

- **APEC 2015 Expert Consultation on**
- **Assessment Methodology of Fishery and Livestock Losses**
- **Taipei, July 16-17, 2015**

Information Sheet: Major Issues on Food Loss Assessment and Improvement

(APEC/PPFS & ATCWG Multi-Year Project M SCE 02 2013A)

Ching-Cheng Chang
Chinese Taipei



Outline

About the Multi-Year Project

- Relevance
- Progress
- Capacity Building : 2013, 2014
- Capacity Building : 2015

About the Information Sheet

- Definition and Scope
- Assessment Methodology
- Data and Verification

About the project

- **Proposed** by Chinese Taipei in 2013 ATCWG/PPFS
- **Co-sponsored** by
 - 13 APEC economies,
 - ABAC, International Rice Research Institute (IRRI), International Livestock Research Institute (ILRI); and WorldFish.
- **Objectives**
 - Identify **key issues** on reducing food losses and wastes
 - Seek **best practices** in private and public sectors
 - Find **practical solutions** and enhance capacity-building

About the project- Work Plan (3 Phases)

Preparation, Research and Identification

2013

- Launch capacity building seminars in major cereals.
- Identify key issues on reducing post-harvest losses and wastes
- Study methodology on loss assessment and toolkit, database

Investigation of Food Losses and Waste

2014~
2016

- **Modify methodology, toolkit and dataset** based on feedbacks from MEs
- **Launch annual capacity building seminars** on reducing PHL for grain, fruit and vegetables, fishery and livestock, and consumption wastes

Action and Inter-linkages

2017~2
018

- Launch a high-level meeting to facilitate policy dialogue
- Complete final report including policy recommendation and action plans
- Disseminate project results via APIP online website

Relevance to APEC

- **2014 Leaders' Declaration**
 - Par 18 (b): *“implement the APEC Food Security Road Map Towards 2020 to enhance supply chain connectivity, achieve efficiencies, **reduce post-harvest losses and waste**, and improve the food system structure by 2020, to provide lasting food security to APEC economies; “*
- **APEC Food Security Roadmap Towards 2020**
 - *“Enhance food supply efficiency, provide more affordable food for lower income consumers. APEC economies will strive to **reduce food loss and waste by 10% compared with the 2011-2012 levels by 2020** in the Asia-Pacific economies aim to advance beyond the Millennium Development Goals 2015 hunger goals.”*

Relevance to PPFS

Action Plan of PPFS 2014

- **Priority in WG on Enhancing Trade and Market:**
 - Post-harvest management tech & standards
 - Supply chain and cool chain
 - **Food loss and waste reduction**
 - Quality and safety assurances
- **Key areas for cooperation**
 - Technology exchanges in food storage, supply chain and **food loss reduction**
 - Engage with **ATCWG, OFWG, HLPDAB, CTI.**



Capacity Building Seminars 2013-2014

1st APEC Seminar Taipei, Aug 5-8, 2013

Main challenges in
**Food losses and Food
Security**

Best Practices in
Reducing Post-harvest
losses on **Food Grains**

Key Issues on
strengthening **Public-
Private Partnership
(PPP)** on reducing
post-harvest losses

2nd APEC Seminar Beijing, Sept 15, 2014

Major issues in
reducing food losses
in **Fruits and
Vegetables**

Best practices of
enhancing PPP in
**Fruits and Vegetables
supply chain**

Innovative
technologies and
management in **Fruits
and Vegetables supply
chain**

Capacity Building in 2015

APEC 2015 Expert Consultation on Assessment Methodology of Fishery and Livestock Losses Taipei, July 16-17, 2015

Discuss loss assessment methodology in fishery and livestock supply chain

Collect baseline information and capacity building



APEC Seminars on Strengthening Public-Private Partnership to Reduce Food Losses in the Supply Chain of Fishery and Livestock Iloilo, September 27, 2015

Identify practical solutions and incentives to enhance PPP of reducing food losses in fishery and livestock

Best practices sharing and innovative technologies on reducing food losses in fishery and livestock supply chain

APEC 2015 Expert Consultation

3 Purposes



Improve assessment methodology and data collection on identifying causes in fishery and livestock



Design survey questionnaire and identify key targets to improve data collection and sharing



Discuss work plan for the technical team on food loss assessment and capacity building

Content of Information Sheet

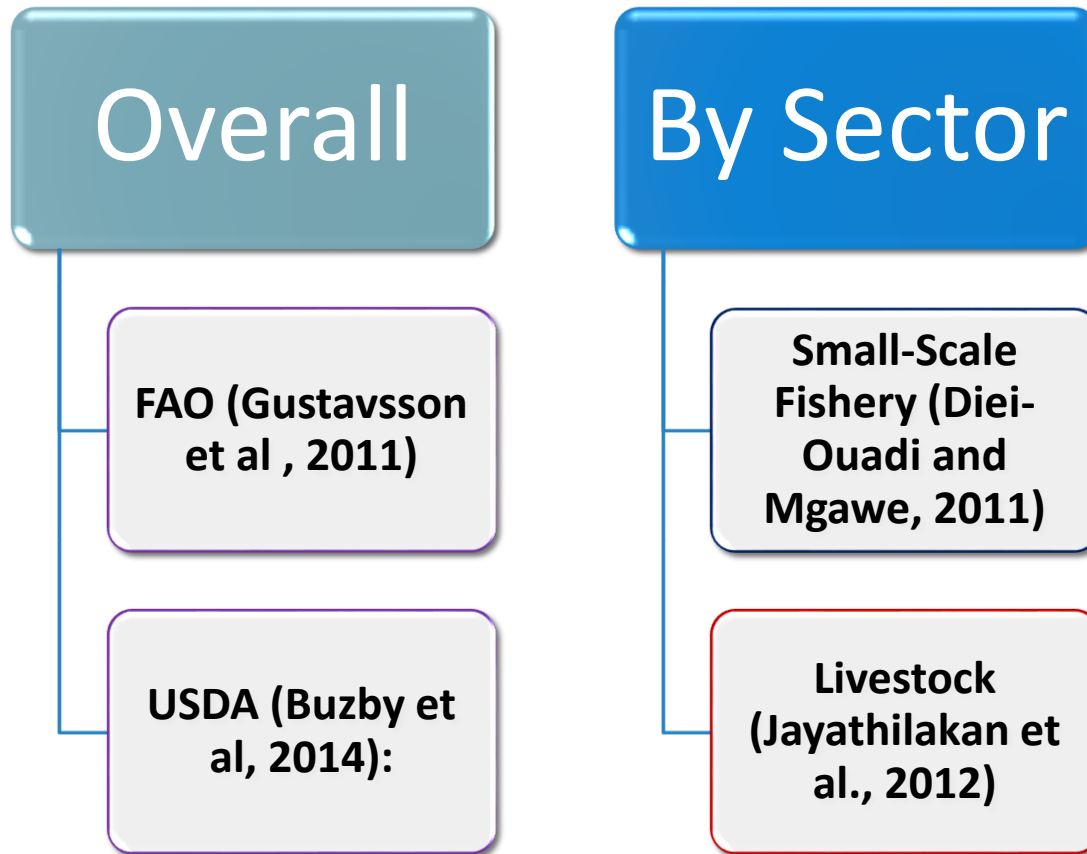


Definition &
Scope

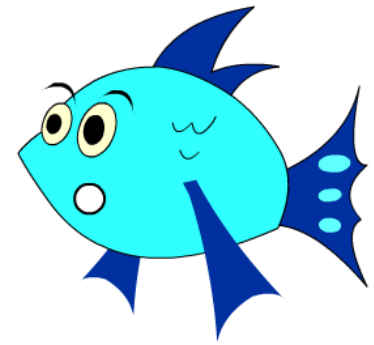
Assessment
Methodology

Data &
Verification

I. Definition & Scope



Definition for Fishery Loss



➤ FAO(Diei-Ouadi and Mgawe, 2011)

✓“Fish that is either discarded or sold at a relatively low price.” owing to

- **biochemical and microbiological spoilage**
- discarding of **bycatch at sea** because fish is too small or not valuable enough to land for sale;
- poor **processing** techniques damaging fish;
- **animal** predation and **insect** infestation;
- inadequate **packaging and storage** practices leading to damage of the end product;
- **market dynamics** affect price and income.

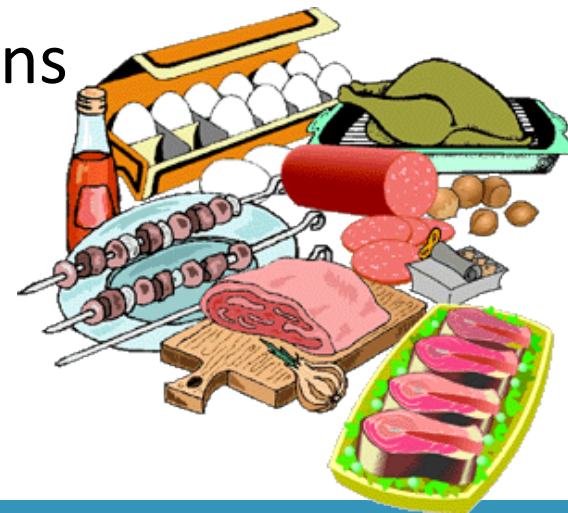
Definition for Livestock Loss

FAO (Gustavsson et al., 2011):

- ✓ *The majority of the waste in the meat industry is produced during **slaughtering**.*
- ✓ *Such waste includes **bones, tendons, skin, the contents of the gastro-intestinal tract, blood and internal organs**.*

Food Loss Reduction in livestock means

→ **“By-Product Reutilization”**



By-products as a percentage of market live weight

Item	Pigs		Cattle		Sheep	
	%	kg	%	kg	%	kg
Market live weight		100		600		60
Whole carcass	77.5	77.5	63.0	378.0	62.5	37.5
Blood	3.0	3.0	18.0	4.0	2.4	
Fatty tissue	3.0	3.0	4.0	24.0	3.0	1.8
Hide or skin	6.0	6.0	6.0	36.0	15.0	9.0
Organs	7.0	7.0	16.0	96.0	10.0	6.0
Head	5.9	5.9				
Viscera(chest and abdomen)	10.0	10.0	16.0	96.0	11.0	6.6
Feet	2.0	2.0	2.0	12.0	2.0	1.2
Tail	0.1	0.1	0.1	6.0		
Brain	0.1	0.1	0.1	6.0	2.6	0.156

II. Assessment Methodology

Model of FAO (Gustavsson et al , 2011)

5 Activity :

- agricultural production;
- handling and storage;
- processing and packaging;
- distribution; and
- consumption.

7 Commodity :

- cereals;
- roots and tubers;
- fruit and vegetables;
- oilseeds and pulses;
- meat;
- fish and seafood;
- milk; and
- eggs

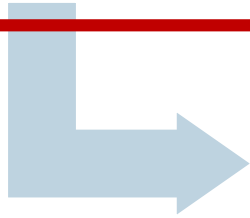
8 Regions:

- Europe,
- North America & Oceania,
- Industrial Asia,
- Sub Sahara Africa,
- North Africa,
- West & Central Asia,
- South & Southeast Asia,
- Latin America.

Structure of Assessment Model

• Model for Cereal & F&V

1. Production and Harvesting Loss _i	=	$((R \times L_1) / ((1 - L_1)) \times E$
2. Handling and Storage Loss _i	=	$R \times L_2$
3. Processing and Packaging Loss _i	=	$(C_i + F_i \times U_i) \times L_3$
4. Distribution and Marketing Loss _i	=	$F_i \times (1 - U_i) \times L_{4 \text{ for fresh}}$ $+ \{(C_i + F_i \times U_i) \times (1 - L_3)\} \times L_{4 \text{ for processed}}$
5. Consumption Loss _i	=	$F_i \times (1 - U_i) \times (1 - L_{4 \text{ for fresh}}) \times L_{5 \text{ for fresh}}$ $+ \{(C_i + F_i \times U_i) \times (1 - L_3)\} \times (1 - L_{4 \text{ for processed}}) \times L_{5 \text{ for processed}}$

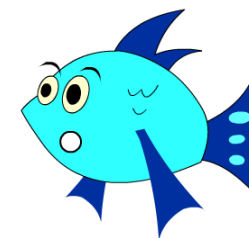


• Model for Fish & Livestock

Total Food Loss Equations for APEC Economy *i*

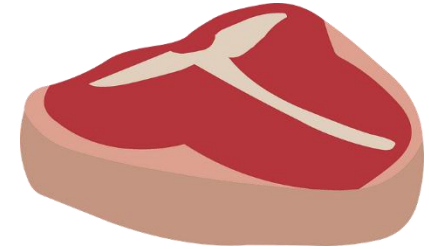
1. Production and Harvesting Loss _i	=	$((C \times L_1) / ((1 - L_1)) \times E$
2. Handling and Storage Loss _i	=	$(C + A) \times L_2 \times E$
3. Processing and Packaging Loss _i	=	$(C + A) \times L_3 \times U_i$
4. Distribution and Marketing Loss _i	=	$((P \times F) / (1 - L_5)) \times L_4$
5. Consumption Loss _i	=	$((P \times F) / (1 - L_5)) - (P \times F)$

Loss Ratios - Fishery



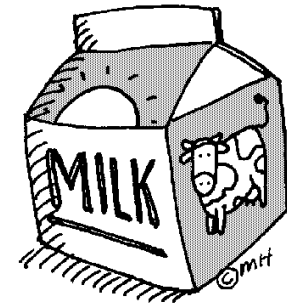
APEC Economy		Production Harvesting (L ₁)	Handling Storage (L ₂)	Processing Packaging (L ₃)	Distribution Marketing (L ₄)	Consumption (L ₅)	Process Ratio	Edible Ratio
Australia, New Zealand	USAID	9.4%	0.5%	6.0%	9.0%	11.0%	79%	50%
	FAO	12.0%	0.5%	6.0%	9.0%	33.0%	...	50%
Canada, United States	USAID	12.0 %	0.5%	6.0%	9.0%	33.0%	79%	50%
	FAO	12.0%	0.5%	6.0%	9.0%	33.0%	...	50%
Chile, Mexico, Peru	USAID	5.7%	5.0%	9.0%	10.0%	4.0%	46%	50%
	FAO	5.7%	5.0%	9.0%	10.0%	4.0%	...	50%
Indonesia, Malaysia, The Philippines Thailand, Viet Nam	USAID	8.2%	6.0%	9.0%	15.0%	2.0%	46%	50%
	FAO	8.2%	6.0%	9.0%	15.0%	2.0%	...	50%
PR China, Rep Korea, Chinese Taipei	USAID	15.0%	2.0%	6.0%	11.0%	8.0%	79%	50%
	FAO	15.0%	2.0%	6.0%	11.0%	8.0%	...	50%
Russia	USAID	9.4%	0.5%	6.0%	9.0%	11.0%	79%	50%
	FAO	9.4%	0.5%	6.0%	9.0%	11.0%	...	50%

Loss Ratios-Meat



APEC Economy	Production Harvesting (L ₁)	Handling Storage (L ₂)	Processing Packaging (L ₃)	Distribution Marketing (L ₄)	Consumption (L ₅)	Process Ratio	Edible Ratio
Australia, New Zealand,	3.7%	1.0%	5.0%	4.0%	11.0%	50%	50%
Canada, The United States Japan	3.7%	1.0%	5.0%	4.0%	11.0%	50%	50%
Chile, Mexico, Peru	5.6%	1.1%	5.0%	5.0%	6.0%	50%	50%
P R China, Rep Korea, Singapore, Chinese Taipei	3.1%	0.6%	5.0%	6.0%	8.0%	50%	50%
Indonesia, Malaysia, Thailand, The Philippines, Viet Nam	5.6%	0.3%	5.0%	7.0%	4.0%	50%	50%
Russia	3.2%	0.7%	5.0%	4.0%	11.0%	50%	50%

Loss Ratios-Milk



APEC Economy	Production Harvesting (L ₁)	Handling Storage (L ₂)	Processing Packaging (L ₃)	Distribution Marketing (L ₄)	Consumption (L ₅)	Process Ratio	Edible Ratio
Australia, New Zealand,	3.7%	1.0%	5.0%	4.0%	11.0%	50%	50%
Canada, The United States Japan	3.7%	1.0%	5.0%	4.0%	11.0%	50%	50%
Chile, Mexico, Peru	5.6%	1.1%	5.0%	5.0%	6.0%	50%	50%
P R China, Rep Korea, Singapore, Chinese Taipei	3.1%	0.6%	5.0%	6.0%	8.0%	50%	50%
Indonesia, Malaysia, Thailand, The Philippines, Viet Nam	5.6%	0.3%	5.0%	7.0%	4.0%	50%	50%
Russia	3.2%	0.7%	5.0%	4.0%	11.0%	50%	50%

Loss Ratios-Eggs



APEC Economy	Production Harvesting (L ₁)	Handling Storage (L ₂)	Processing Packaging (L ₃)	Distribution Marketing (L ₄)	Consumption (L ₅)	Process Ratio	Edible Ratio
Australia, New Zealand,	3.7%	1.0%	5.0%	4.0%	11.0%	50%	50%
Canada, The United States Japan	3.7%	1.0%	5.0%	4.0%	11.0%	50%	50%
Chile, Mexico, Peru	5.6%	1.1%	5.0%	5.0%	6.0%	50%	50%
P R China, Rep Korea, Singapore, Chinese Taipei	3.1%	0.6%	5.0%	6.0%	8.0%	50%	50%
Indonesia, Malaysia, Thailand, The Philippines, Viet Nam	5.6%	0.3%	5.0%	7.0%	4.0%	50%	50%
Russia	3.2%	0.7%	5.0%	4.0%	11.0%	50%	50%

A few Information Gaps

1. Baseline Data:

- **Year 2012: Not complete**

2. Fishery

- Should “**by-catch**” be counted as fishery loss?
- Loss ratios by “**stage**”
- Processing ratios
- Edible ratios

3. Livestock

- What is “**Edible**” By-Products? → Need a check list
- Loss ratios by “**stage**”
- Processing ratios
- Edible ratios

Thank You
&
Comment Welcome

Contact: Ching-Cheng Chang

Email: Emily@econ.sinica.edu.tw

Emily33662666@gmail.com