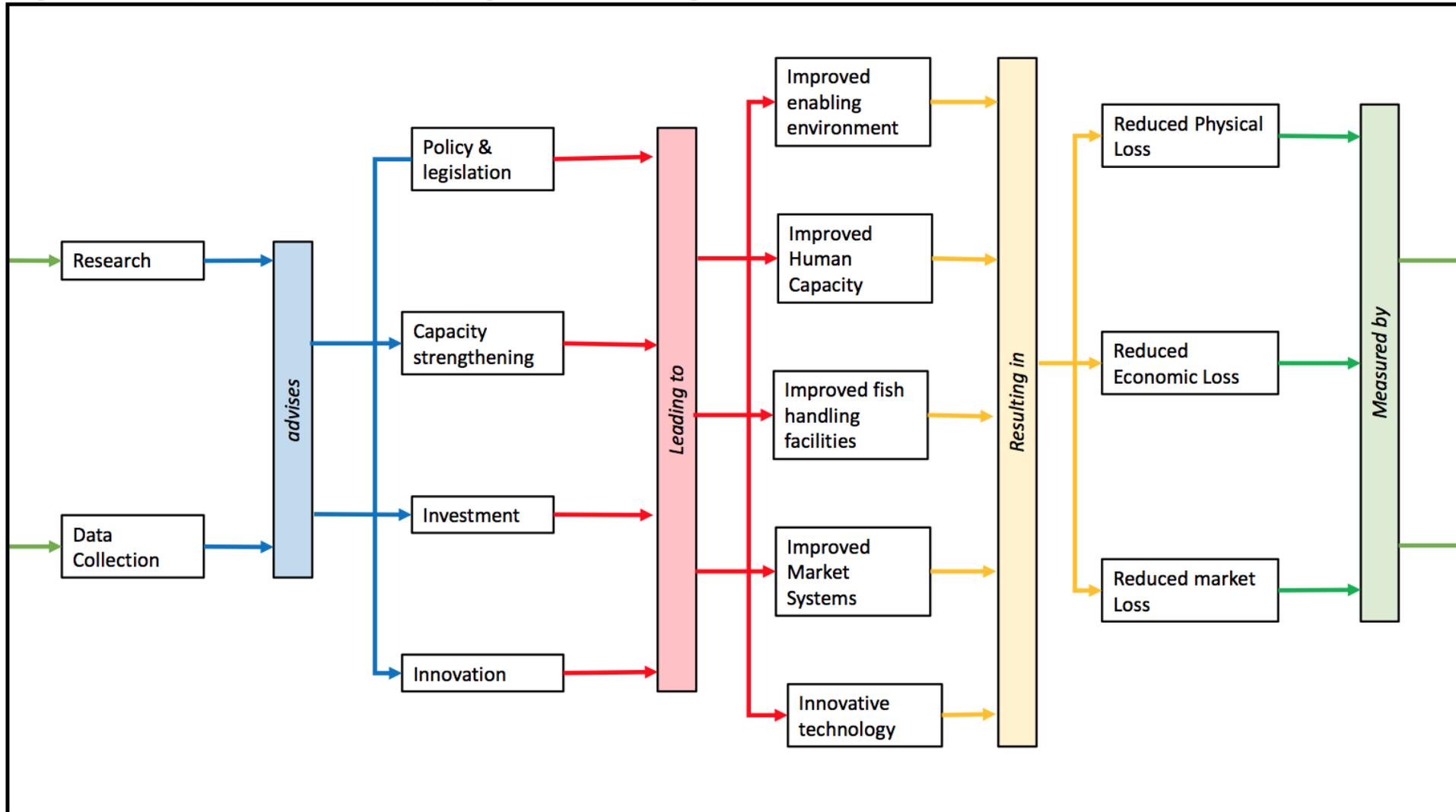
Presentation  
to Market

# Measures and Strategies Implemented for Postharvest Loss Reduction of Fish in Indonesia

- Govt of Indonesia has a comprehensive plan for measuring and tackling postharvest losses in the fisheries sector
- Postharvest losses are reported in national statistics (but not disaggregated by physical and economic losses)
- Demonstrates that with a structured system and policy support targeted investments and improvements can be made. Still early days in Indonesia, so impact not yet known.

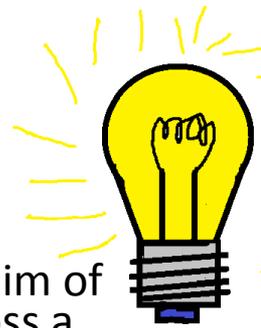


# Example of best practice: the system for identifying & addressing PHL in Indonesia's fisheries sector



# Lessons learned from case studies

- Are significant losses but **good examples of OIC Member Countries putting systems in place**
- The bulk of the information concerned the **physical losses - easier to estimate**. In general, the reported information we found suggests that physical losses for all of the commodity groups are similar to that known for non-OIC Member Countries.
- **Much less was reported concerning the economic losses. Losses differ markedly from one value chain for another, even for the same product and commodity.** In all cases the monetary cost of the losses was significant but not always known how the costs were estimated. **If the monetary losses could be captured**, this will lead to benefits for the consumer and actors in the value chain along with potential benefits to national balance of payments.
- **Least is known regarding the quality/nutrition losses.** Critical for countries where deficiencies occur.
- Postharvest losses and their causes is complex because there are three types of loss being physical, economic and quality/nutrition losses.
- The losses tend to be specific to each commodity crop and probably to the specific value chains for a particular commodity group.



# Recommendations

1. Establish **national PHL reduction coordination committees** with the specific aim of identifying, prioritising and sharing postharvest losses data and practices across a range of strategic commodities.
2. Promote a consistency of approach. An OIC wide **PHL reduction coordination body** should be initiated with the aim of using consistent methods, sharing best practice and promoting system wide efforts.
3. Promote **capacity building and sharing** - best practice' workshops
4. Encourage local, national and, potentially, regional **multi-stakeholder commodity platforms**.
5. Involve **financial service providers** to investigate the possibility of developing specific PHL reduction instruments.
6. Consider developing projects that specifically engage **private sector actors** in identifying and reducing PHL. A challenge fund may be cost effective.
7. Consider a consistent approach to postharvest loss analysis and subsequent actions with **gender differentiation** in mind and to consider vulnerable groups in society.
8. A **competition** to develop PHL reduction ICTs could have a high impact to cost ratio.
9. Policy makers to consider **by-products**, particularly where high volumes can be achieved, can result in strategic investment opportunities for by-product upgrading and reduced postharvest losses.
10. If postharvest losses are to be addressed, a **system of measuring them at a strategic level** should be considered and promoted to national agricultural statistics bodies.

Thank you