

# 2017 APEC Expert Consultation on Food Losses and Waste Reduction

Agricultural Technical Cooperation Working Group (ATCWG) Policy Partnership of Food Security (PPFS)

June 2017

# APEC Multi-Year Project: "Strengthening Public-Private Partnership to Reduce Food Losses in the Supply Chain" (M SCE 02 2013A)

## Prepared by

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# 2017 APEC Expert Consultation on Food Losses and Waste

# Reduction

# (APEC MYP SCE 02 2013A)

# (Cover Page Format)

Project Number	MYP SCE 02 2013A	
Project Title	Strengthening Public-Private Partnership to	
	Reduce Food Losses in the Supply Chain	
Proposing Economy	Chinese Taipei	
Seminar Title	APEC Expert Consultation on Food Losses and	
	Waste Reduction	
Seminar Location	Taipei, Chinese Taipei	
Seminar Date	June 12-13, 2017	

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# I. Purpose

Food losses and waste (FLW) are a significant indicator of inefficient food systems and this issue needs to be addressed sooner rather than later to prevent even greater widespread losses in social, economic, and environmental aspects. Many global initiatives have been developed, such as SAVE FOOD, SDG 12.3 of Agenda 2030, ZERO Hunger, and have taken place at the local scales. APEC has also taken a leading step to reduce FLW by supporting a multiple-stage research and policy advising project.

Chinese Taipei has been implementing the APEC Multi-Year Project on "*Strengthening Public-Private Partnership to Reduce Food Losses in the Supply Chain*" since 2013. Project implementation has so far established a network of experts on food loss and waste, a technical team to gather and maintain pertinent data and perform analyses, and consultations on food crops in 2013, vegetables and fruits in 2014, fishery and livestock products in 2015, as well as retailers and consumers waste in 2016. In 2017~2018, the project reaches its final phase by synthesizing all previous progress and information collected into policy recommendations and action plans.

The 2017 APEC Expert Consultation on Food Losses and Waste Reduction was hosted in National Taiwan University, Chinese Taipei, on June 12-13, 2017. The event counted with the participation of 18 APEC member economies, for a total of 70 official participants representing governments, academic communities, food industry, food bank operators, NPOs and NGOs. There were 8 panel sessions and 15 renowned speakers presented relevant studies for the measurement of FLW, public-private partnership initiatives, global trends in food consumption and waste reduction, and more. Additionally, there were 16 APEC member economies reports delivered by the delegates of each of the APEC member economies. A panel discussion was conducted in session 7 which originated an open deliberation platform among participants and as a result originated a list of non-regret solutions for FLW. This two-day expert consultation paves the way for the APEC agenda on reducing FLW. The main points were to:

- Discuss the *Actions/Programs* for APEC FLW reduction with pilot actions (i.e., No Regrets Options) in APEC member economies;
- *Survey questionnaire design* on evaluating the feasibility of the *Actions/Programs* to Reduce APEC FLW by 10 Percent by 2020;
- Identify *capacity building needs* to increase adoption of innovative technologies and best practices;
- Evaluate the possibility to form an APEC <u>Food</u> <u>Losses/Waste</u> <u>A</u>ccounting and <u>R</u>eporting <u>Partnership</u> (FLoWARP).

Outcomes of this consultation will be delivered to the ATCWG and PPFS at the APEC 2017 Food Security Week in Can Tho City, Viet Nam.

# II. Program

**Date:** June 12-13, 2017

Venue: 1<sup>st</sup> Conference Hall, Administrative Building, National Taiwan University, Taipei

Host: Council of Agriculture, Chinese Taipei

DAY 1: June 12, 2017 (Monday)			
08:30-09:00	Registration		
09:00-09:20	Welcome Remarks		
	- Dr. Chi-Chung Chen, Deputy Minister, Council of Agriculture, Chinese Taipei		
	- Amb. Pei-Yung Hsu, APEC Senior Official, Director General, Ministry of		
	Foreign Affairs, Chinese Taipei		
00.20 00.20	- Prof. Pan-Chyr Yang, President, National Taiwan University, Chinese Taipet		
09.20-09.30			
09:30-10:00			
10:00-12:00	Session 1: Overview of FLW Reduction Roadmap and Actions		
	- Reality of Food Losses: A New Measurement Methodology		
	- Daddaak ta Dlata Supply Chain Efficiencies to Dadyas Food Losses		
	Dr Nathan Gray (University of Adelaide Australia)		
	- An Overview of APEC Roadmap and Action Plans for Reducing Food Losses		
	and Waste and Preliminary Survey Results		
	Dr. Ching-Cheng Chang (Academia Sinica, Chinese Taipei)		
	- No Regret Options and a Roadmap to Reduce APEC Food Waste by 10 Percent		
	Prof. Tony Shih-Hsun Hsu (National Taiwan University, Chinese Taipei)		
	Chair: Dr. Miranda Mirosa, University of Otago		
12:00-13:30	Lunch		
13:30-15:00	Session 2: Evaluating the Potential of <i>Actions/Programs</i> to Reduce APEC FLW by 10 Percent by 2020.		
	- The FLW Standard: Measuring and Reporting on Food Loss and Waste		
	Mr. Brian Lipinski (World Resources Institute, the United States)		
	- Reducing Food Loss and Waste in Japan-Accounting and Reporting System		
	Mr. Kenta Suzuki (Food Industry Bureau, Ministry of Agriculture, Forestry		
	and Fisheries, Japan)		
	FUSIONS & REFRESH, Experiences from Fubic-Flivate Farmerships across		
	Dr. Toine Timmermans (Wageningen University & Research, Netherlands)		
	- Chair: Mr. Benjamin Lephilibert, LightBlue Environmental Consulting		
15:00-15:20	Coffee Break		
15:20-17:40	Session 3: Member Economies Report: Experience Sharing by Delegates (10		
	min each)		
	1. Australia		
	2. Chile		
	3. People's Republic of China		

4. Hong Kong, China
5. Indonesia
6. Malaysia
7. Mexico
8. New Zealand
9. Peru
10. Russia
11. Singapore
12. Chinese Taipei
13. The Philippines
14. Thailand
15. The United States
16. Viet Nam
Chair: Dr. Nathan Gray, University of Adelaide

DAY 2: June 13, 2017 (Tuesday)			
08:30-09:00	Registration		
09:00-10:00	<ul> <li>Session 4: Policies and Innovations on Reducing Postharvest Losses</li> <li>Main Issues: <ul> <li>Situation, Policies and Innovations on reducing Post-harvest Losses in Vietnam</li> <li>Dr. Dang Kim Khoi (Institute of Policy and Strategy for Agricultural Policy, Viet Nam)</li> <li>Comprehensive Approaches to Reducing Post-Harvest Losses</li> <li>Ms. Zhang Yi (State Administration of Grain of China, People's Republic of</li> </ul> </li> </ul>		
	China) Chair: Mr. Brian Lininski, World Resources Institute		
10:00-10:20	Coffee Break		
10:20-12:00	<ul> <li>Session 5: Data Collection and Consistent Accounting System in APEC</li> <li>Main Issues: <ul> <li>Lessons Learned in Estimating Food Loss in the United States</li> <li>Dr. Jean C. Buzby (Economic Research Service, USDA, the United States)</li> </ul> </li> <li>Adoption of Global Data Standards in Supply Chain to Enhance Integrity, Visibility and Efficiency <ul> <li>Ms. Cindy Yin (GS1 Hong Kong, Hong Kong, China)</li> <li>Policies to Promote Public-Private Partnership</li> <li>Dr. Miranda Mirosa (University of Otago, New Zealand)</li> </ul> </li> <li>Chair: Dr. Nguyen Do Anh Tuan, Institute of Policy and Strategy for Agricultural Policy</li> </ul>		
12:00-13:30	Lunch		
13:30-14:30	<ul> <li>Session 6: Policies and Innovations on Reducing Food Waste</li> <li>How Technologies and Innovative Approaches Can Help Address a Widely</li> </ul>		

	Overlook Sustainability Issue in The Hospitality Industry: Food Waste.			
	Mr. Benjamin Lephilibert (LightBlue Environmental Consulting, French)			
	- Food Waste Reduction from Enterprise & NGO.			
	Mr. Winson Wu (Carrefour Cultural and Educational Foundation, Chinese			
	Taipei) and Mr. Jeff Chen (Association of Foodbanks, Chinese Taipei)			
	Chair: Dr. Miranda Mirosa, University of Otago, New Zealand			
14:30-15:00	Coffee Break			
15:00-17:00	Session 7: Panel Discussion on "Next Steps for APEC to Address FLW"			
	Main Issues:			
	- Explore the best way to tackle the FLW challenges of the rapidly changing landscape of APEC food system beyond 2020;			
	- Discuss how benefits of FLW reduction can be shared more widely among APEC member economies and stakeholders along the food chain.			
	- Elaborate the approach to form an APEC <u>Food Losses/Waste Accounting</u> and <u>Reporting Partnership</u> ( <i>FLoWARP</i> ) to reveal the true cost of FLW to the society and environment.			
	- Discuss the risk/opportunities and capacity building needs to enable technical and			
	- Explore PPFS/ATCWG work with other fora to reach the desired target			
	Panelists (in alphabetical order)			
	Dr. Bo-Ji Chen (National Taiwan University, Chinese Taipei)			
	Mr. Brian Lipinski (World Resources Institute, the United States)			
	Dr. Miranda Mirosa (University of Otago, New Zealand)			
	Moderator: Dr. Nathan Gray (University of Adelaide, Australia)			
17:00-17:30	Session 8: Conclusions, Recommendations, and Follow-Ups			
	- Summary Report			
	Dr. Ching-Cheng Chang (Academia Sinica, Chinese Taipei)			
	- Closing Remarks			
	Dr. Chi-Chung Chen (Deputy Minister, Council of Agriculture, Chinese Taipei)			

# **III. Profile of Speakers**

# Session 1: Overview of FLW Reduction Roadmap and Actions

# 1. Dr. Maximo Torero



World Bank Email mtorero@worldbank.org

Dr. Maximo Torero is the World Bank Group Executive Director for Argentina, Bolivia, Chile, Paraguay, Peru and Uruguay since November 2016. Prior to joining the Bank, Dr. Torero led the Division of the Markets, Trade, and Institutions at the International Food Policy Research Institute (IFPRI). His major research work lies mostly in analyzing poverty, inequality, importance of geography and assets (private or public) in explaining poverty, and in policies oriented towards poverty alleviation based on the role played by infrastructure, institutions, and on how technological breakthroughs (or discontinuities) can improve the welfare of households and small farmers. His experience encompasses Latin America, Sub-Saharan Africa, and Asia.

## 2. Dr. Nathan Gray



University of Adelaide Email nathan.gray@adelaide.edu.au

Dr. Nathan Gray is a Director of Transnational Projects, Faculty of Professions, University of Adelaide. Dr. Gray specializes in strategic international management and policy advice to governments, NGO's and corporations in the Asia Pacific. He has a detailed and unique knowledge of emerging corporate and government opportunities in Asia, gained through extensive experience operating in Asian markets. As a professional with a particular focus on South East Asia and Indonesia, Nathan's strongest skills and abilities exist in international business and cross cultural environments, where he has substantive experience facilitating international business transactions and trade between Australia, Asia, Europe and North America.

### 3. Dr. Ching-Cheng Chang



Institute of Economics, Academia Sinica; Department of Agricultural Economics, National Taiwan University Email: emily@econ.sinica.edu.tw

Dr. Ching-Cheng Chang is a Research Fellow in the Institute of Economics at Academia Sinica and is a Professor in the Department of Agricultural Economics at National Taiwan University where she teaches linear programming, agricultural sector modeling, and modeling applications. She also directs the Socioeconomic Department of the APEC Research Center of Typhoon and Society. Her research interests include efficiency measurement, dynamic optimization, climate change impacts on labor, and trade policy and market structure of the international commodities market. Dr. Chang holds a PhD in Agricultural Economics from the Pennsylvania State University.

### 4. Prof. Tony Shih-Hsun Hsu



Department of Agricultural Economics, National Taiwan University Email m577tony@gmail.com

Dr. Tony Shih-Hsun Hsu is Professor, Department of Agricultural Economics, National Taiwan University. Dr. Hsu graduated from Texas A&M University, USA, 1991. He was Chair, Department of Agricultural Economics, National Taiwan University, 2005-2011. He was selected as Research Fellow, Global Trade Analysis Project (GTAP), Purdue University, USA, 2003. He was serving as Member of the Editorial Advisory Board, Journal of Agricultural Economics, International Association of Agricultural Economists (IAAE), 1998-2003. He is President, Taiwan Association of Input-Output Studies (TAIOS) and Co-PI, SUSFANS (an EU HORIZON 2020 Project). He is now member of Board of Directors, International Cooperation Development Fund (ICDF). His research interests include International Trade, Agricultural Development and Policy, Applied General Equilibrium Analysis, Agricultural and Resource Economics.

# Session 2: Evaluating the Potential of Actions/Programs to Reduce APEC FLW by 10 Percent by 2020

# 5. Mr. Brian Lipinski



World Resources Institute Email BLipinski@wri.org

Mr. Brian Lipinski is an Associate within the Food Program at the World Resources Institute. Mr. Lipinski as a co-author on the Food Loss and Waste Accounting and Reporting Standard, the first globally accepted set of accounting and reporting principles for measuring and reporting on FLW. He was also the lead author on the paper "Reducing Food Loss and Waste," published by WRI in 2013. He has written extensively on the topic and has served as an advisor for numerous FLW-related studies, including serving on the advisory board for ReFED. He holds an M.S. in Environmental Policy from the University of Michigan's School of Natural Resources.

## 6. Mr. Kenta Suzuki



Ministry of Agriculture, Forestry and Fisheries Email kenta\_suzuki910@maff.go.jp

Mr. Kenta Suzuki is a deputy director for food loss and waste policy, Ministry of Agriculture, Forestry and Fisheries, Japan. Mr. Suzuki is a specialist in restraining waste generation (review of delivery deadline / best-before date), promotion of NO-FOODLOSS Project (raising public consciousness & encouraging action), food bank activity and circular recycling. He received a bachelor degrees in Bio-resources from Tsukuba University. He have been participated in rice paddy farming policy at regional office, GIAHS (Globally Important Agricultural Heritage Systems by FAO) policy and basic plan for food in agriculture and rural areas.

#### 7. Dr. Toine Timmermans



Wageningen University & Research Email toine.timmermans@wur.nl

Dr. Toine Timmermans is a Program Manager Sustainable Food Chains at Wageningen University & Research, and Coordinator of the EU projects FUSIONS and REFRESH. The overall aim of the project REFRESH is to contribute to SDG 12.3, halving food loss and food waste across the post-harvest supply chain. Dr. Timmermans is a coordinator of the FLW reduction project within the CGIAR program CCAFS (Climate Change, Agriculture and Food Security) with a focus on in developing and emerging countries in Sub Sahara Africa. To provide evidence for the amount of mitigation that could be achieved by reducing FLW, understanding the systemic drivers for food loss and waste, and to identify strategies for reducing FLW in ways that achieve a food- and nutrition- secure food system while also reducing emissions.

# Session 4: Policies and Innovations on Reducing Postharvest Losses

## 8. Dr. Dang Kim Khoi



Centre for Agricultural Policy – Institute of Policy and Strategy for Agricultural Policy Email : khoi.dang@cap.gov.vn

Dr. Dang Kim Khoi completed his PhD degree in Policy Economics in the Australian National University. He has rich experience and knowledge in international and development economics, environmental economics and governance as well as policy and institutional issues of agricultural and rural development in Vietnam and Laos. He has led and coordinated numerous studies at national and regional levels. He is also the author of a number of research and policy reports on environment, climate change, international integration, trade liberalization and agricultural growth in developing country context. He has won several coveted awards, including the Ford Foundation Scholarship, ACIAR endeavor fellowship.

#### 9. Ms. Zhang Yi



State Administration of Grain Email: Zhangyi6267@126.com; fad@chinagrain.gov.cn

Ms. Zhang Yi was born in August 20, 1983 in China. Ms. Zhang is a senior staff member of the Department of Foreign Affairs of the State Administration of Grain, China since 2013. She received master's degree in English Translation from University of International Business and Economics and received bachelor's degree in Electronic Information Engineering from China Jiliang University.

# Session 5: Data Collection and Consistent Accounting System in APEC

# 10. Dr. Jean C. Buzby



Economic Research Service, USDA Email : JBUZBY@ers.usda.gov

Dr. Jean Buzby has worked either directly or indirectly for the U.S. Department of Agriculture's Economic Research Service (USDA/ERS) for over 20 years. Dr. Buzby is the Branch Chief of the Diet, Safety, and Health Economics Branch in the Food Economics Division. Prior to moving into management, her primary areas of work as an economist at ERS were food safety and food consumption research. Dr. Buzby's food safety research included estimating the costs of foodborne illness, analyzing the legal incentives for firms to produce safer food, and exploring international trade and food safety issues. Her food consumption research was primarily centered on using information gleaned from the Food Availability (Per Capita) Data System. She has also conducted research on food loss in the United States for over a decade and continues to estimate the amount and value of food loss at the retail and consumer levels in the United States, using data from ERS's Loss-Adjusted Food Availability Data Series.

# 11. Ms. Cindy Yin (Sze-Lai Yin)



GS1 Hong Kong Email : CindyYin@gs1hk.org

Ms. Cindy Yin is expertise in food industry for more than 10 years, specialized in promoting traceability practices and platform to enhance product safety and consumer trust through technology innovation. Furthermore, Ms. Yin is steering the Hong Kong ECR and organizes annual food forum event which brings together government officials, food professionals and industry stakeholders for knowledge exchange.

#### 12. Dr. Miranda Mirosa



Department of Food Science, University of Otago Email miranda.mirosa@otago.ac.nz

Dr. Miranda Mirosa is the Director for the Consumer Food Science Programme and a Senior Lecturer in the Department of Food Science, University of Otago. In 2015, Dr. Mirosa led a grant for developing NZ/China collaborations in food safety and security science. As Principle Investigator, she led a team of 13 NZ scientists from 7 different institutes to China to partake in a conference and industry visits. Dr. Mirosa currently holds a NZ/China Postharvest Loss and Food Waste Research Fellowship, funded by the NZ Ministry for Primary Industries – a programme aiming to enhance business-research-government partnerships through commercially meaningful research, complement joint research programmes under the China-NZ Food Safety and Security Science Roadmap, and support the APEC Food Security and Free Trade Area Asia Pacific work.

# Session 6: Policies and Innovations on Reducing Food Waste 13. Mr. Benjamin Lephilibert



LightBlue Environmental Consulting Email: contact@lightblueconsulting.com

Mr. Benjamin Lephilibert is the founder of LightBlue, a regional auditing, capacity building and consulting firm supporting organizations willing to improve profitability and minimize their social and environmental footprint. He worked across Asia with various prestigious partners from the private sector (Accor, ClubMed), governmental agencies (TCEB) as well as from International Organizations (UNILO, EU). He has been a pioneer on the topic of Food Waste Prevention, has developed one of the most comprehensive standard to date, integrating implementation of a food waste monitoring system, online tracking of data, capacity building and revision of SOPs at critical food waste generation points. He is as well an international guest speaker, guest lecturer, a judge for International Sustainability Awards and an active member of several sustainable tourism working groups (GSTC).

## 14. Mr. Jeff Chen (Chieh-Fu Chen)



Association of Foodbanks Email: jeffchen@redcross.tw

Mr. Jeff Chen is a Secretary General, Association of Foodbanks. He works in the nonprofit organization—the Red Cross Society, Taichung City Branch since 2006. He learned the experiences from well-organized foodbanks in USA and other countries for improving the food shortages problem of the Food Assistant Program commissioned by Taichung City government. Mr. Chen established the first "supermarket-style" foodbank in Taichung in 2013. It becomes an example and be imitated by other cities and counties. Furthermore, he initiated the Association of Taiwan Foodbanks (ATF) in 2016. There are 46 foodbank members throughout Taiwan nowadays.

#### 15. Mr. Winson Wu



Taiwan Carrefour Cultural and Educational Foundation Email: winson\_wu@carrefour.com

Mr. Winson Wu is an Executive Chief, Taiwan Carrefour Cultural and Educational Foundation. Mr. Wu exercises his profession from operation, public affairs and human recourses to corporate social responsibility (CSR). He leads Taiwan Carrefour Foundation to launch the "Carrefour food project", which laid the foundation of the Association of Taiwan Foodbanks (ATF) establishment, made Carrefour Taiwan the first retail brand to start the daily un-sold food donation to NGOs. On top of that, he continues to help the social enterprises to develop the anti-waste product and small farmer on friendly agriculture. On the anti-waste subject, he is constant invited to share Taiwan experience in Asian or Global Food Bank network. He brings advanced anti-waste knowledge to advocate in media & forum for local development of anti-waste subject. Multiple CSR award winner regarding food program.

# **IV. Summary and Recommendations**

Improving food security with the recent climate change is very difficult. Therefore, an alternative for attaining major food security in the APEC region is to reduce postharvest losses and food waste. This is the founding rationale which originated this multiyear APEC project. A major consensus is needed in order to reduce food loss and waste (FLW) by 10% compared to the year 2011 and 2012 in the APEC member economies. While the amount of food that is being produce has increased in the recent years, the amount of food that is lost or wasted has proportionally increased as well. As a result, the APEC region needs to establish common grounds regarding the definition of food loss and waste or wasted.

Through two days of presentations and discussions, participants have the opportunities to identify challenges, priorities, actions and capacity building needs to move the food waste reduction and recovery agenda forward in the APEC region.

# I. Summary:

- 1. We acknowledge that FLW is a global problem and can be best addressed from *"Triple"* perspectives as suggested by the HLPE of FAO (2014).<sup>1</sup>
  - A *food system* perspective
    - Considering FLW not as an accident but as an integral part of food systems, e.g., along the food chains
  - A food and nutrition security perspective
    - looking at how food losses and waste relate to the various dimensions of food security and nutrition security
  - A sustainability perspective
    - Including the environmental, social and economic dimensions of sustainability
- 2. We acknowledge that causes of FLW and their solutions can be best organized in *"Three"* levels
  - *Macro*-level (food system and beyond)
    - Policies, regulation, infrastructure, enabling environments
  - *Meso*-level (food chain)

<sup>&</sup>lt;sup>1</sup> FAO (2014), <u>A Report by High Level Panel of Experts (HLPE) on Food Security</u> and Nutrition of the Committee on World Food Security, Full report is available at www.fao.org/cfs/cfs-hlpe.

- Organization, coordination and communication among food chain actors
- *Micro*-level (households and individual enterprise)
  - Awareness, behavioral response, perception, Price incentives, vulnerability
  - Role of media and social enterprise, NGOs
- 3. We acknowledge a "food-use-not-waste" hierarchy to minimize FLW and the existence of many "no-regret" solutions in addition to those suggested in the ReFED 2016 report
  - 1. Prevention:
    - ReFED (2016)<sup>2</sup> propose: consumer education campaigns, waste tracking & analytics, standardized date labeling, produce specifications, packaging adjustments, smaller plates, secondary resellers, trayless dining, spoilage prevention packaging, improved inventory management, manufacturing line optimization, cold chain management
    - APEC Member Economies propose: raise consumer awareness (incorporate celebrities), education, value creation, smart packaging, smart label, storage improvement, smarter operations, automatic discounting system (based on expiry date), measurement of FLW, identify causes of FLW, review on the policies on FLW, food safety, food standards, monitoring actions taken to reduce FLW, technical and infrastructure interventions, set acceptable levels of food loss/waste, economic studies on how markets will adjust to increased food supply, R&D on postharvest, implementing good practices at postharvest.

# 2. Recover and Redistribution

 ReFED (2016) propose: donation tax incentives, standardized donation regulation, donation matching software, donation transportation, donation storage and handling, value-added processing, donation liability education.

<sup>&</sup>lt;sup>2</sup> ReFED (2016), <u>A Roadmap to Reduce U.S. Food Waste by 20 Percent.</u> Full report is available at <u>https://www.refed.com/downloads/ReFED\_Report\_2016.pdf</u>.

- APEC Member Economies propose: social guarantee, social incentives (for food donors) tax incentives for transparent businesses, corporate food donations, social enterprise business model

# 3. Recycling

- ReFED (2016) propose: centralized composting , centralized AD, water resource recovery facility with AD, commercial greywater, community composting, home composting, animal feed, in-vessel composting
- APEC Member Economies propose: garbage fee by weight

# 4. Through our survey, we understand major barriers to reducing FLW in APEC region include:

- Lack of technology and infrastructure
- Lack of interest from consumers
- Lack of data or standards
- Lack of clear objectives
- Poor planning or insufficient funding

# II. Recommendations

# 1. Mobilize all actors and consumers for awareness and actions from bottom-up

- Awareness raising from consumers campaign and education
- capacity building of food chain actors and employees
- Price and financial incentives
- Data, Standards, Reporting system

# - Recognize the existence of a range of "No-regret" solutions (the Roadmap) to move our FLW reduction forward in APEC region

Our preliminary assessment suggests that:

- The Roadmap will require a 9.5 billion investment per year which will yield an expected 55 billion in social economic value.
- Implementing the Roadmap is projected to generate 81,000 new jobs, recover 9.8 billion meals per year of food donations to nonprofits, reduce 8.7 trillion gallons per year of freshwater use, and avoid nearly 96 million tons of greenhouse gas emissions annually

## 3. Conduct more stocktaking activities in APEC region

- There are a growing number of initiatives around APEC at economy, regional, and local levels.
- More than half of them require public and private partnerships in a multistakeholder settings
- Many preventive initiatives/programs are in place
- Macro  $\rightarrow$  Meso  $\rightarrow$  Micro

- 4. Recognize the need for an *APEC FLW Quantification Manual* to provide practical guidelines for APEC MEs
  - A common standard yet flexible approach on how to quantify, measure, and make improvements in different stages of the food supply chain.
- 5. Acknowledge the importance of a coordinated entity, e.g., *APEC FLW Center*, to ensure that research, data standards harmonization, and information dissemination continually build upon itself.
  - To harmonize definition and measurement, identify no-regret solutions and necessary interventions, monitoring progress, assess economic impacts, and set acceptable levels of FLW
  - To address the diversity of capacity building and best practices sharing
  - In Europe, FUSIONS (now REFRESH, an EU Horizon 2020 Project) was developed to help coordinate the research agenda.

## V. Minutes by Sessions

Session 1: Overview of FLW Reduction *Roadmap* and Actions *Chair: Dr. Miranda Mirosa, University of Otago* 

1.1

Food Loss and Waste across the Value Chain Dr. Maximo Torero (World Bank)

#### Summary

Dr. Torero's presentation covered the work that the World Bank is doing in regards to the measurement methodology of FLW. The micro, macro and meso level are the three largest components of the world food system. Within this food system, there are different actors and regulations which govern each one of these stages. Therefore, proper identification of the causes of FLW and effective policies for adopting FLW practices are important to ensure food security for the growing human population by the year 2050. Dr. Torero presented findings from a proposed methodology which accounts not only for quantity but also quality of food commodities.

- There is significant lack of data of FLW which forms a major barrier for addressing this problem.
- FLW is a global problem and should be taken as a policy priority for economic and social development.
- There has been continuous recognition of the impact of FLW by international organizations. In 2013, G20 requested FAO and IFPRI to launch a platform for FLW measurement methodology sharing and best practices.
- Dr. Torero referred to a calculation by IFPRI that shows that in order to gain food security by 2050 the average worldwide reduction of FLW should be around 12%. In addition different regions may need different reduction targets.
- Dr. Torero mentioned that there has not been any major legislation to the FLW issue, but rather actions which are mainly for improving access to information and better food handling practices.
- The link between food losses and environmental impacts such as greenhouse gas emissions and climate change should be look very carefully because of the additional benefits that FLW reduction could bring.
- Dr. Torero talked about an aggregate macro approach and a commodity specific

micro approach for the measurement of FLW. While the macro approach is relatively cheaper and rather easily done compared to the more complex and expensive micro approach, they both present strengths and weaknesses for the formulation of specific policies.

- Some issues with the measurement methods are the definition of FLW, measurement standards, commodity classification, and diagnostic outcome. Clear specification of quantity and/or quality loss must be established as well.
- Dr. Torero introduced a 3 layer accounting component of production loss which takes into account the economic opportunity cost of production, the layers are:
  - FL, food losses;
  - FLW, food losses + waste;
  - PLFW, food losses + waste + potential food loss.
- The proposed methodology focus directly on the production, processing, and transformation part of the food value chain and less on the consumer side. The goal to create a consistent methodology, which looks at both quantity and quality measurements and can be used across different countries.
- The results from a study using the proposed methodology shows that about 24% of losses occur at the producer level. On the other hand, previous studies calculate that about 18% is the production stage loss. This involved 12 countries and the results showed good consistency.
- Four types of problems were identified in the previously mentioned study:
  - 1. Farmers are not ready to cope with extreme weather events.
  - 2. Lack of knowledge and technology.
  - 3. Lack of mechanization and infrastructure to reduce losses.
  - 4. Farmers do not have any incentive to improve the quality of what they produce, particularly in developing countries where regulations on standardization is not being enforced.
- Dr. Torero mentioned that for APEC economies and other economies around the world, the way forward to reducing FLW must address the micro, meso, and macro-level causes.
- When asked how the quality can be addressed, Dr. Torero answered that there are two points to address, commodity's attributes and standards. He gave the example that economies may have different requirements upon commodities attributes such as humidity. Other important aspect is the variety of the crop. Data collection of each variety average loss and price as well as standards is important. He also mentioned that if there is well enforced standards and price gain depending on the quality, farmers will have the incentive to reduce loss and improve quality of their crops.

# 1.2 Paddock to Plate – Supply Chain Efficiencies to Reduce Food losses Dr. Nathan Gray (The University of Adelaide)

#### Summary

Dr. Gray presented two examples related to the problem of FLW in two APEC economies, Australia and Indonesia. He urged governments and industries to collaborate in order to formulate effective polices that reduce inefficiencies in the food supply chain and production cycles. These two examples are both related to the experience Dr. Gray has gained working with businesses and government agencies as a business advisor.

- Example 1 is about the production and market of Potatoes in Indonesia. Example 2 is about the food supply chain inefficiencies in Australia.
- Example 1:
- Potato production in Indonesia accounts for about 1 million tons per year.
- Around 15 varieties of potatoes are mostly dominant in the market.
- The process required by the government for breeder rights in Indonesia is very complex and it might take up to 24 months to get approved.
- The certified potato seeds are very costly, when farmers cannot afford them, they will store some of their production as seed for the next cropping season.
- The resulting seedlings may be up to generation G3 to G7, which makes them vulnerable to diseases.
- There has been a gradual increase in the amount of potato seeds and fresh potato imports into Indonesia. The losses caused in the storage of seed tubers can be linked to this increased import demand.
- Example 2:
- Woolworths, one of the major supermarkets chains in Australia, decided to reduce its number of regional distribution centers in the early 2000's. This has made the supply chain very inefficient, with products being sent back and forth across cities and even countries before they reach the final consumer. Consequently, shelf life becomes shorter making food waste more likely to happen.
- Dr. Gray emphasized that logistic networks are cost efficient for logistics companies, but not necessarily cost efficient for consumers.
- Dr. Gray suggested that governments and industries should make changes to remove these inefficacies. These changes may involve individual food technologies in

production inputs and systems that allow the usage of these technologies; policies that remove restrictions on food innovation and protect intellectual property rights; and education or training for food producers.

- In order to improve the food supply chain, Dr. Gray mentioned that it is needed to bring consumers and producers closer to each other, and reduce the time that food takes to reach the end user.

1.3

An overview of APEC Roadmap and Action Plans for Reducing Food Losses and Waste and Preliminary Survey Results

Dr. Ching-Cheng Chang (Academia Sinica, Chinese Taipei)

### Summary

Dr. Chang briefly presented the initiatives that APEC leaders have taken in order to achieve food security in the region. After that, she talked about the progress of the multi-year APEC project of Strengthening Public-Private Partnership to Reduce Food Losses in the Supply Chain. One important part of Dr. Chang's presentation is the preliminary results from a survey to APEC member economies regarding programs and/or actions introduced to reduce FLW. Dr. Chang concluded by saying that more efforts need to be taken to overcome barriers found at the macro and meso level for FLW reduction.

- Dr. Chang showed in chronological order, starting from 2010, the responses that APEC leaders have had towards the topic of food security and food loss reduction.
- APEC Food Security Road Map towards 2020 was drafted in 2014. Some of the relevant points of this road map are the integration of Policy Partnership on Food Security (PPFS) and the attainment of 10% reduction of FLW compared to the 2011-2012 levels by 2020 in the Asia-Pacific economies.
- Dr. Chang mentioned that it is very difficult to select an ideal methodology for FLW assessment. Therefore, in order to work in line with the Sustainable Development Goals (SDGs), the Mass Flow Model (MFM) of FAO can be adapted to the APEC region.
- An information platform has been set up with content on FLW reduction initiatives and best practices, featuring social networks and e-training tools.
- Through the capacity building activities APEC economies agreed that representatives from governments, businesses, and academia can respectively provide with policies and programs, practical solutions, and methodologies for the

enhancement of PPPs (Public-Private-Partnerships) for FLW reduction.

- Dr. Chang presented preliminary survey results which included meso-level (industry based solutions) and macro-level (government and policy oriented solutions).
- The collected data from the surveys constituted 52 programs/actions from 10 APEC economies.
- From the 10 economies that answered the survey:
  - 9 considered there is capacity building needs
  - All said they are trying to apply innovative and practical solutions
  - Only 1 had a Law providing immunity for food companies
  - 4 lack data collecting system.
- Economies reflected that consultation with experts, planning, and active involvement are strengths for a successful implementation of FLW reduction programs. On the other hand, monitoring and evaluation, poor infrastructure, and funding and financing are the weaknesses for the implementation of programs.
- The major barriers for achieving 10% FLW reduction by 2020 were lack of interest from consumers, lack of reliable data, cultural issues, and poor planning or insufficient funding.
- From the 52 programs, 34 are joint public-private initiatives, and 18 are only from the public sector.
- From the 52 programs, 20 and 19 address policy and education, respectively. While 9 and 7 address financing and innovation, respectively.
- From the 52 programs, 37 look at prevention tools, 3 at recovery, and 12 at recycling.
- Dr. Chang suggested that the next steps toward reducing FLW are looking at food chain solutions to overcome the existing barriers from meso and macro level.
- The replacing of MDGs with SDGs should be adapted, and work towards SDG 12.3 of halving per capita global food waste at the retail and consumer level by 2030. In the same way, reduce food losses, including post-harvest losses.

#### 1.4

# No Regret Options and a Roadmap to Reduce APEC Food Waste by 10 Percent *Prof. Tony Shih-Hsun Hsu*

(National Taiwan University, Chinese Taipei)

#### Summary

Professor Hsu clearly explained the non-binding target of 10% FLW reduction (base year: 2011) in the APEC region, or 67.4 million tons, by the year 2020. A comprehensive approach that looks at the 3 largest components of the food system:

micro, meso and macro level, is where non-regret options needs to be implemented. The non-regret options may be grouped into prevention, recovery and recycling solutions. Prof. Hsu suggested the creation of a coordinated institution, i.e. APEC FLW Center, and a manual for quantifying FLW in the APEC economies.

- Prof. Hsu clarified in the beginning of his presentation that the set target of reducing FLW by 10% by 2020 is a non-binding agreement; however, economies should contribute at the best of their capacity because of the potential socio-economic and environmental benefits from reducing FLW.
- Prof. Hsu showed that the distribution of FLW among the five stages proposed by FAO (Production, Handling & Storage, Processing & Packaging, Distribution, and Consumption) is different for each individual economy.
- In 2011, FLW in the APEC region was 674 million tons. Therefore, reducing this amount by 10% equals to a reduction of 67.4 million tons by 2020.
- The proposed approach to reach the FLW reduction target is a comprehensive food system approach, which not only focus in the production, but rather on the whole food supply chain until the product reaches the final consumer.
- The practical solutions will be oriented at three levels: micro (household or individual enterprise), meso (food system stakeholders / communication), and macro (food system and beyond, including policies).
- With the concept of a frontier, Prof. Hsu graphed the relationship of FLW reduction and economic activity in order to formulate the no-regret options.
- No regret options may be known as "options worth doing anyway" or "win-win options".
- Prof. Hsu introduced APEC solutions for FLW which uses as a reference *ReFED*, *A Roadmap to Reduce U.S. Food Waste by 20 Percent (2016)*. The solutions are grouped into three categories: Prevention, Recovery, and Recycling. For the U.S. case, the founding needed to reduce FLW by 20% over a decade is \$18 billion.
- There are **13 prevention solutions:** 
  - 1. Consumer education campaigns
  - 2. Waste tracking & analytics
  - 3. Standardized data labelling
  - 4. Produce specifications (Retail)
  - 5. Produce Specifications (Restaurant and Foodservice)
  - 6. Packaging adjustments
  - 7. Smaller plates
  - 8. Secondary resellers

- 9. Trayless dining
- 10. Spoilage prevention packaging
- 11. Improved inventory management
- 12. Manufacturing line optimization
- 13. Cold chain management

In addition, a dataset of the prevention solutions may be established in order to collect relevant data such as costs and impact of these solutions.

- There are **7 recovery solutions:** 
  - 1. Donation tax incentives
  - 2. Standardized donation regulation
  - 3. Donation matching software
  - 4. Donation transportation
  - 5. Donation storage and handling
  - 6. Value-added processing
  - 7. Donation liability education

Similarly, a dataset of the recovery solutions should be set up.

## - There are **8 recycling solutions**

- 1. Centralized composting
- 2. Centralized anaerobic digestion
- 3. Water resource recovery facility with anaerobic digestion
- 4. Commercial greywater
- 5. Community composting
- 6. Home composting
- 7. Animal feed
- 8. In-vessel composting

Also a dataset of the recycling solutions should be established.

- In summary, Prof. Hsu mentioned that the financing cost of deducing FLW in the APEC region could be around \$9 million per year. However, the benefits are far greater than the cost of taking these non-regret actions.
- The annual benefits might be:
  - 95 million tons of greenhouse gases (GHGs) reduced
  - 9.8 billion meals recovered
  - 8.7 trillion gallons of water saved
  - 81,169 jobs created (partial list)
- Prof. Hsu mentioned the Fusions Project in the EU as an example leading forward to the reduction of FLW. The Fusions Quantification Manual is vital for the project because it helps to measure FLW in the 28 EU member economies, and the measurements can be used to better target prevention efforts and prioritize sectors.

- Prof. Hsu suggested that given the diversity of research that needs to be taken, a coordinated entity be created, e.g., APEC FLW Center, to ensure that research continually build upon itself.
- An APEC Food Waste Quantification Manual, like the EU Fusions Manual, is indispensable for providing practical guidelines.

# Session 2: Evaluating the Potential of Actions/Programs to Reduce APEC FLW by 10 Percent by 2020. *Chair: Mr. Benjamin Lephilibert, LightBlue Environmental Consulting*

#### 2.1

The FLW Standard: Measuring and Reporting on Food Loss and Waste Mr. Brian Lipinski (World Resources Institute, the United States)

#### Summary

Mr. Lipinski is co-author of the Food Loss and Waste Protocol, which is a standardized protocol for the measurement of FLW. In his presentation, he illustrated the importance of accurate data collection and harmonization of the definition of FLW. He briefly introduced the newest and future developments of the tools they are working on, which are all liked to the protocol. He encouraged APEC economies to take action toward FLW reduction regardless of the current data availability, given that as actions are being taken, data is as well being generated. Mr. Lipinski mentioned that a first important big step for APEC will be to establish a tracking inventory in order to reach the 10% FLW reduction target.

- Mr. Lipinski presented the Food Loss and Waste protocol which is the outcome of a multi-stakeholder effort involving international organizations such as WRI, FAO, FUSIONS-EU, and others, to provide practical guidance and a standardized protocol for the measurement of FLW.
- Defining the scope of FLW is important because this identifies what gets measured. As an example, two organizations may look at FLW in a different perspective and have different results based on that, therefore, a system such as the Food Loss and Waste Protocol facilitates harmonization and standard measurements.
- Mr. Lipinski mentioned that the FLW standard is an extensive document which provides good guidance on quantification methods. However, because this is a very broad approach, a tailored manual, similar to the EU-FUSIONS quantification manual, would be very valuable for the APEC region.
- In the website <u>FLWprotocol.org</u> there are case studies, webinars, and news updates.
- Mr. Lipinski announced that within the next year they will launch an open-source website database. Governments, researchers, industries or anyone who has conducted measurements of FLW will be able to upload their data and share their experience on FLW measurement. This is useful because it can be accessed by

induvials or organizations who would like to have an idea of the FLW in a given region, but lack the resources to conduct measurement efforts on their own.

- Mr. Lipinski urged APEC member economies to take action in order to reduce FLW
  regardless whether there is or not perfect data of FLW in the region. Through these
  actions data collection will likely be improved and more tailored actions could be
  initiated, creating a cycle for improvement of the local food system.
- Mr. Lipinski suggested that setting a tracking inventory is the first big step to reach the 10% reduction target of FLW in the APEC region. Moreover, he emphasized that measurements must be conducted within each economy given that FLW occurs at different stages of the food supply chain of APEC economies.

# 2.2

# Reducing Food Loss and Waste in Japan-Accounting and Reporting System Mr. Kenta Suzuki (Food Industry Bureau, Ministry of Agriculture, Forestry and Fisheries, Japan)

#### Summary

Mr. Suzuki introduced some of the initiatives taken in Japan in order to reduce FLW. In 2014, 6.2 million tons of food was wasted while the loss from the industry was about 19.5 million tons. The reduction targets for FLW are different for each stake holder in Japan and these are clearly defined in this presentation. Mr. Suzuki proposed to APEC economies to have further discussion and agreement in specific issues regarding FLW. He briefly introduced a pilot project in Japan that is looking at the regulatory framework to make food waste reporting an obligation for certain operators in the food value chain. Additionally, he mentioned the public awareness campaign "*Tabekeri*" to combat food waste at the consumer (micro) level.

- Mr. Suzuki clarified that in Japan food loss is equal to food waste and the words may be used interchangeably.
- Food loss in Japan during 2014 was about 6.21 million tons from which about 3.39 million tons are from business and 2.82 million tons from households.
- From the industry, the total amount of food waste in Japan during 2014 was about 19.53 million tons, the largest losses (82%) was found in manufacturers followed by restaurants (10%), retailers (7%), and wholesalers (0.2%).
- A food recycling law was established in the year 2000 in Japan with the objective to reduce FLW. At that time, the food-recycling rate target for each industry was: manufacturers (95%), wholesalers (70%), retailers (55%), and restaurants (50%).

- Reduction, reporting, and recycling 3R are the basic foundations of the role of the Japanese government to move forward the reduction of food waste.
- From the data collected in 2014 the achieved recycling rate in Japan was: manufacturers (95%), wholesalers (57%), retailers (46%), and restaurants (24%).
- Only 2% of the food industry companies reported their food waste in Japan in 2014.
- The Japanese government has set specific targets for each business type, based on the sales volume of those businesses.
- Mr. Suzuki presented an undergoing project for detailed survey of mandatory reporting, which is for the industry and household, and that integrates edible and inedible parts. A new target is intended to be set for the edible part once they have the pertinent data.
- Mr. Suzuki proposed to the APEC member economies that the definition of FLW, measurement method, range of reduction action, and base year for the target must be clearly discussed.
- The "one-third rule" which states that at least 1/3 of the expiration date time should be allocated within each link of the value chain including manufacturer, retailer and consumer may generate inefficiencies in the food system.
- The expiration date to expiration month display has been changed in some of the products' labels in Japan as a way to prevent the disposal of food which is still edible.
- Improved packaging material can extend the shelf life of some products, such packages may be oxygen absorbing materials which better isolate the product from external conditions.
- The number of food banks as well as the volume of food that is donated has increased since the year 2002.
- The No-Foodloss-Project in Japan tries to raise public awareness and to encourage actions in the private and public sectors throughout the entire food chain. In retailers' stores, restaurants, and cafeterias friendly reminders are posted referring to the *"Tabekiri* (finish your food) movement"

# FUSIONS & REFRESH, Experiences from Public-Private Partnerships across Europe

Dr. Toine Timmermans (Wageningen University & Research, Netherlands)

#### Summary

Dr. Timmermans shared some of the work that two projects, FUSIONS and Refresh, have been doing in the European economies. He shortly referred to some of the initiatives or individual actions that are taken under the framework of these projects. Dr. Timmermans categorized FLW as the symptoms of a mal-functioning world food

system, therefore, in order to attack these symptoms effectively, a holistic approach as well as game-changing innovations are needed. He said assertively that leaders of the golden triangle (academic, governmental and private institutions) are responsible for leading the initiatives toward FLW reduction. He encouraged further collaborative research in APEC economies regarding FLW reduction and all possible outcomes which may benefit people and the environment.

- Dr. Timmermans shared the experiences from FUSIONS and Refresh, the two leading programs to address food loss and waste in the 28 European states.
- Fifteen years ago the programs initiated in the Netherlands with the goal to make more efficient use of resources and create a circular economy. In the year 2009, it was expanded to the E.U. economies and by 2012 the programs have gained international recognition.
- Food loss and waste were denominated as the symptoms of a mal-functioning food system. Therefore, leaders of the world must work together in order to find tangible solutions to this problematic area.
- The FUSIONS framework defines food waste and identifies the destination of the waste. The latest measurement indicates that 88 million tonnes of food waste per year is produced in the EU-28. The sources of waste are: household (53%), processing (19%), food service (12%), production (11%) and wholesale and retail (5%).
- Grass-root initiatives and social movements are part of the 200 partners of the FUSIONS project. These initiatives must be able to be easily adapted and create a positive impact for the reduction of FLW.
- "Cr-EAT-ive Project-Greece" (FUSIONS) is one that works with children in kindergartens in order to raise awareness among households and influence behaviour of families, teachers and other people who may interact with them. Some outcomes of the project include food waste diaries, teaching material with fun exercises and guides, and guidance and training of canteen staff.
- "Food battle" is an initiative where household and consumers participate with voluntary skills and try to reduce the food waste at home. In some cases 20-35% of food waste is reduced within 2-3 weeks.
- In the political agenda of the EU, the topic of food loss and waste reduction is of great importance. In Italy, France, and the U.K. legislation rules are being designed in order to promote or even mandate food donations or other types of initiatives that reduce FLW. Nevertheless, Dr. Timmermans remarked that this strategy is very complex and could be very time-consuming and politically unviable. On the other hand, voluntary initiatives may have a quicker and more viable outcome in the E.U. and other parts of the world such as in the APEC economies.
- The Refresh program (2015-2019) is to develop a "Framework for Action" model that finds evidence-based tools to allow targeted, cost-effective voluntary interventions. It involves collaborative agreement between a number of key public and private organizations to take action against an agreed ambition or target.

- A summary of 5 success factors of voluntary agreements includes:
  - 1. Strong lead organization and the right mix of key players.
  - 2. Governmental involvement at an early stage.
  - 3. Engage signatories in the early stages.
  - 4. Effective measuring and reporting framework.
  - 5. Funding availability improves effectiveness.
- One example of a framework for action is The Dutch taskforce of circular economy which is formed by seed companies, producers, distributors, retailers, waste management companies, governmental organizations, scientific organization, media communicators, and investors.
- Dr. Timmermans warned that looking at the symptoms rather that a holistic approach is not the solution for FLW. Although taking actions within these symptoms, i.e. the ugly fruits campaign, can contribute to raising consumer awareness and gain engagement of various parts of the economy.
- The Refresh approach requires a physical place, or ecosystem, where stakeholders can meet and discuss new innovations, financing schemes, and all variety of solutions can be developed. In the Netherlands, such ecosystems are already being provided. For example, a whole portfolio of food processed products, that otherwise would have become waste, has been put at display in one of such ecosystems in the Netherlands.
- There has been facilitation for scaling up promising ideas. One of those solutions is a new drying technology that can extend the shelf life of fresh products up to three years. Another promising innovation is the utilization of insects for the production of protein.
- The relevance of technologies has to be analyzed because of the low margins in the food sector. Thus, an investment is more likely to occur when there is evidence that the technology has game-changing-profitable results. For example, business models working with ICT communication apps which will help better connect stake holders and make more informed and waste reducing decisions.
- Dr. Timmermans concluded by encouraging research institutions collaboration and harmonization in processes, for example of post-harvest measurements, and all type of work that is being done to address food loss and waste reduction in APEC economies. He also added that individual targets of FLW reduction fulfil ethical and social necessities of various economies, and also help to significantly reduce the environmental impact of food production and agriculture.

# Session 3: Member Economies Report: Experience Sharing by Delegates *Chair: Dr. Nathan Gray, University of Adelaide*

3.1

Australia Ms. Rebecca Liu Australia Office in Taiwan

# Summary

The delegate from Australia reaffirmed the position of Australia in the APEC community and its involvement in the Expert Consultation on Food Losses and Waste Reduction. National policies and other initiatives, funding schemes, and a national summit are all part of the current and future plans that Australia is developing to halve food waste by 2030.

# **Key Points:**

- Australia's attendance at the APEC Expert Consultation on Food Losses and Waste Reduction is as an observer and is intended to inform Australia on what our APEC partners are doing to reduce food loss and waste.
- Australia acknowledges that food loss and waste is a global problem affecting our economy, society and environment.
- On 30 June 2016, the Australian Government committed to developing a National Food Waste Strategy and to host a National Food Waste Summit to halve Australia's food waste by 2030.
- This commitment includes \$1.2 million of funding over two years to assist four major food rescue organisations to reduce their running costs and mitigate personal food insecurity across Australia.
- The National Food Waste Summit will be held in November 2017. It is intended that key stakeholders from industry, governments, not for profit organisations and the community sector will come together to discuss, review and endorse the strategy which will be released in 2018.

# 3.2

# Chile

# Ing. Agr. Msc. Pilar Eguillor Recabarren / Ing. Agr. Msc. Luis Saez Tonacca Office of Agricultural Studies and Policies / Santiago de Chile University

# Summary

The Chilean delegates briefly introduced the agricultural production of Chile.

Additionally, they mentioned that although there is not an official accounting system for FLW in Chile, independent small studies have collected some data about FLW. Various initiatives such as food banks, the program SAVEFOOD, the National Committee for Food Loss and Waste Reduction in Chile, sustainable value chains, and zero waste program in the processing industry of fruits and vegetables, were among the most relevant initiatives in Chile. The delegates ended up their presentation by showing the capacity building needs in their economy, which are mainly linked to training and information dissemination.

- In Chile about 35.5 million hectares of land are used for agriculture, livestock and forestry.
- There is not an official FLW data collecting system in Chile However, data from some independent studies have reported that:
  - 20% of lettuce is lost at the harvesting stage
  - 58,320 ton/year of potatoes are lost
  - 280 ton/year of imported rice is lost during storage
  - 300,000 ton/year of bread is wasted
  - 53% of hake fish caught is lost
- 52% of fruit and vegetable production in Chile goes to industrial processors. Researchers found that on average 4.6 million tons of solid waste is produced from the industry, 75% goes to compost, energy production, or landfill and 25% goes to animal feed.
- In 2010, the first (and so far the only one) food bank in Chile opened, which is called "red de alimentos" (food network). Through their work, which is supported by 200 local social organizations, they have recovered about 18 million Kg of food and helped around 201,806 vulnerable persons.
- SAVEFOOD, a network of Latin American and Caribbean Experts for the Reduction of FLW, serves to coordinate regional efforts at the regional level under the guidance of FAO.
- In 2014, Chile's government created a FLW Reduction National Committee. This committee became an official organization recently in 2017 under the name: Food Losses and Waste Reduction National Committee of Chile (Both Delegates that presented in this Expert consultation are part of the committee).
- The national committee will work in 3 strategic lines: governance and strategic alliances, knowledge and innovation, and communication and awareness.
- Other independent organizations working toward FLW reduction in Chile are "Cadenas de Valor mas Sustentables (Cav+S)", translated as "More Sustainable

Value Chains"; and "Disco Sopa Chile" which is translated as Chile Disco Soup. Cav+S works with companies in order to measure and reduce their negative environmental impact thus creating a more sustainable food system, while Disco Soup works with individuals of all ages in the recovery of food that otherwise will go to waste.

- The recent (2017) National Program "Zero waste of raw material in the food industry" assess the waste/loss of raw material in fruit and vegetables and aims to find solutions to reduce/prevent the waste.
- In Chile, there are special tax benefits for businesses that donate food to rescue organizations such as food banks (The presenter did not specify the percentage or form of tax benefit).
- Chile's delegate mentioned the following capacity building needs:
  - Training in data collection, accounting methods, statistic systems.
  - Expertise for training professionals who work in key areas of FLW reduction.
  - Advice and information about regulations or incentives that help reduce FLW.

# 3.3 People's Republic of China Ms. Zhang Yi State Administration of Grain, China

## Summary

The presentation mainly referred to the circulation (storage, transport, and process) of food grains in China. Identified causes and possible solutions to the losses occurred during these three phases were presented. On the consumer side, educational campaigns and shifts in the perception of the external appearance of certain processed food products have been part of the work China is doing to reduce FLW.

- The presentation focused on the circulation part of the food supply chain (storage, transport, and process) of grains: rice, wheat, maize and soy beans; and their finished products.
- During harvest 3% and 8% is lost from mechanical and manual harvest, respectively. Some of the reasons are small-scale production, harvesting delayed from the best harvesting period due to machinery unavailability, low skills from the operators and poor machinery performance.
- Some of the solutions to reduce losses at the harvest stage are: stipulations to control loss rate, operators training, technical guidance and machinery improvement.

- On-farm storage losses occur because of climate change, negligence on storage, lack of know-how, and poor facilities.
- The source of damage for crops comes from rats (49%), mold (30%), and pest (21%).
- Some of the solutions to reduce losses at the storage phase include: better storage infrastructures, post-harvest service center for cleaning and drying of grains, technical assistance, R&D on new storing technologies, and on-farm scientific applications.
- During transport loss rate of grains could be over 5%. Commonly, food is transported from northern to southern china in packages by rail. Currently, about 15% of grains are transported in bulk; therefore, bulk grain transportation infrastructures might help to reduce the loss during transport.
- Low concentration of processors causes relatively low yield-rate, conversion-rate and utilization of by-product.
- Perception of food appearance has led food processors to over polish or refine grain products; therefore, work needs to be done to change people's perception and move towards less process, healthier food products.
- Educational campaigns to raise awareness and bring back traditional values of food appreciation have been initiated in China.

#### Indonesia

Resa Setia Adiandri, S.TP., M.SI Indonesian Agency for Agricultural Research and Development (IAARD)

#### Summary

Similar to other APEC economies, Indonesia lacks an official data collection system of FLW. The government chose 7 strategic crops to fight hunger and attain food security for the Indonesia population. There are opportunities for PPPs in Indonesia through research and development, good handling practices of food, Food Bank of Indonesia (FOI), and UPSUS which is a national program to increase agricultural productivity. The delegate remarked the importance of information sharing and collaborative work in order to effectively intervene for the reduction of FLW.

- Data and information about FLW in Indonesia are very limited.
- Post-harvest losses of rice accounted for 10.43% in 2012. The distribution is: harvesting (0.53%), threshing (0.83%), drying (6.09%), and milling (2.98%).

- The distribution of the Indonesian population is uneven which creates tough competition for land utilization and might affect food production to meet national needs. Additionally, climate change represents another big challenge for attaining major food security in Indonesia.
- The Indonesian government have chosen 7 strategic staple foods in order to guarantee food security for their population. Those crops are: rice, corn, soybean, sugarcane, meat, chili, and red onion.
- UPSUS or Upaya Khsusus (Special Effort) is a national program implemented by the Ministry of Agriculture of Indonesia in order to increase productivity and reduce yield losses.
- Through UPSUS the government rehabilitates and builds irrigation systems, develops transportation access and networks, and provides production inputs.
- From 2015 to 2019 annual post-harvest loss reduction targets on average for specific crops are: rice (0.95%), corn (0.26%), soybean (0.28%), peanuts (0.12%), cassava (0.50%), and sweet potatoes (0.50%).
- The strategy to reach such targets includes: facilitating and optimizing post-harvest facilities and machinery such as harvesters, dryer, silo, etc. And also implementing Good Handling Practices (GHP) which aims at reducing post-harvest losses, extending product's shelf life, enhancing value added, etc.
- Foodbank of Indonesia (FOI) was established on 21 May, 2015 and they work with various organizations to bring food surplus to those in need for food. Food donations to FOI may include preserved food, unused food, and food at least 2 months before it expires.
- Research and product development has focused on improving freshness of products such as chilies and mangoes.
- In order to spread innovative solutions for agriculture the Multi Channel Dissemination Spectrum (MCDS) approach has been adopted.
- MCDS disseminates technologies produced by IAARD through various medium such as meetings, consultations, exhibitions, training, printed or electronic publications, and others.
- The delegate from Indonesia concluded by acknowledging the importance of public-private partnerships to support FLW reduction programs. Moreover, she mentioned that some of the improvement may be oriented at processing practices; preservation and packaging technologies; transportation and logistics management; marketing infrastructures and strategies; and consumer awareness.

Malaysia Mr. Mohd Ramesh Krishna / Dr. Azman Hamzah Ministry of Agriculture and Agro-based Industry / Malaysian Agricultural Research and Development Institute (MARDI)

#### Summary

The delegates from Malaysia presented FLW data, particularly for the rice industry. They emphasized the research that the institute MARDI is currently doing to reduce food losses at the post-harvest phase, develop new hybrids and improve food packaging materials. A healthy food portion approach, similar to the Japanese bento box, is being promoted in Malaysia to raise consumer and food services awareness about the importance of a healthy diet and waste reduction. In the same way as Chile's engagement in the SAVEFOOD program, Malaysia is also engaged in this program and a network of experts is being develop in order to come with more efficient strategies for the reduction and prevention of FLW.

- Although there is not a well-established accounting system of FLW in Malaysia, it is estimated that about RM\$276 million are loss in the paddy postharvest stage every year. Annually about 30-50% of fruits and vegetables are lost or wasted during processing and distribution, and 3,000 tons of cooked food is waste every day.
- Rice post-harvest losses in 2016 accounted for 7.89% or 205,140 tons. This is distributed as follows: harvesting (1.39%), transportation (0.63%), drying (0.12%), milling (3.05%), and storage (2.71%). It is worth to mention that compared to the year 2015, rice post-harvest losses in 2016 were reduced by 54,100 tons.
- In order to reduce FLW, there are some ongoing initiatives supported by MARDI in areas such as post-harvest research in rice, minimal processes of fruits and vegetables, development of new hybrids, urban horticulture, and R&D on value added products.
- Packaging and distribution is being improved through better grading, packaging and labeling guidelines, disease and pest controls, and good agricultural practices certification.
- At the consumption side, guidelines for restaurant owners and catering services are being provided so they can serve nutritious well-balanced portions. Food safety guidelines are also being distributed.
- MYsaveFOOD is the key project in Malaysia that works with funding from FAO

and is part of SAVEFOOD initiative. This project, similar to the FLW reduction committee in Chile, creates a network that helps to increase awareness and support initiatives to reduce FLW.

- The delegates from Malaysia showed a flowchart (production line in time) of the production of some food products, which can be used as a way to raise consumer's awareness about the importance of reducing food waste.

## 3.6

# Mexico

Prof. Roberto Andrés Fuentes Rascon Secretaria General de Gobierno, Gobierno de Chihuahua, México (General Secretariat, Government of Chihuahua, Mexico)

#### Summary

In 2010, microdata from the household survey for income and expenditure in Mexico showed that food waste accounts for 37%. At the national level, post-harvest losses, including transportation, storage and processing, is around 37 million tons. Prof. Fuentes presented the National Crusade Against Hunger as the leading program to fight hunger and reduce FLW in Mexico. Other initiatives include a network of 50 food banks all over the country, tax benefits for food donors, and strategies to reduce post-harvest losses and improve farm land productivity in the face of climate change.

- Prof. Fuentes mentioned that although Mexico produces enough food to feed its entire 120 million people population, only 57.5% of Mexicans have access to enough food. Moreover around 17,000 tons of food are waste every day in Mexico.
- The National Crusade Against Hunger, created by presidential decree in 2013, is the main public policy that aims to reduce FLW in Mexico (The Spanish name of the program is: Cruzada Nacional Contra El Hambre).
- The Crusade puts at the center the self-management and social capital of the community itself, making people the protagonists of their own development, but also having the support of the government, private institutions and academia.
- The program five main objectives are:
  - 1. Zero hunger
  - 2. Eliminate acute child malnutrition
  - 3. Increase food production
  - 4. Minimize post-harvest and food losses during storage, transportation, marketing and distribution.

- 5. Promote community participation
- Using microdata from the National Survey on Income and Household Expenditure (2010), a general index of food waste in Mexico was created.
- The index points out that about 37.2% of food was wasted in 2010. Among the top 3 most wasted products in Mexico are: guava (57.7%), cow's milk (57.1%), and mangoes (54.5%).
- Mexico intends to minimize post-harvest losses, which are currently about 37.5 million tons of food, and also reduce the amount of loss during distribution which could be as high as 18.4 million tons.
- Some actions that are being taken in Mexico includes: tax benefits for food donors, food banks development, prediction and contingency system in the face of climate change, improvement in agricultural work, integral improvement of post-harvest collection systems, optimization of food outlets to expand shelf life of products.
- Both, the Income Tax Law and the Federal Tax Code, prioritize that prior to their destruction of food that the taxpayer can't sell to the market, it should be delivered to welfare institutions. Likewise, the Tax Administration System has implemented a social communication campaign in order to promote companies' integration into the food donation system.
- There are more than 50 food banks located in different parts of Mexico. They receive donations from a network of more than 4,000 companies. The food banks have a staff of around 10,000 workers, who 90% are volunteers. About 60% of rescued food are fruits and vegetables.

New Zealand Dr. Miranda Mirosa University of Otago

#### Summary

Dr. Mirosa presented food rescue initiatives in New Zealand which consists of safely retrieving edible food that would otherwise go to waste, and distribute it to those in need. These programs have been working since 2008 and have obtained substantial outcomes. KiwiHarvest is one of the organizations in New Zealand that is conducting food rescue actions, their outcomes and operating model was presented by Dr. Mirosa. In addition, Dr. Mirosa showed some of the findings from her research as a specialist in food systems, particularly she mentioned the social benefits derived from food donations.

- In New Zealand, the 103,000 tons of food wasted every year could feed around 50,000 80,000 New Zealanders.
- The food rescue program has been working since 2008. The model follows 5 basic stages: donation → collection → sorting → distribution → feeding
- In 2014 a legislation called "the Immunity of Food Donors Act" was passed. This legislation removes the liability from the food donor if anyone got sick from consumption of the donated food, under the condition that this food follows strict safety standards.
- There is not a comprehensive study of the effect of this legislation; however, more people is willing to donate food once the legislation is explained to them.
- Dr. Mirosa presented the case study of KiwiHarvest, which is an organization that works with 150 food donors and 160 charities and community groups in Auckland and Dunedin, New Zealand since 2012.
- KiwiHarvest's work relies on 3 main pillars which are the rescue of food, education of communities, and engagement with those communities about the work that they do.
- In 5 years, about 1 million tons of food, equivalent to 3 million meals, have been rescued.
- In addition to the nutritional benefits that food rescue has, there are also positive social and environmental impacts for the local communities. People can get engaged through volunteering or donations to KiwiHarvest.
- Food safety is required to receive the benefit of the legislation that protects food donors from liability. In order to meet the standards for food safety, there are various agreements and documents which must be followed. Among them is the food safety and handling manual which serves as a guide of standard operating procedures for food-share.
- From her research Dr. Mirosa mentioned that some of the social values of food rescuing among the stakeholders are:
  - For food donors: key promotional opportunity and higher recognition of corporate social responsibility.
  - For recipient agencies: greater volume and increased outreach.
  - For volunteers: meeting new people, sense of accomplishment by helping others, and skill-learning activities.

Peru

Ms. Angela Duran Figallo / Ms. Sheyla Melissa Calderon Ruiz Office of Agricultural Policies of Ministry of Agriculture / National Fisheries Health Agency-Sanipes, Ministry of Production

#### Summary

The delegates from Peru remarked the importance of PPFS for attaining major food security, create a more sustainable food system, and reduce post-harvest losses. They introduced the COMSAN or Multi-sectoral Commission on Food and Nutritional Security that served as the formulator of ENSAN or National Strategy for Food Nutrition and Security in Peru. The strategy puts the general public and private sector as the main actors for the development of actions and initiatives seeking after food security and FLW reduction. The delegates introduced the major challenges for Peru in terms of FLW reduction.

- The Multi-Sectoral Commission on Food and Nutritional Security (COMSAN) of Peru was created in 2012. This commission involves local and state Governments of Peru, Ministries, and Civil Society.
- The COMSAN developed the National Strategy for Food and Nutritional Security (ENSAN) with the general objective to ensure that the population is able to meet, at all times, its nutritional requirements.
- The strategy ENSAN involves the active participation of the public and private sectors, and its work is extended to five dimensions: availability of food, access to food, utilization, sustainability and institutionality.
- The COMSAN acts as a platform in which four main areas for the implementation of actions are discussed, these areas are:
  - 1. Food loss and waste
  - 2. Food education
  - 3. Water safety and sanitation
  - 4. Public procurement
- A workshop on FLW in Peru with the participation of the public and private sector was conducted, the identified challenges are:
  - Lack of regulation on food waste and losses.
  - Lack of data or quality information about FLW.
  - Lack of knowledge of the magnitude of post-harvest losses in the food chain.
  - Limited consumer awareness.

- Need of methodologies for monitoring and evaluation.
- Food recycling and reuse is promoted through the National Agency of Food Safety, which is part of the Ministry of Agriculture in Peru, as a part of the municipal (local) incentive programs that the Office of Agricultural Policies conduct.

#### Russia

Ms. Veronika Bondareva / Dr. Evgeny Tsvetnov Russian APEC Study Center / Lomonosov Moscow State University Eurasian Center for Food Security

#### Summary

The delegates from Russia offered clear examples of initiatives that help to reduce postharvest losses and waste in Russia. They also presented the national strategies and role of the Ministry of Agriculture related to food security, and FLW reduction. The Lavkalavka initiative, an organization of more than 200 farmers, is the most outstanding example of how organized work can help reduce FLW.

- The delegates from Russia presented statistics of food losses for different food groups during the year 2015-2016. The largest loss in volume is found in potatoes with 2.3 million tons and vegetables with 581 thousand tons in losses. The largest loss by percentage is found in fish with 35-50% and meat with 45-50%. Berries and fruits both suffer losses of about 25%.
- There are two types of private initiatives in Russia that help to reduce FLW. One of them is "Charity food fund Rus" which is the first food bank in Russia and cooperates with large food producers, the church, and government institutions. The other initiative is "The National confederation upakovka" which aims at reducing FLW by using improved ecological packaging technology.
- The state program of agriculture development and regulation of agricultural markets until 2020, is aimed to develop infrastructure and improve transportation and storage conditions.
- The initiative Lavkalavka integrates more than 200 farms around Russia. They own manufacturers, restaurants, cafes, stores, and local markets and work jointly to be more efficient and reduce FLW though the creation of value-added products.
- Lavkalavka products a which are not sold by their expiration date account for about 6%, these are further distributed into:
  - 1% is sold with 50% discount

- 1% is frozen
- 1% is used at the Café kitchen
- 1% is distributed among Lavkalavka employees
- The remaining (2% approx.) is used as animal feed
- The delegates briefly introduced the different roles that government agencies play in the food system in Russia. In particular, the functions of the Ministry of Agriculture which involves the realization of federal target programs, provide food security and the creation of favorable conditions for food quality and safety.

# Singapore Mr. Yihang ONG Technology & Industry Development Group, Agri-Food & Veterinary Authority

#### Summary

Mr. Ong talked about the initiatives for FWL reduction in Singapore which are grouped into: education and outreach, standards and guidelines, government funding and support. Much effort is being put on the consumer side in Singapore. One particular approach is an education campaign for school children, who may have the opportunity to become "Ambassador Students" advocating in favor of food recycling and waste prevention. Other initiative under development in Singapore is the On-site waste recycling system placed in two hawker centers.

- There are three largely grouped initiatives in Singapore aimed at prevention, reduction, recovery, and recycling of FLW which are: education and outreach, standards and guidelines, government funding and support.
- Posters, videos, food waste resource handy guide, and recipe contests are all part of the actions taken in order to raise consumers awareness and educate the general public about the importance of FLW reduction.
- "I love my food" project is oriented to develop role model students called
   "Ambassador Students" who promote recycling and reduction of FLW practices at schools in Singapore.
- Standards and guidelines that help manufacturers, retailers, and other actors across the food supply chain to minimize food waste have been developed. Moreover, a Good Samaritan law to provide immunity to food donors is under development.
- The Singaporean government does not offer tax incentives to companies that work on FLW reduction. However, it does offer funding schemes for those companies,

i.e. 3R Fund from the National Environment Agency.

 On-site food waste treatment systems are being tested in two hawker centres in Singapore. One at Blk 628 Ang Mo Kio Avenue 4 Market and Food Centre and the other at Tiong Bahru Market.

#### 3.11

Chinese Taipei Lao-Dar Juang Agriculture and Food Agency, Council of Agriculture

#### Summary

The delegate from Chinese Taipei presented actions taken by the private and public sector in recent years to reduce post-harvest losses, improve by-product quality and recycle food waste. More importantly, is the emphasis given to the funding of research and development of new technologies. Significant improvements has been accomplished in the cold chain of pork distribution, post-harvest treatment of fruits and vegetables, and in the production and marketing of sweet potato.

- From the government policy side, Chinese Taipei has put efforts related to the food system through: Education, by the creation of a network of 60 agricultural schools/universities that work in coordination with the Ministry of Agriculture. Technology development and adoption into plant, livestock and fishery products. Establishment of public assistance and food banks at the local level. At the regional level, the APEC PPFS project with the target of 10% FLW reduction by 2020.
- The private sector cooperates with actions related to the food supply chain through education, cooperation in food re-distribution and logistics, goods and food banks, and others.
- In the period 2012-2016, there were 132 studies conducted which were focused mainly on plants handling and storage.
- In order to prevent over-production a warning system has been developed in Chinese Taipei. This system takes into account the vegetable seedlings in nursery grounds to estimate the cultivated area.
- Investment in drying and low temperature storage facilities is being promoted among rice farmers' associations.
- In a joint effort, the government and private sector, successfully adopted new technology in sweet potato production which not only helped to reduce post-harvest losses but also contributed to market expansion to Indonesia and Singapore.

- The traceability system for pork was improved with accurate temperature and delivery controls and all data made available to consumers through a QR code placed on the label of the product.
- Tilapia parts, such as bones and head, are further processed and transformed into oil, sauce, cookies, human skin-care products, animal feed, among others.
- Food waste from household or commercial premises is used as feed for animals (mainly pigs) after heat treatment at ≥90°C (central temperature).
- Post-harvest treatment of fruits and vegetables aimed at extending shelf life, improve quality, and prevent deterioration has been put into placed in Chinese Taipei.
- The cold chain logistics which involves multi- temperature controlled storage and automated temperature control equipment has been optimized to guarantee freshness and good quality of food products.

# The Philippines

# Ms. Cherry Romero

# Government, Bureau of Fisheries and Aquatic Resources

## Summary

This presentation was mainly oriented towards the reduction of losses in the fisheries sector in the Philippines. The overall goal of the Philippines is to reduce the losses from 25% in 2012 to 15% by 2020, a reduction of 10%. In order to achieve this goal, some facilities for fish landing and icing methods has been built and more are expected to be constructed within the next few years. Besides infrastructure needs, the Philippines is also in need of technologies for freezing and drying of fish, assessment of the interventions, and more fish by-product development.

- In the beginning of her presentation, Ms. Romero presented various legal frameworks that expand in broad areas of food safety, consumers' health, and food security in the Philippines.
- A comprehensive National Fisheries Industry Development Plan for the Philippines is intended to address issues such as the reduction of post-harvest fisheries losses from 25% to 15% by 2020. The estimate base of 25% is taken from a 2012 FAO study.
- A study conducted in Mindanao analyzed sardines postharvest losses during two stages: fish landing and auction market. Market forced losses are very similar in

both stages accounting for 25-30% of the losses. Physical losses represent about 50% during the landing stage; on the contrary, no physical loss was found at the auction market stage. Finally, quality loss was nearly 15% during fish landing while at the auction stage quality loss was up to 75% of losses. From this study, adequate practices may be addressed depending on the stage of the supply chain. Some may include infrastructure development and improved icing methods.

- Facilities such as air blast freezers, community fish landing centers and fish stalls are among the responses that government and private enterprises are taking to reduce post-harvest losses in the fishery sector of the Philippines.
- The bureau of fisheries is promoting the registration of fisher folks in the Philippines so that they can better access local as well as central government support, especially during emergencies.
- Ms. Romero pointed out that some of the capacity building needs in the Philippines are:
  - Impact assessment of the fisheries post-harvest interventions.
  - Capacity building on advanced post-harvest technology including drying and freezing technologies.
  - Major utilization of fisheries by-products.

#### 3.13

#### Thailand

# Ms. Supamas Klinkajorn / Ms. Parinya Sakorncharoen Department of Agriculture, Ministry of Agriculture and Cooperatives / Department of Livestock, Ministry of Agriculture and Cooperatives Development

#### Summary

The presentation of the delegates from Thailand was divided into crops section, livestock section, and a brief outline of the food waste current situation. In the crop section much emphasis was given to the strategies to reduce post-harvest losses in chili which is the most largely produced crop in Thailand. For the livestock section, the delegates shared the relevant work that is put upon the reduction of DEA (dead on arrival) of broiler chickens. In the food waste reduction initiatives, they shared the national movements and consumer awareness campaigns to work under the 3 Rs: reduce, reuse, and recycle.

- <u>Crops section:</u>
- Post-harvest losses of vegetables account for 30%, and 20-50% of fruits. The

factors responsible of post-harvest losses may be physical, biological, chemical or environmental.

- Some of the post-harvest reduction initiatives are: facilitation of cold storage and transportation facilities, campaigns that raise awareness of the losses among all stake holders, application of appropriate packaging techniques, and others.
- Chili is the most largely produced vegetable in Thailand. In order to reduce postharvest losses of chili, handling and drying techniques have been introduced as well as standardized controls and techniques. Moreover, training workshops have been held. In 2018, improved packaging technology is planned to be promoted.
- Livestock Section:
- Thailand is the world's fourth largest exporter of broiler meat. Therefore, they spent a lot of resources to disease prevention and control in order to maintain food security for their economy and the world.
- DOA (dead on arrival) is the amount of chicken that dies during transportation from the farm to the slaughter house. In Thailand, 2.7 million birds were dead before they could be properly industrialized in 2016. Therefore, reducing the amount of DOA would represent better utilization of resources. Some of the solutions may include shorter distance and traveled time between farm and slaughter house, and improved animal welfare. Between 2014 and 2016, the DOA percentage of the total production of broiler decreased from 0.2767 to 0.2101; however the volume of loss was almost equal, around 2.7 million, because of the constant growth of the poultry industry.
- The delegate from Thailand urged to promote data collection, information sharing and research in order to reduce food losses in the supply chain.
- Food waste situation:
- About 26.77 million tons per year of food are wasted in Thailand. In Bangkok,
   4,500 tons of waste is produced every day.
- Some of the policy which involves the food system in Thailand are:
  - The 12<sup>th</sup> National Economic and Social Development Plan which takes into consideration climate change adaptation, adoption of new technologies and coordination of manufacturers and logistics operators.
  - The Strategy Plan of the Ministry of Agriculture and Cooperative that works toward major food security, higher value and quality food products.
  - The National Agenda on Waste Management, which promotes changes in consumption behavior and the 3Rs, reduce, reuse, and recycle.
  - The private sector in Thailand have also been engaged in FLW reduction strategies such as restaurant and supermarket campaigns to raise consumer awareness, and food donations for school lunch such as eggs donation from

Tesco Lotus to schools.

# 3.14 The United States

## Summary

The delegate from the U.S. talked about the different initiatives that are being taken to reach the goal of 20% reduction of FLW by the year 2030 in the U.S. He emphasized that all stakeholders in the food value chain are equally important to reach this goal. In addition, ReFED, a non-governmental organization has helped a lot with the formulation of a roadmap to target food loss and waste initiatives. Finally, the delegate from the U.S. outlined the importance of research and innovation to reduce food losses and waste, not only in the U.S. but also in other parts of the world.

- The USDA estimates that 31% or about 60 million tons of all available food supply in the U.S. at the retailer and consumer level was not eaten in 2010.
- In September 2015 the USDA joint the US Environmental Protection Agency to announce the goal of 20% of FLW by 2030.
- The core value of the goal is that no waste will equal to no landfills.
- The reduction of FLW is core to the USDA's mission and all agencies work in coordination for the promotion of FLW reducing strategies that also serve as incentives for private stake holders.
- Practical solutions and best practices sharing is also part of the work that is being done in the U.S. to reduce FLW.
- The U.S. Food loss and waste 2030 champions are the companies or organizations which take solutions to reduce by 50% their food loss and waste by the year 2030.
- The U.S. food waste challenge invites farmers, processors, manufacturers, retailers, communities, and government agencies to turn in their attributes to food recycling and recovery. By September 2016, over 4,000 organizations have joint the challenge.
- Much of the work being done for the reduction of FLW in the U.S. is conducted by the non-government and multi-stake holder organization *Refed* which helped to develop the Road Map toward the reduction of FLW in the U.S. by 2030.
- The USDA recognizes that technology and innovation are crucial for the reduction of FLW and thus, contributes with different agencies, research institutions, and universities to encourage innovation and technology development.

# Vietnam Dr. Dang Kim Khoi Centre for Agricultural Policy – Institute of Policy and Strategy for Agricultural Policy

### Summary

Dr. Dang presented examples in Vietnam which have improved the agricultural and food system locally. He mentioned that there is not an official measurement of FLW in Vietnam, therefore, one of the most important capacity building needs is the establishment of a measuring system. Other needs to address FLW in Vietnam include consumer education and regulation as well as protection for food donors.

### **Key Points:**

- Three private initiatives to reduce post-harvest losses in Vietnam:
  - 1. Bui Van Ngo Industrial & Agricultural Machinery: They initiated as an importer of agricultural machinery but after years of work have been able to develop machinery on their own and export to other countries.
  - 2. Loc Troi Group: They provide seeds and technical extension to farmers. Additionally, they offer support to farmers in order to gain major access to markets.
  - 3. Synchronous rice processing technologies of Vinaseed: One of the biggest exporters from Vietnam to the E.U.
- There is not an established system to handle food waste recycling in Vietnam. However, most families in rural areas use household waste to feed pigs. In the cities, the waste is collected from restaurants and used as animal feed as well.
- There is not an official act or rule concerning food donations in Vietnam. Moreover, the cultural perception of food rescue may be considered impolite. On the other hand, there are small groups of people who work in food distribution in case of emergencies or encourage local consumption (some celebrities may be involved) when there is overproduction in Vietnam, particularly of rice.
- Dr. Dang outlined the following capacity building needs of Vietnam:
  - Food loss and waste measurement.
  - Innovation programs that change consumer behavior and teach how to avoid food loss and waste.
  - Advanced processing technologies.
  - Food recycling system.

#### 3.15

# Session 4: Policies and Innovations on Reducing Postharvest Losses Chair: Mr. Brian Lipinski, World Resources Institute

#### 4.1

# Situation, Policies and Innovations on reducing Post-harvest Losses in Vietnam Dr. Dang Kim Khoi (Institute of Policy and Strategy for Agricultural Policy, Viet Nam)

#### Summary

Dr. Dang initiated his presentation by showing how Vietnam has become one of the largest agricultural exporters in the World. Despite the constant production growth, Vietnamese farmers still use very rudimentary technology for harvesting, transportation and storage of their products, especially rice. This lack of advanced technologies and proper handling facilities originates large losses for farmers, which at the same time is a loss for consumers and a big inefficiency of the value chain. Vietnam is promoting the adoption of more sophisticated and efficient technologies for packaging and processing of its agricultural products through preferential loans to farmers and farmers associations.

- In 2015, Vietnam's agricultural GDP was about 18%. In the period 2005 to 2015 the agricultural land area and the agricultural land productivity increased continuously. As a result, Vietnam is currently a large agricultural exporter. The top 10 crops exports range from 1 to 6.9 billion USD in value during 2016.
- Challenges for the food sector in Vietnam include population growth, depleting natural resources in particular water, agricultural productivity reaching the ceiling of production, climate risks such as rising sea levels, urbanization, and food safety and security for the whole Vietnamese population.
- Dr. Dang focused his presentation in post-harvest losses that occur in 3 stages of the food value chain namely: handling and storage, processing, and distribution.
- Dr. Dang cited survey results from the Project ADP/2015/01, ACIAR which shows that people's perception of post-harvest losses as a relevant issue for food security is lacking behind other problems such as need for infrastructure, low wages, and natural disaster risks.
- In Vietnam there is not a local organization in charge of collecting data concerning FLW, therefore most of the data presented was from FAO. The FAO data shows that losses in rice, fruit and vegetables in 2003-2013 are around 9-10% in Vietnam.
- The value chain for rice in the Mekong Delta is formed by many stages in which

losses may easily occur. One study by VIAEP (2016) shows that post-harvest loss in Vietnam could be as high as 13.7%.

- In Vietnam the most popular harvesting technology of rice is to pick up the rice by hand while in economies like China and Thailand, more sophisticated, mechanical operations are used for rice harvesting.
- Drying and storage technologies used in Vietnam are rudimentary. For instance, sun is used for drying rice, and for then rice is placed in bags inside warehouses instead of using silos.
- Processing and packaging technologies are not very advanced and thus investment in more efficient and advanced technology may help reduce post- harvest losses of rice.
- Although there is not official data of how much loss occurs during rice transportation, Dr. Dang mentioned that it is very likely that large amounts are lost because rice often travel long distances by boat loaded in individual bags which do not adequately protect the product before it reaches the market.
- A key governmental organization for the reduction of post-harvest losses in Vietnam is the Ministry of Agriculture's Department of processing and market development for agricultural products. Additionally, there are various private and public organizations that could enroll in collaborative initiatives.
- The Vietnam Academy of Agricultural sciences has set up an Institute of Agricultural Engineering and Post-Harvest Technology to work directly on the topic of technology development for reducing post-harvest losses.
- Post-harvest reduction technologies (mainly in the form of machinery) are being promoted to organized or individual farmers through preferential loans which had reached 4,470 billion VND by July 30 2016.
- Some of the outlined challenges for the reduction of post-harvest loss are:
  - Small and fragmented agricultural land which complicates advanced technologies adaptation.
  - Limited financial access and high interest rate.
  - Environment and climate change.

# 4.2 Comprehensive Approaches to Reducing Post-Harvest Losses Ms. Zhang Yi (State Administration of Grain of China, People's Republic of China)

## Summary

Ms. Zhang presentation focused on the circulation part which is storage, transport and processing stages of the value chain of grains in China. The efficiency of mechanical harvesting equipment needs to be improved in order to reduce losses. Storage facilities that provide enough protection from the main damaging agents: pests, rats and fungi, are necessary to reduce in-farm losses of grains. The Chinese government had provided over 10 million sets by the end of 2015 of such improved storage facilities. More infrastructure for bulk transport of grains may help to reduce losses. Education campaigns and enforcement of regulations to prevent over-processing of food is in the agenda to improve the food system in China.

- The 13<sup>th</sup> five year project for economic and social development of the Chinese government (2016-2020) sets a general goal of reducing FLW by 40% by the year 2020.
- To reduce losses during mechanical harvest, machine operators are receiving more training and technical guidance. Similarly machine manufacturers are being encouraged to improve the performance of the equipment they produce.
- About 29.9 million tons of storage capacity has been built up since 2013. New storage capacity, mechanical ventilation, circulation fumigation, and real-time monitoring and cooling system are some of the improvements in the storage phase.
- On-farm storage losses remains high, therefore, since 2009 scientific-storage-facilities are being promoted in rural China. Common types of such facilities include: modular color-steel bin for wheat and rice and steel rectangle container for maize. By the end of 2015, over 10 million set of the facilities had been distributed, lowering on-farm losses by 6% equal to about 1.15 million tons of grain each year. About one half of all the farms already have this type of storage in China.
- A new generation of storage facilities which is targeted for certain crops, easier to install and move around, and quicker to handle. For example, the foldable steel container, which can be easily folded and moved around and facilitates handling; the foldable honeycomb panel container; and the flexible bag container made of polypropylene.
- Facilities for larger farmers are also being improved such as the 150m<sup>3</sup> for high-

moisture maize, fully-enclosed steel silo for rice and wheat with ventilation and sensors which can transmit data to farmers' computers.

- Apart from modern equipment, indigenous methods to protect grain from pest and insects may also be part of the FLW reduction strategies. For instances, wild pepper, white spirit, ailanthus leaves, shaddock peel, dried kelp, wormwood and calamus are all proved to have certain benefits for the prevention of pest in grains.
- Post-harvest service centers have been built in which cleaning, drying, storing, processing, and selling services for grains are offered. The goal is to cover all major grain production areas in China by 2020.
- A lot of grain is transported from Northern to Southern China, but only 15% is loaded in bulk form, therefore, more bulk-form transportation of grains must be employed to reduce energy use and reduce the loss of grains during transport. The plan for greener logistics 2020 addresses the need to construct more infrastructure that facilitates bulk grain transportation.
- For the processing stage, the goals include reduction of over-polishing or rice and over-whitening of wheat flour, more utilization of by-products such as rice bran, and the establishment of a technical code and energy consumption standard.
- For the consumption stage, "Empty Your Plate" is a catch phrase in Chinese society, there are educational campaigns to bring back traditional values i.e. the view that food waste is a not just inappropriate but it is a sin, and also the involvement of celebrities in campaigns are some of the initiatives.

# Session 5: Data Collection and Consistent Accounting System in APEC. Chair: Dr. Nguyen Do Anh Tuan, Institute of Policy and Strategy for Agricultural Policy

#### 5.1

Lessons Learned in Estimating Food Loss in the United States Dr. Jean C. Buzby (Economic Research Service, USDA, the United States)

#### Summary

Dr. Buzby shared the findings and lessons learned from the collection of data in order to formulate the Loss-Adjusted Food Availability (LAFA) measurement in the U.S. at three levels: 1. the primary, farm to retail level; 2. the retailer level; 3. the consumer level. After sharing the different challenges faced during the data collection at each level, Dr. Buzby presented the ongoing work that her institution (ERS) is undertaking to improve the LAFA data as well as to identify more evidence of the economic and social implications of food loss and waste.

- Dr. Buzby began by presenting the definition that the Economic Research Service (ERS) uses in their analysis of FLW. This definition includes food loss from spoilage, inefficiencies, cooking loss, and food waste, but it excludes pre-harvest culling or selective harvesting due to labor shortages, low market prices or oversupply and also it excludes non-edible parts such as peach pits, watermelon rinds, cores, and bones.
- The Food Availability Data System (FADS) has a spreadsheet for each one of the 215 commodities in which the per capita availability of each commodity is estimated.
- Loss-Adjusted Food Availability (LAFA) measures the loss at three levels:
  - The primary farm to retail level which may include transport, processing, and wholesaling.
  - The retailer or supermarket level.
  - The consumer level which includes losses of food consumed at home and away from home i.e. restaurants, schools.
- In 2010, 132.9 billion pounds or 31% of the food supply at the retail level and consumer level was uneaten in the U.S. At the retail level the loss accounted for 43 billion pounds and at the consumer level the loss was 89.9 billion pounds. The estimated retail value of the loss is 162 billion USD.

- In 2014, the most important points from an ERS-sponsored workshop are: FADS relies on continuous, high quality national annual data at different points of the food value chain. The food loss factors are not refined enough to vary over time, therefore, Dr. Buzby warned that they are not to be compared one year to the next but rather to look at a particular year.
- Some of the lessons learned of measuring losses at the primary level are:
  - There is lack of data on the amount of some commodities going to pet food use;
  - It is difficult to produce reliable national farm-to-retail conversion factors for individual commodities
  - The fear of losing competitive advantage may limit data collection.
- Some of the lessons learned at the retail level are:
  - Supermarket loss (shrink) for fresh meat, poultry, and seafood is difficult to measure because there is lack of reliable supplier shipment data.
  - Random weight item sales makes inappropriate to use UPC-coded data alone to estimate shrink.
  - It is also important to determine the extent to which shrink captures an unknown amount of theft, accounting errors, and other factors.
- At the consumer level the lessons are:
  - It is challenging to estimate losses for some commodities, for instance wheat flour, of multi-ingredient foods such as bread, cookies, and pasta.
  - In some cases, sample sizes were too small for the commodities to calculate accurate loss factors.
  - Measuring food waste at home and away from home for individual commodities is needed, distinguishing the waste proportion between these two will be very interesting as to know what kind of food is wasted more at restaurants than at home.
- The ongoing ERS research initiatives on food loss are:
  - An update of Estimate for Cooking Loss and Uneaten Food at the Consumer Level using food acquisition and purchase survey data to 48 household in the U.S.
  - A one year contract with an Expert Panel on Technical Questions and Data Gaps in the LAFA data (preliminary findings: september 2017)
  - A senior economist is currently working on a paper called Optimal Food Waste: An Economic Perspective which arguments and evidence that a nonzero level of food waste should be expected in a well-functioning economy.

# 5.2 Adoption of Global Data Standards in Supply Chain to Enhance Integrity, Visibility and Efficiency

Ms. Cindy Yin (GS1 Hong Kong, Hong Kong, China)

#### Summary

Ms. Yin presented barcode technologies and how information pertinent to product expiry date can be included in the barcode of not only food products but also on items such as pallets and boxes, which in turn can facilitate logistics and prevent food waste. She emphasized the importance of a platform for sharing data among stakeholders in the supply chain because by doing this, over-supply of products is avoided and better planning can be developed. The main target products that should adopt this type of technology are those with a short shelf life such as fresh produce and bread.

- Ms. Yin introduced how complex may be to separate ingredients that are part of the waste in prepared food, i.e. pizza, and identify the source or entire value chain from the production until those ingredients are combined in a final product.
- Today's businesses need to process large amounts of product-related information which may be involved within a system or various systems and between different operators. This raises the question whether these systems are interoperable and traceable, taking into account the format they may take and the way in which information flows among different stakeholders.
- GS1 Standards can help to seamlessly share information between supply chain stakeholders. For example automation of a date, information flow, data quality, which can all reduce errors and increase efficiency thus reducing food waste.
- Through this type of information standards, processors may be able to calculate the conversion ratio of raw material in their processing plants and make adjustment and planning more efficiently.
- Ms. Yin introduced the importance of product and items identification by a barcode carrier. In addition, she mentioned that a platform where all information is shared among stakeholders in the food supply chain is helpful because it brings their efforts together and help prevent over-supply.
- Ms. Yin clarified that 1D barcode technology which carry expiry date, batch number and other type of information has been available for many years and it is being used by retailers. The SSCC pallet identification labels is an identification system which can be used to improve logistics management at a more macro approach of the food

supply chain.

- Automatic expiry date management system benefits retailers by optimizing forecasting/ordering from suppliers, selling-out nearly-expired products with markdowns for consumers, and reduce in-store loss and waste.
- GS1 and Fudan University are currently working on a pilot project for 2D barcode technology which would be shorter (in length) and allow consumers to read product information from their mobile devices.
- The main product categories should be those with limited shelf life such as meat, fish, poultry, fruits, vegetables, bread, and chilled foods.
- Ms. Yin commented in the Q&A section that the system of GS1, which carry the expiry date of products, will send a warning signal when an expired product reach the cashier and is about to be purchased. This is only a special feature because usually products will be removed from the shelf before they have expired.

#### 5.3

#### **Policies to Promote Public-Private Partnership**

Dr. Miranda Mirosa (University of Otago, New Zealand)

#### Summary

Dr. Mirosa presented three case studies from New Zealand related to FLW reduction. The first case is the Love Food Hate Waste (LFHW) campaign, the second is Bioresource Processing Alliance, and the third involves market research about consumers' willingness to pay for no-waste labeled products. These three initiatives are examples of PPPs in New Zealand that work in different aspects to recycle, reuse, and prevent food loss and waste.

- The first case study is Love Food Hate Waste (LFHW), a campaign in New Zealand to reduce household food waste. The objectives of this campaign are: to create an online hub for sharing waste reduction initiatives, promote food waste minimization through a series of printed media and social networks.
- LFHW has different focus each year, for example fruits and vegetables, cheese and breads, etc.
- Through the LFHW campaign, some infographics in ways how to make food last longer are provided. These practices are based on empirical evidence and can be put into practice easily at home.
- The second case study is the Bioresource Processing Alliance (BPA) which provides

funding to researches for by-product development. Private businesses and the MBIE (Ministry of Business, Innovation and Employment) provide the funds for this six year project.

- Four key areas of focus for the BPA are: extraction, high value processing, deconstruction, and reconstruction of waste streams into innovative valuable products.
- The sectors involved in the BPA waste stream are horticulture, agriculture, marine, forestry and microbiological sources. For example, onion skins may be used as a food ingredient or as a dietary supplement ingredient. Other example is the Green Spot Technologies which uses fruit and vegetable pomace to develop high protein, low sugar, high fiber, low GI ingredient for a range of products. Finally, beer breweries developed dog biscuits from beer by-product.
- The third case study is Government funded, industry-led research that promotes commercially meaning research. The scope is by looking at consumers' willingness to pay for high value sustainable (no waste) products. The Ministry of Primary Industries of NZ is investing in this 6 months (2016-17) project which will be conducted in Chinese Taipei and China.
- Through market intelligencing the New Zealand government and New Zealand food industries would like to explore market opportunities in these two economies, particularly of innovative no-waste products.
- Dr. Mirosa mentioned that from a general point of view in Chinese Taipei there is not a large demand for no-waste labelled products, and therefore, willingness to pay a premium for this type of products can be expected to be low.
- From surveys conducted in China, Dr. Mirosa pointed out that Chinese consumers are willing to purchase food products that use smart packaging, mainly because of food safety concerns.
- Dr. Mirosa remarked that initiatives in New Zealand and APEC economies are currently fragmented and would benefit from being more connected. Moreover national level policies/strategy and roadmaps for FLW reduction would be very helpful.

# Session 6: Policies and Innovations on Reducing Food Waste Chair: Dr. Miranda Mirosa, University of Otago, New Zealand

#### 6.1

How Technologies and Innovative Approaches Can Help Address a Widely Overlook Sustainability Issue in The Hospitality Industry: Food Waste. *Mr. Benjamin Lephilibert* (*LightBlue Environmental Consulting*)

#### Summary

Mr. Lephilibert shared how he became engaged in food waste management in the hospitality business. As a response to the problem of food waste, which in many cases is disregarded by chefs and managers, he and his team developed a standard for the hospitality businesses called the Pledge on Food Waste. This is an approach working across different areas of the hospitality business industry, but mainly focused on the maximization of financial benefits while reducing food waste. This standard has helped Hotels to reduce their waste by up to 78 tons of food, creating not only financial but also environmental and social benefits. The standard has been internationally and locally recognized and future developments are underway.

- Mr. Lephilibert briefly introduced how he got involved in of food waste management in the hospitality industry after realizing through various auditions that food waste represents a big challenge for these businesses worldwide.
- In many parts of the hospitality industry the amount of food waste is underestimated but through carefully accounting all the waste, the amount is much larger than what managers or chefs estimate.
- From his experience, Mr. Lephilibert illustrated how the staff in the hospitality industry may deny the findings from the waste measurement that a third party undertake in their installations. Thus, to make people aware of the significance of waste and the benefits from reducing it, is very important for a successful intervention.
- Lack of data and measurement of waste is one of the biggest components missing in the hospitality industry, which make waste management unpractical. Most hotels will use the ratio of how much is purchased to the amount of sales, and if it is high enough they will not be concerned about reducing food waste.
- In some cases, food waste before food reaches the plate may be 25-46% along the entire food value chain, from the moment hotels purchase food until it reaches the

final consumer.

- The Pledge on Food Waste is a standard for the hospitality industry which focuses on maximizing the financial benefits while reducing food waste. The standard has been endorsed by various international organizations as well as the Thailand Convention & Exhibition Bureau (TCEB) which provides subsidies to Hotels and Convention Centers that adopt the standard and comply with it.
- The Pledge on Food Waste is based on 9 key guidelines. Besides food waste measurement, it also promotes staff and costumers involvement in the issues of food waste reduction.
- The main target of the standard is to work closely with employees of the hospitality industry in the food waste prevention strategies. There are two phases of a project which involves an initial phase which is a 3-5 days capacity building and training to use the platform and a second phase which lets the employees to measure the waste themselves.
- The Pledge on Food Waste approach is applied to different areas of work of the hospitality organization and involves a bottom-up orientation. Thus, 2 critical questions that employees must be able to answer are: Why are we doing this? What is in there for me? Clearly, incentives (not only monetary but also recognition such as certificates of achievement) for employees are necessary to raise their interest in the food waste reduction actions.
- The system to collect data is an app called food excess managing platform. Information collected may include time shift, type of food waste (spoilage, preparation, buffet), the area where it is being recorded, plate-waste, and nonedible organic waste. A key indicator is the pre-consumer food waste because this is under control, within the own hospitality businesses.
- One of the possible recycle use of waste mentioned by Mr. Lephilibert is "effective microorganisms" which is in rising popularity in Thailand and may be used in combination with food waste, sugar and water for various cleaning tasks.
- Substantial achievements include cases in Hotels from Thailand and the Maldives where up to 32% of food waste reduction have been accomplished. In the case of the Maldives (Fushi Hotel) the reduction was estimated around 78 tons in one year, and the major cause of the waste was poor transportation facilities and poor cooling equipment.
- Some new developments in the system is to include gamification, which is integrating some entertainment for activities which are routinely and redundant and could make operators feel bored quite easily.

# Food Waste Reduction from Enterprise & NGO. Mr. Winson Wu (Carrefour Cultural and Educational Foundation, Chinese Taipei) and Mr. Jeff Chen (Association of Foodbanks, Chinese Taipei)

## Summary

Carrefour has 100 stores in Taiwan and receives over 100 million customers every year. From every 100 NTD in sales, approximately 0.53 NTD becomes waste. Food represents 70% of all the waste from Carrefour's stores. In order to raise the public image of Carrefour and create a positive benefit for society, they decided to donate food and work collaboratively with food banks across Taiwan, creating a network that prevents food waste. The presenters shared what they consider key components for making food donations a common practice among food retailers in the short run, and a compulsory practice in the long run.

- Carrefour-Taiwan numbers: 100 stores / 12,000 employees / over 100 million customers every year.
- Every \$100 NTD of sales from Carrefour, 0.53 becomes waste. From that waste, 70% are food items and 50% belongs to fresh food products.
- As in many other supermarkets, Carrefour has a specific special-discount clearance area for products near the expiry date. However, there are some products which are still eatable but not saleable, these products are sent to Food Banks in Taiwan.
- It was emphasized the importance of a reliable partner such as the Alliance of Food Banks in Taiwan, in order to assure companies that their food donations will be properly distributed and not used for secondary sales or even worse, become waste.
- Food donations raises consumers awareness of the corporate social responsibility of enterprises, however, within a businesses unit it is necessary to advocate, educate, and train staff to make sure that there will not be food safety issues with the food that is donated.
- Food banks collect the food donations from Carrefour stores. They will also make sure that the food is safe to eat. Additionally, Carrefour will keep an electronic record of all the food that is donated.
- Equipment and facilities such as refrigerated trucks, cold chambers, and social grocery stores are key elements.
- From the 70% of the food waste, during 2016 only 15% was donated. For 2017, that percentage is expected to increase to 30% and further grow to 40% by 2018. The forecast for 2018 is that 750,000 meals will be donated. One important thing is that

donations will not likely reach 100% because there is some food which is not eatable and thus cannot be donated.

- Media dissemination of food donations initiatives are important to create "a culture of donations" and possibly increase donations from other enterprises.
- Information technologies (IT) play an important role in food donations such as providing information of the nearest food bank where donations can be made.
- Carrefour advocates to its more than 3,000 suppliers to make food donations when faced with food that is eatable but not saleable.
- Of all the cooperation process, the most challenging one is how to create enough balance between food safety and food waste.
- Governments can promote food donations initially by removing liability from food donors. In the middle term governments could create tax incentives for food donors. Finally, in the long term governments could make food donations a mandatory law for retailers and processors.

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