Food and Agriculture Organization of the United Nations

SUSTAINABLE DEVELOPMENT GOALS

APCAS/24/B3.3

ASIA AND PACIFIC COMMISSION ON AGRICULTURAL STATISTICS

30TH SESSION

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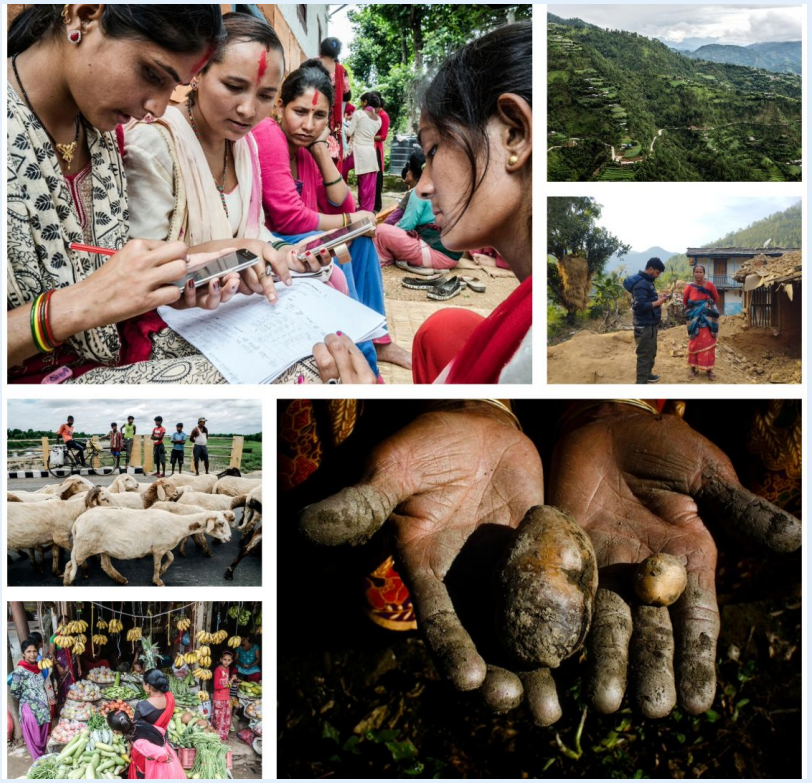
Kathmandu (Nepal)



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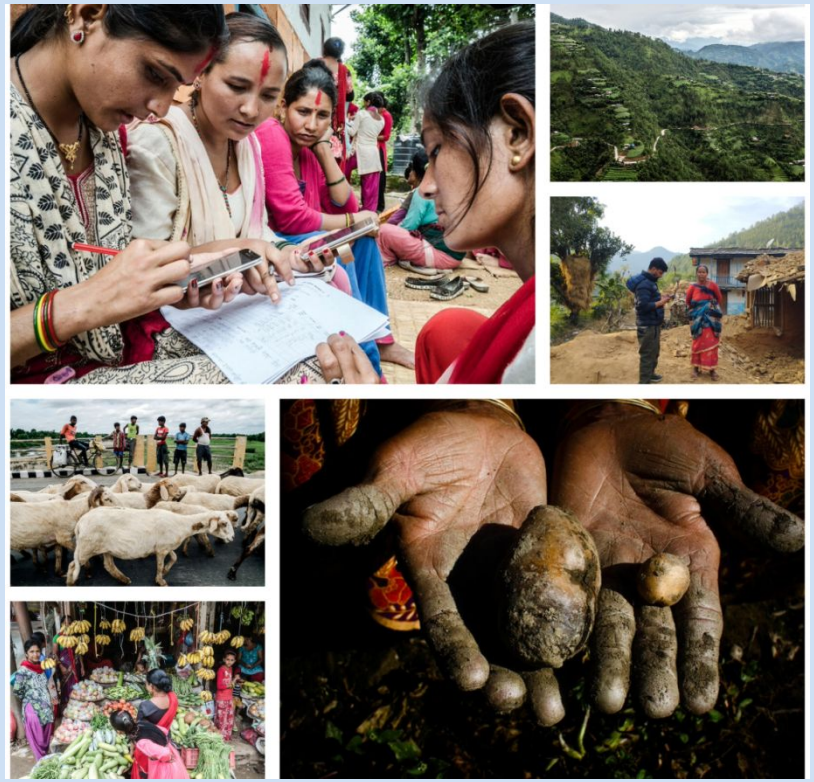
SIDE EVENT B:

Vietnam Experiences with Farm-based SDG indicators

B3.3: Result of 12.3.1a (loss in coffee)

Presenter: Do Thi Thu Ha, GSO & Nguyen Hoang Dan, MARD, Vietnam



Metadata

Lead Ministry/Agency	Ministry of Agriculture and rural development (MARD)
Data users	Survey on the current status of post-processing, processing; Coffee post-harvest losses and proposed solutions to reduce losses post-harvest" – Technical supported by VnSat project
SDGi data source	12.3.1a
Data collection year(s)	Harvest year: 2016-2017
Reference period	Last 12 month ago

Metadata

Sample size	***Scope of survey*** Including 5 Central Highlands provinces: Lam Dong, Dak Lak, Dak Nong, Gia Lai and Kon Tum. ***- Units for survey*** + Farming households producing, semi-processing, and processing green coffee. + small-scale units collecting green-coffee, semi-processing, processing and selling green coffee. + Enterprises that preserve, mill, process and consume raw coffee and constant coffee. ***- Scale of survey*** + Each province selects representative subjects in terms of production scale for investigation, including: 700 units with the sample ratio of enterprises/establishments/coffee farmer households being 1/2/7, respectively: processing enterprises: 70 units; Collection agents: 140 units and farmer households: 490 units.
Data collection frequency	
Data collection mode	Paper Questionnaire
SDGi reporting status	Not public

Current status

- In 2017, the country's coffee area reached 645,000 hectares, an increase of 16.4% compared to 2010; productivity 24.2 tons/hectare (+ 12.5%) compared to 2010.
-The Central Highlands region accounts for 89.6% of the country's coffee area; The Southeast region accounts for 6.68%; The North Central and Central Coast regions account for 1.4%; The Northern Midlands and Mountains region accounts for 3%.
- There are three main types of coffee grown,including: Robusta coffee (Rubusta) accounting for 92.8%, Arabica coffee accounts for 6%, Jackfruit coffee accounting for 1.2%. Households with coffee area <0.5 hectares accounting for 32.81%; from 0.5 - 1 ha accounts for 30.61%; from 1.1 - 2 hectares accounts for 20.93%; over 2 hectares accounts for 15.65%.

Survey questions

To collect information according to 4 survey questionnaires (two for households, one for small-scale units, one for enterprises), including information:

- **Current status of coffee production of HH**: productivity area, output, and quality of fresh coffee nut; techniques for harvesting, transporting, and preserving fresh coffee cherries; pre-processing and processing process, infrastructure of drying activities, storage warehouses, machinery and equipment for drying, milling, classifying and polishing green coffee; organization, production and processing, quantity, qualifications, and human resources serving coffee processing;
- **Situation of using by-products, using waste and treating waste to protect the environment**; Collect information on loss rates and losses in production stages and stages; Quantity of raw materials/semi-finished products/finished products after each stage, assessment of losses through each stage, determination of investment needs in infrastructure, machinery and equipment, technical equipment to improve quality , reducing losses in coffee processing.
- Organize and supervise experimental production at farmer households, apply technical operations according to standard technical and technological processes from harvesting, semi-processing, and processing, with the use of technical procedures. traditional daily routine. Compare and evaluate experimental results.

Adaptation of methods

Statistical methods

- Based on the survey questionnaire combined with interviews with subjects in the field, use appropriate techniques to determine the level of loss at each stage and each stage of each actor in the chain.

Sampling and experimental methods

- Experimental measurement of samples in the field, preliminary determination of loss level;
- Implement experiments to compare and verify actual losses against standard procedures.

Expert method

- Organize seminars and get feedback from independent experts to determine the accuracy of data and the real causes of losses.

Adaptation of methods

Calculation method

- **Volume loss** in each stage is the loss of expected volume compared to the actual volume obtained in that stage . If T is called the rate of loss in volume in a certain stage, then T is calculated according to the formula Tkl= (Q-Q1)*100 /Q (%) in which: Q is the expected harvest yield , Q1 is the actual harvest output.
- **Quality loss** is assessed through losses in many criteria such as: black seeds, broken seeds, mold, microorganisms, chemical residues, particle size, color, particle shape, number Faults, pests, uniformity, amount of impurities, purity, moisture, grain size... and generally expressed in the downgrading of coffee according to the grading scale in National Standard TCVN 4193:2014- Coffee beans.

+ Quality loss can be quantified by the rate of reduction in selling price and is calculated according to the formula: Tkl= (P-P1)*100/P (%) where P is the best possible selling price of the product , P1 is the actual selling price of the prod

- **Economic loss** is understood as the total loss in quantity and quality converted into money or % reduction in value of agricultural products (T= Tsl+Tkl).

Indicator results

Coffee post-harvest losses include losses at the following stages:

- (1) Losses in the production and raw material procurement stage
- (2) Losses in the processing and coffee bean processing stage
- (3) Losses in the preservation and product consumption stage

Indicator results

I. Losses in the production and raw material procurement stage

1.1. Rate of loss in raw material at households. Losses at the harvesting and transportation stages for households and groups of households

Table 1. Volume loss in harvesting and transportation of producers

Unit: %

Indicators	Lam Dong	Dak Lak	Dak Nong	Gia Lai – Kon Tum	Medium
Harvest loss rate	3.62	3.37	3.65	3.48	3.52
Rate of loss in transportation	0.52	0.51	0.46	0.55	0.51
total	4.14	3.88	4.11	4.03	4.03

Accordingly, there are natural losses due to uneven ripening of fruits, overripe fruits that are overripe and dry and fall off, green fruits that reduce seed volume, flat fruits, immature fruits, and impurities will be removed during the preliminary processing process. The latter also causes volume loss.

Indicator results

I. Losses in the production and raw material procurement stage

1.2. Rate of loss in raw material purchasing at establisments.

In the process of purchasing and transporting from the place of production and preliminary processing of the seller to the purchasing agent facility, including: losses due to spillage when packaging, punctured or torn containers; bad transportation roads; spillage in weighing, delivery.

The average loss rate in terms of lost volume and loss in purchasing and transportation is 0.76%.

Table 2. Rate of loss in purchasing and transportation of establisments

Loss rate / Provinces	Mass loss rate (%)	Value loss (*) (%)
Lam Dong	1.36	2.11
Dak Lak	0.62	1.27
Dak Nong	0.52	0.72
Gia Lai – Kon Tum	0.76	0.81
Medium	0.76	1.13

Indicator results

I. Losses in the production and raw material procurement stage

1.3. Rate of loss in raw material purchasing at enterprises

- Average volume loss rate 0.75%
- Coffee output quality decreased by 24,156 tons, selling price decreased by 7.5% on average. The rate of loss due to loss of quality calculated by the volume of loss is 0.77%.
- Value loss: 0.75% + 0.77% = 1.52%

Table 3. Rate of loss in purchasing at processing enterprises

Loss rate / Provinces	Mass loss rate (%)	Value loss (*) (%)
Lam Dong	0.97	1.77
Dak Lak	0.7	1.9
Dak Nong	0.49	1.19
Gia Lai – Kon Tum	0.82	1.32
Medium	0.75	1.52

Indicator results

I. Losses in the production and raw material procurement stage

1.4. Total loss in harvesting and purchasing coffee

Table 4. Summary of loss rates in coffee harvesting and purchasing

Loss rates / Object	Mass loss rate	Loss of value
- Farmer households	4.03	4.03
- Purchasing establisments	0.76	1.13
- Processing enterprises	0.75	1.52
Total	5.54	6.68

Indicator results

II. Losses in the pre-processing and coffee bean processing stage

- ***2.1. Rate of loss in raw material processing at households***
- Losses in the drying process
  - Loss rate by weight: 1.1%
  - The weight of coffee reduced in quality during drying (resulting in a 10% decrease in selling price) is 3,111.5 tons, equivalent to 0.13%.
  - Total loss is 1.1% + 0.13% = 1.23%.
- Loss rate in the grinding process of dry coffee beans
  - Average loss rate by weight: 0.84%
  - Weight loss in quality is 25.24 tons (1.0%); with a 10% decrease in selling price, the loss rate converted to weight is 0.10%.
  - Loss in value during grinding: 0.94%

Table 5. Summary of loss rates in processing at households.

Loss rates / Processing stage	Mass loss rate	Loss of value
Drying process	1,10	1,23
Grinding process	0,84	0,94
Medium	1,94	2,17

Indicator results

II. Losses in the pre-processing and coffee bean processing stage

2.2. Rate of loss in raw material processing at establisments

- These agents conduct preliminary sorting, polishing, packaging, and sell to coffee processing enterprises.
- The evaluation results of losses in preliminary processing at purchasing agent facilities are as follows:

Table 6. Losses in preliminary processing at establisments

Loss rates / Provinces	Mass loss rate	Loss of value
Lam Dong	2,72	3,56
Dak Lak	1,9	2,02
Dak Nong	0,87	1,24
Gia Lai – Kon Tum	1,77	1,95
Medium	1,73	2,28

Indicator results

II. Losses in the pre-processing and coffee bean processing stage

*2.3. Rate of loss in raw material processing at **enterprises***

- The evaluation results of losses in processing raw coffee beans at these enterprises are as follows:

Table 7. Losses in processing at coffee processing enterprises

Loss rates / Provinces	Mass loss rate	Loss of value
Lam Dong	0,93	1,13
Dak Lak	0,98	1,01
Dak Nong	0,53	1,83
Gia Lai – Kon Tum	0,66	2,16
Medium	0,81	1,27

Indicator results

II. Losses in the pre-processing and coffee bean processing stage

2.4. Total loss in pre-processing and coffee bean processing

- **Table 8. Summary of losses in pre-processing and coffee bean processing**

Loss rates / Object	Mass loss rate	Loss of value
- Farmer households	1,94	2,17
- Purchasing establisments	1,73	2,28
- Processing enterprises	0,81	1,27
Total	4,48	5,72

Indicator results

III. Losses in the preservation and product consumption stage

3.1. Rate of loss in the raw material preservation and product consumption at households

- Loss rate by weight in the storage of production households: 0.86%.
- The weight of coffee reduced in quality is 2,350 tons, with a 10% decrease in selling price, corresponding to a loss rate due to quality reduction of 0.09%.
- Total loss: 0.86% + 0.09% = 0.95%.

Table 26. Loss rates in the storage of households

Loss rates / Provinces	Mass loss rate	Loss of value
Lam Dong	0,69	0,73
Dak Lak	0,93	0,97
Dak Nong	1,13	1,26
Gia Lai – Kon Tum	0,68	0,75
Medium	0,86	0,95

Indicator results

III. Losses in the preservation and product consumption stage

3.2. Rate of loss in the raw material preservation and product consumption at establishments

- Loss rate in terms of weight: 0.49%
- Loss rate due to quality reduction: The weight of coffee reduced in quality is 4,000 tons, equivalent to 0.15% (due to a 7.5% decrease in selling price).
- Loss in value for agents: 0.64%.

Table 9. Loss rates in the preservation and product consumption at establishments

Loss rates / Provinces	Mass loss rate	Loss of value
Lam Dong	0,59	0,99
Dak Lak	0,56	0,66
Dak Nong	0,45	1,68
Gia Lai – Kon Tum	0,59	0,69
Medium	0,49	0,64

Indicator results

III. Losses in the preservation and product consumption stage

*3.3. Rate of loss in the raw material preservation and product consumption at **enterprises***

- Loss in quality: The weight of low-quality coffee, with a 7% decrease in selling price, is 38,360 tons, corresponding to 0.74%.
- Loss in value: 0.48% + 0.74% = 1.22%.

Table 10. Loss rates in the consumption of enterprises

Loss rates / Provinces	Mass loss rate	Loss of value
Lam Dong	0,56	1,06
Dak Lak	0,5	0,7
Dak Nong	0,35	1,22
Gia Lai – Kon Tum	0,51	1,19
Medium	0,48	1,22

Indicator results

III. Losses in the preservation and product consumption stage

3.4. Summary of loss rates in preservation and consumption

- Loss rate by weight in the preservation and consumption of production households, purchasing agents, and processing enterprises is 1.83%..
- Loss rate due to quality reduction is 0.98%. In which: (1) Loss due to quality reduction of households: 0.09%; (2) Loss due to quality reduction of purchasing agents: 0.15%; (3) Loss due to quality reduction of enterprises: 0.74%.
- Loss in value in preservation and consumption: 1.83% + 0.98% = 2.81%.

Table 11. Summary of losses in preservation and consumption.

Loss rates / Object	Mass loss rate	Loss of value
- Farmer households	0,86	0,96
- Purchasing establisments	0,49	0,64
- Processing enterprises	0,48	1,22
Total	1,83	2,81

Indicator results

IV. Total losses throughout the chain

Table 12. Total losses throughout the chain, 2016

The stages and object	Mass loss rate (%)	Loss of value (%)
I. Preservation and Transportation	**5,54**	**6,68**
- Farmer households	4,03	4,03
- Purchasing establisments	0,76	1,13
- Processing enterprises	0,75	1,52
II. Pre-processing and processing of green coffee beans	**4,48**	**5,72**
- Farmer households	1,94	2,17
- Purchasing establisments	1,73	2,28
- Processing enterprises	0,81	1,27
III. Preservation and consumption	**1,83**	**2,81**
- Farmer households	0,86	0,95
- Purchasing establisments	0,49	0,64
- Processing enterprises	0,48	1,22
Total loss	**11,85**	**15,21**

Source and year of data: MARD, 2017

The results above show that post-harvest losses for coffee are still quite high (the quantity loss is 11.85% and the value loss (including losses due to reduced quantity and quality) is 15.21%).
However, according to estimates by experts from MARD, the loss rate for coffee (in both quantity and value) is currently (2023) less than 8%.

Challenges

1. Through assessment surveys and experimental organization, it's evident that post-harvest losses (both in quantity and quality) in the production of green coffee beans remain high. This results in resource wastage, labor inefficiency, and affects the competitive position of Vietnamese coffee in the market. The causes include:

- For harvesting and coffee transportation stages: (1) Incorrect harvesting techniques. (2) Transportation and procurement processes not meeting requirements.
- For storage and drying stages: (1) Prolonged storage time leads to poor preservation of freshly harvested coffee cherries, resulting in decreased quality of coffee beans inside. (2) Mixing of different types and ripeness levels of cherries leads to uneven drying, affecting subsequent processing stages. (3) Improper drying techniques.
- For processing stage: Lack of uniformity and outdated machinery in some processing units increase losses during grinding, sorting, and polishing.
- In the preservation and consumption stages: (1) Storage facilities for production households lack investment and are often makeshift, such as using homes, yards, or open spaces for storage; (2) Extended product storage times.

2. The calculation of the full and accurate amount of coffee losses faces many challenges due to the existence of various types of coffee and various forms of production organization; the production and processing procedures of each type have differences and go through many stages.

3. The calculation of post-harvest loss data for various food products encounters many difficulties and challenges due to the large number of food types; each type has different production and processing procedures, and different types of losses. Therefore, it requires suitable calculation methods for each type and a sufficiently large budget to implement. Thus, expanding the calculations to other products (besides coffee) such as rice, corn, vegetables, and aquatic products is very challenging.

Solutions

Post-harvest loss reduction solutions

- 1. Support for restructuring production towards sustainable linkages between enterprises and farmers, for completing the value chains.
- 2. Support for the application of science and technology, and enhancing agricultural extension activities..
  - Promote research on coffee varieties, applying new varieties to production.
  - Support the implementation of sustainable coffee production projects under climate change conditions.
  - Strengthen product quality management according to standards and regulations.
- 3. Implementation of solutions to support reducing post-harvest losses and improving processing quality from the processing stage.
  - Provide training to support farmers, agents, and enterprises with practical techniques to reduce losses in harvesting, transportation, processing, and coffee bean processing.
  - Improve infrastructure.
  - Encourage investment in large-scale wet processing technology, coupled with water treatment to mitigate environmental pollution.
- 4. Continue researching to refine methods and calculations of post-harvest losses to ensure accurate and comprehensive measurement of food losses, providing a basis for proposing appropriate solutions.

Recommendations to other countries and to FAO

- Accurately calculating post-harvest losses for various food products is challenging and requires scientific methods tailored to each type of food. Therefore, it is recommended that FAO provide specific guidelines and increase training sessions on calculating this indicator as well as other SDG indicators.

Thank you for your attention!

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