Foreign Agricultural Service, United States Department of Agriculture

PHILIPPINES Food for Progress

Building Safe Agricultural Food Enterprises

Baseline Evaluation

4/9/2021

This publication was produced at the request of the United States Department of Agriculture. It was prepared independently by Asian Social Project Services Inc.

Baseline Study for the Building Safe Agricultural Food Enterprises (B-SAFE) Project in the Philippines

Program: Food for Progress

Agreement Number: FCC-492-2019/015-00-A
Funding Year: Fiscal Year 2019
Project Duration: October 1, 2019 – September 30, 2023
Implemented by: Winrock International

Evaluation Authored by: ASIAN SOCIAL PROJECT SERVICES INC.
[Dr. Ernesto O. Brown, Team Leader]

Table of Contents

List of Figures

List of Tables

List of Acronyms

ACRONYM	FULL TERM
AMR	Antimicrobial resistance
ASEAN	Association of Southeast Asian Nations
ASF	African Swine Fever
ATI	Agricultural Training Institute
BAFS	Bureau of Agriculture and Fisheries Standards
BAI	Bureau of Animal Industry
BPI	Bureau of Plant Industry
BFAR	Bureau of Fisheries and Aquatic Resources
B-SAFE	Building Safe Agricultural Food Enterprises
CAO	City Agricultural Office
CSO	Civil Society Organization
DA	Department of Agriculture
DENR	Department of Environment and Natural Resources
DOCS	Day-old Chicks
DOH	Department of Health
DOST	Department of Science and Technology
FAW	Fall Armyworm
FDA	Food and Drug Administration
FFPR	Food for Progress
FNRI	Food and Nutrition Research Institute
FPA	Fertilizer and Pesticide Authority
FPSQ	Farm Production Survey Questionnaires
GAP	Good Agricultural Practice
GAHP	Good Animal Husbandry Practices
GAQP	Good Aquaculture Practices
GHP	Good Hygienic Practice
GMP	Good Manufacturing Practice
GOP	Government of the Philippines
GSP	Good Storage Practice
HACCP	Hazard Analysis and Critical Control Points
IPM	Integrated Pest Management
IPPC	International Plant Protection Convention
ISN	Impasugong Samahang Nayon
ISO	International Organization for Standardization
ITCPH	International Training Center on Pig Husbandry
KIGQ	Key Informant Guide Questions
KII	Key Informant interview
LAMPCO	Linabu Agrarian Multi-Purpose Cooperative
LGU	Local Government Unit
LRME	Locally Registered Meat Establishments
NCBP	National Committee on Biotechnology of the Philippines
NMIS	National Meat Inspection Service
NSIC	National Seed Industry Council
OIE	World Organization for Animal Health
OPAG	Office of Provincial Agriculturist
PAO	Provincial Agricultural Office
PNS	Philippine National Standard
PVO	Provincial Veterinary Office

RBB	Rice Black Bug
RFP	Request for Proposal
RFO	Regional Field Office
SME	Small and Medium Enterprises
SPS	Sanitary and Phytosanitary
TA	Technical Assistance
TPSQ	Trader/Processors Survey Questionnaires
UBRA	United Broiler Raisers Association
UNIBAT	United Batangas Hog Raisers Association
US	United States
USDA	United States Department of Agriculture

Executive Summary

Project Background and Purpose

The Building Safe Agricultural Food Enterprises (B-SAFE) is a four-year project implemented by Winrock International and funded by the Food for Progress (FFPr) program of the United States Department of Agriculture (USDA). B-SAFE has two strategic objectives that are aligned with USDA's FFPr Strategic Objectives:

- Increase agricultural productivity by improving the Sanitary and Phytosanitary (SPS) Standards in production and management of supply chains; and
- Expand trade of agricultural products by improving the Government of Philippines (GOP) regulatory agencies' capacity to manage risk-based systems, promote awareness of biotechnology, enhance regulatory standards and processes, enhance domestic and export market linkages, and build the capacity of the private sector to leverage investment.

The focus of B-SAFE is on six commodities in selected provinces in the Philippines: rice and corn in Bukidnon, hogs and broiler chicken in Batangas, milkfish in Pangasinan, and coco sugar in Davao del Sur and Misamis Oriental. The baseline study, therefore, establishes the baseline situation for these commodities in the selected provinces. The specific objectives of the study were as follows:

- Establish a baseline as points of comparison to support measurement of program impacts as part of future project evaluation activities;
- Validate targets for performance indicators to ensure realistic target setting;
- Conduct a situational analysis as basis for assessing program design; and
- Identify and recommend responses to risks and constraints that may pose challenges to planned project implementation.

The baseline study focused on twelve FFPr standard indicators (SI) and two custom indicators (CI) listed in **Annex 1**. The study estimated the baseline for the following four (4) standard indicators and two (2) custom indicators. The baseline values of the disaggregates of these indicators were also calculated.

- SI-4: Number of individuals in the agriculture system who have applied improved management practices or technologies with USDA assistance
- SI-11: Number of host government or community-derived risk management plans formally proposed, adopted, implemented, or institutionalized with USDA assistance
- SI-18: Value of annual sales of farms and firms receiving USDA assistance
- SI-19: Volume of commodities sold by farms and firms receiving USDA assistance
- CI-1: Number of individuals using improved packaging, equipment, transportation, or cold storage as a result of B-SAFE investment
- CI-2: Number of farms/firms/ laboratories with GAP, GMP, HACCP, or ISO certification as a result of USDA assistance

In addition to establishing the baseline values of the indicators, the study carried out a situational analysis designed to: (1) map value chains and establish SPS conditions, postharvest losses, and risks; (2) assess

the organizational performance and risk management capacity of host government agency partners and communities related to food safety; (3) describe the existing conditions at baseline; and (4) identify areas for collaboration among value chain actors. Using probit model analysis, the study explored the factors that would likely explain the adoption of improved technologies and practices by producers.

Evaluation Questions

The evaluation questions addressed to potential B-SAFE beneficiaries and stakeholders were intended to generate the baseline estimates for the B-SAFE indicators and inform the baseline situation related to: (1) level of postharvest losses, SPS conditions and risks; (2) organizational performance and risk management capacity of host government agency partners and communities; and (3) potential collaboration among value chain actors.

The questions addressed to the farm household baseline survey were on size of operation (e.g. area planted, number of animals raised, size of fish cages, number of production cycles, etc.); sources of inputs; farm practices and technologies, especially in relation to food safety (e.g. GAP, HACCP, GAHP, etc.); farm performance (e.g. yield, volume and value of production, etc.); postharvest and marketing practices; access to support services such as extension, credit, etc., socio-economic and demographic characteristics of the farmers and problems encountered especially related to food safety, among others.

The questions addressed to the traders and processors were on size of operation (volume and value of procurement); handling practices/technologies and standards used especially in relation to food safety; major markets of the products; etc. The questions addressed to value chain enablers (e.g. provincial and municipal local governments, trade associations, business service providers), which were asked through key informant interviews (KIIs), were on understanding of food safety, regulatory policies and framework, level of implementation and monitoring of food safety standards, facilities available, programs implemented, risk management plans, trainings attended on food safety and recommendations for improvement related to food safety, etc.

Methodology and Limitations

The study used a mixed methods design which combined both quantitative and qualitative tools. For the quantitative approach, the study surveyed the potential stakeholders and beneficiaries of the six commodity value chains, namely the producers and traders/processors. The sample size was established using the Cochran formula with 95% confidence level and 7.5% margin of error. Total sample size for the survey covering the six commodities was 2,008. To determine the respondents in the study, a two-stage cluster design (barangays as clusters) with listing operation using fractional interval systematic sampling was employed. In addition to the survey and as part of value chain mapping, the study also gathered primary data through 29 KIIs of key value chain players covering production, trading/processing as well as value chain enablers such as trade associations, local government units (LGUs) and NGAs, among others.

Three sets of research instruments were used in the study. These include i) Farm Production Survey Questionnaires (FPSQ); ii) Trader/Processors Survey Questionnaires (TPSQ); and iii) Key Informant Guide Questions (KIGQ). The FPSQs and TPSQs were tailored to the commodity under consideration while the KIGQs were tailored to the type of key informants (i.e., LGUs, trade associations, business service providers). Research instruments are provided in Annex 4 and 5.

As a major limitation, the study was done at the height of the pandemic which limited the mobility of the study team. Nevertheless, the survey was still conducted face-to-face, although the KIIs were done mostly through virtual means.

Findings, Conclusions, and Recommendations

It was established from the data gathered that for the six commodities covered, 99.51% of potential B-SAFE beneficiaries have applied at least one improved management practice or technology, 16.46% have used improved packaging, 36.94% have used improved equipment, 21.25% have used improved transportation, and 1.43% have used improved cold storage. The value of annual sales of farms and firms amounted to USD 3,477,421,750, which was generated from the sales of 1,429,181 MT of products. It was also found that there are 3,463 farms/firms/laboratories with GAP, GMP, HACCP, or ISO certification and 16 host government or community-derived risk management plans either formally proposed, adopted, implemented or institutionalized (**Table 1**). The indicators for which baseline values were set at zero are given in **Table 2**.

Table 1. B-SAFE indicators with estimated baseline values

Indicator Title	Baseline Value	
SI-4: Number of individuals in the agriculture system who have applied improved management practices or technologies with USDA assistance	Total estimate: Percent of total population:	88,050 99.51%
CI-1: Number of individuals using improved packaging, equipment, transportation, or cold storage as a result of B-SAFE investment Disaggregation by technology type (Multiple Response) • Packaging	Packaging Total estimate: Packaging Percent of total population:	14,561 16.46%
• Equipment	Equipment Total estimate: Equipment Percent of total population:	32,682 36.94%
• Transportation	Transportation Total estimate: Transportation Percent of total population:	18,800 21.25%
• Cold storage	Cold Storage Total estimate: Cold Storage Percent of total population:	1,265 1.43%
SI-18: Value of annual sales of farms and firms receiving USDA assistance	Total estimate, in USD: Average Sales per Individual, in USD:	3,477,421,750 39,494
SI-19: Volume of commodities sold by farms and firms receiving USDA assistance	Total estimate, in MT: Average Volume per Individual, in MT:	1,429,181 16.23
CI-2: Number of farms/firms/ laboratories with GAP, GMP, HACCP, or ISO certification as a result of USDA assistance	Number:	3,463
SI-11: Number of host government or community-derived risk management plans formally proposed, adopted, implemented or institutionalized with USDA assistance	Number:	16

Table 2. B-SAFE indicators with baseline values set at zero.

Indicator Title	Baseline Value
SI-9: Number of technologies, practices, and approaches under various phases of research, development, and uptake as a result of USDA assistance	Baseline is zero.
SI-12: Percent of USDA-assisted organizations with improved performance	Baseline is zero.
SI-13: Number of public-private partnerships formed as a result of USDA assistance	Baseline is zero.
SI-14: Value of new USG commitments and new public and private sector investment leveraged by USDA to support food security and nutrition	Baseline is zero.
SI-17: Number of policies, regulations and/or administrative procedures in each of the following stages of development as a result of USDA assistance	Baseline is zero.
SI-21: Number of individuals who have received short-term agricultural sector productivity or food security training as a result of USDA assistance	Baseline is zero.
SI-22: Number of individuals participating in USDA food security programs	Baseline is zero.
SI-23: Number of individuals benefiting indirectly as a result of USDA assistance	Baseline is zero.

Disaggregating the results by improved management practices and technologies, the study found that there are important practices and technologies which are not being applied by a significant proportion of potential beneficiaries, hence could be good entry points for B-SAFE:

- Among rice and corn farmers in Bukidnon, only 45% and 38% respectively, are using sustainable practices and technologies. There are no rice or corn farmers who have engaged in consolidated farming;
- Among hog raisers in Batangas, there is low application (only 3%) of improved practices on postharvest handling and storage, especially those with privately owned and operated slaughterhouses (low application of sanitation, use of UV lamps for flies, storage freezers, etc.). Carcass chillers and blast freezers are not being used. In addition, only 14% are involved in value added processing;
- Among broiler growers in Batangas, there is low application (only 46%) of climate adaptation practices such as natural ventilation, blower and cooling pads. Only 12% of producers are applying good postharvest handling and storage such as sanitation of crates and animal handling facilities and only 23% are into value-added processing;
- Among milkfish growers in Pangasinan, the study found that while 64% of grow out operators are adopting the recommended stocking densities, the accompanying necessary method of feeding is not being applied. Moreover, while 77% of milkfish growers are aware of the need to acclimatize the fry/fingerling stock, only half of them is practicing it; and
- Among coco sugar producers in Davao and Misamis Oriental, only 3% are practicing improved marketing and distribution. This includes better product packaging, labeling and promotion.

On the application of improved packaging, equipment and transportation, the study highlights the following:

- Application of improved packaging is very low among producers of rice in Bukidnon (13%), corn in Bukidnon (24%), broiler chicken in Batangas (2%), and coco sugar in Davao and Misamis Oriental 40%

- Only 3% of broiler chicken growers and 0.27% of hog raisers in Batangas use improved equipment; and
- Only 8% of traders use dressing machines for broiler chicken in Batangas.

The study found very limited number of farms and firms with Good Agriculture Practices (GAP), Good Manufacturing Practice (GMP), Hazard Analysis and Critical Control Points (HACCP) or International Organization for Standardization (ISO certification), regardless of commodities. This is not surprising, especially for products sold in their raw or unprocessed forms, as the market has not yet significantly incentivized compliance to these standards. Compliance to standards is higher among processors as products become more differentiated (such as in the case of coco sugar) and for large commercial farms such as in the case of most hogs, broiler chicken and milkfish growers. The study highlights the following:

- There is only 1 rice farm in Bukidnon with GAP certification. In addition, there are no corn farms in Bukidnon that are GAP certified;
- The survey found that most rice and corn farmers apply only certain components of GAP and there is no conscious effort to comply with all the requirements. In most cases, the GAP compliant practices being applied by farmers were actually part of their traditional practices, which coincidentally happen to be the same practices prescribed under GAP;
- With hogs in Batangas, the estimated baseline number of farms/firms/laboratories with GAP, GAHP, GMP, HACCP, or ISO certification was 26;
- For broiler chickens in Batangas, 9.21% of respondents claimed to be Good Animal Husbandry Practices (GAHP)-certified. The proportion of producers who are aware of GAHP is 32%, and those practicing GAHP but not all its components is 30%;
- In milkfish, there were 6 producers with certification for Good Aquaculture Practices (GAqP) and three processors with HACCP certification; and
- There are 62 producers and 31 traders of coco sugar that have standard certifications.

The baseline situation analysis of the six value chains highlights the following:

- Postharvest losses are high: 7.2% per year for rice from harvest to final sale; 8% per year for corn from harvest, shelling, drying and storage and another 2% during milling, storage to final sale; production and postproduction losses in hogs are due mainly to African Swine Fever (ASF) and can reach as high as 70%; production and postproduction losses in broiler chicken are due mainly to avian diseases such as cough/cold and threat of avian flu; and 8.7% in coco sugar particularly due to rejected sap resulting from delayed delivery;
- The technical capacity of potential B-SAFE host government partners in addressing the various food safety, quality and productivity risks is generally adequate, but support may be needed to augment financial capacity, especially in providing trainings, facilities and equipment support to potential beneficiaries;
- The important areas for collaboration are on promoting and capacitating potential beneficiaries to comply to the relevant SPS standards, reducing production and postproduction losses and ensuring the application of more sustainable practices.

The study provides the following specific recommendations, which B-SAFE may act given project parameters.

Rice and Corn in Bukidnon

1. Facilitate trainings for farmers on GAP and assist them in complying with and certifying to the standards. This may also necessitate provision of assistance in the conduct of farm area assessment, building farm storage facilities for fertilizer and chemical inputs and improved farm equipment for threshing and drying (to avoid pavement drying), among others, to reduce contamination and postharvest losses.
2. Establish models of consolidated farming to facilitate compliance to standards, greater effectiveness in combatting risks of pest infestation (e.g., black bug in rice and fall armyworm (FAW) in corn), adoption of more sustainable practices and realize the benefits of economies of scale. As exploratory steps, B-SAFE may examine the potential of building on existing collaborations and models such as the Lead Firm Model of collaboration being practiced by the Acosta Rice Mill in Maramag, Bukidnon for rice and the Farm Clustering Model being pursued by the *Impasugong Samahang Nayon* for corn in Bukidnon.
3. Support the effort of local government agencies and LGUs in pest monitoring and surveillance against black bug in rice and FAW in corn. While there is local technical capacity on this, financial as well as facilities and equipment support are needed.

Hogs and Broiler Chicken in Batangas

1. In hogs, work with the LGUs and the Department of Agriculture (DA) in the repopulation program to rebuild the industry devastated by ASF. Collaboration may be in the following: a) work with the International Training Center on Pig Husbandry (ITCPH) in providing genetic materials for artificial insemination (AI) and semen through its program on AI Sa Barangay where AI training and equipment are provided; b) link with LGUs and DA, such as the Tanauan City LGUs in requiring beneficiaries of the repopulation program to apply for GAHP certification, or if not possible, to ensure food safety practices in their farms.
2. In hogs, promote a model of Locally Registered Meat Establishments (LRMEs) with the private sector to showcase good practices. LRMEs play an important role in ensuring food safety of meat and meat products, and their number is greater than the National Meat Inspection Service (NMIS) accredited facilities.
3. In hogs, facilitate access to cold storage and transport facilities for cooperatives such as *Soro-soro Ibabao* Development Cooperative (SIDC), organizations such as United Batangas Hog Raisers Association (UNIBAT), and farmers and traders/retailers. This may be in the form of cold storage rooms, large freezers, and refrigerated vans and similar facilities that will allow for the transport of pork to Metro Manila and other areas. This is also in preparation for the plan of the DA to move slaughterhouses out of the national capital to minimize transport of live animals.
4. In broiler chicken, facilitate access to appropriate facilities and equipment for primary processing of chicken for smallholder and independent growers. This could include provision of poultry dressing machines and related equipment; vacuum drying equipment; cold storage facilities such as blast freezers, chillers, and freezers; refrigerated vehicles; and others.
5. In broiler chicken, promote model LRMEs with the private sector to cater to producers and traders who have limited access to NMIS accredited poultry dressing plants.

Milkfish in Pangasinan

1. Partner with the Bureau of Fisheries and Aquatic Resources (BFAR) Region 1 and the LGUs to increase access to extension services and training on food safety among the traders/processors. Similarly, training programs on productivity improvement for producers may be packaged and implemented with particular attention to water management, effluent discharge, and other food safety concerns.
2. Provision of assistance to traders and processors in getting BFAR, Hazard Analysis and Critical Control Points (HACCP) and Good Manufacturing Practice (GMP) certification as all these entail time, effort and resources. Likewise, technical assistance in packaging and labeling of manufactured products should be provided particularly to small processors in coordination with the Department of Trade and Industry.
3. Encourage the provision of public and private investment for local hatchery establishment to ensure a fry supply free of contaminants.
5. Support organizing community level milkfish processing projects focusing on deboning and marinating, packaging, and labeling of the products, and link the projects to major market centers.
6. Lobby for the expansion of community fish landing terminal in Bani to service fishpond and cage culture operator.
7. Coordinate with the Cold Chain Association of the Philippines (CCAP) for the establishment of blast freezing facilities in the province.

Coco Sugar in Davao and Misamis Oriental

1. Help in the development of a grading system to encourage farmers to achieve better quality products and conduct of capacity building to achieve product quality development and pursue the concept that "Food Safety and Quality is the Product Standard".
2. Spearhead the formulation of an International Product Standard and Trading System for coco sugar in agreement with other member countries of the International Coconut Community (ICC) to protect the product position in the global market.
3. For coco sap tappers, facilitate access to equipment such as pH meters and facilities such as common service facility for the boiling of coco sap.

Cross-Cutting Recommendations

1. Initiate and support the development of market models that will incentivize farmer's compliance to food safety and quality standards. Especially for products sold in primary form, there is still generally no premium price for products produced following existing product standards.
2. Support consumer and producer awareness campaigns of government entities such as the Food and Nutrition Research Institute (FNRI), Department of Agriculture (DA), and Food and Drug Administration (FDA) and civil society organizations (CSOs) on the importance of food safety, quality and reduced postharvest losses and wastage in the food system.

1. Introduction and Purpose

1.1. Project Context

This study aimed to establish the baseline for the B-SAFE Project, a four-year program implemented by Winrock International and funded by USDA.

The establishment of a baseline is necessary in any development project. It serves as a crucial reference to the context prior to project interventions, provides data that assists with realistic target setting and validation, identifies risks and constraints, and may help assess the appropriateness of project design and provide data against which to evaluate program accomplishments. An accurate baseline necessitates thorough understanding of the project's goals and objectives, theory of change, scope of its activities, strategic interventions, and its direct and indirect beneficiaries.

The baseline study depicts the situation before the project, from which the progress of the B-SAFE project may be tracked. The ex-ante situation should be with reference to the project's performance indicators both in terms of outputs and outcomes.

1.2. Project Description

The B-SAFE project is focused on contributing to the following FFPr Strategic Objectives:

- Increase agricultural productivity by improving the SPS standards in production and management of supply chains; and
- Expand trade of agricultural products by improving the GOP's regulatory agencies to manage risk-based systems, promote awareness of biotechnology, enhance regulatory standards and processes, enhance domestic and export market linkages, and build the capacity of the private sector to leverage investment.

The B-SAFE theory of change is that if the GOP and the private sector use risk-based management approaches to guide their use of relevant SPS-related technical assistance that build capacity; and if the GOP and private sector become stronger at capturing information and decision making to meet SPS and regulatory requirements for export and import markets, in market situations that change quickly; and if the GOP and private sector adopt and invest in SPS systems and have adequate facilities and equipment to use; then agricultural products will have increased trade that meet SPS standards for the US, ASEAN, international, and domestic markets.

B-SAFE's goal is to develop and adopt evidence-based international standards to improve the trade of safe, wholesome food and agricultural products. This is anchored on USDA's FFPr Strategic Objectives SO1 Increased Agricultural Productivity and SO2 Expanded Trade of Agricultural Products and their respective intermediate and foundational results (see **Figure 1.** B-SAFE Results Framework).

B-SAFE will implement five key project activities, three of which are to be implemented with public sector SPS regulatory agencies (Activities 1 and 2) and biotechnology regulatory agencies (Activity 3) of the DA and FDA at the national government level and appropriate LGUs. The approximate number of direct beneficiaries from the public sector is 11,500 persons. Activities 4 and 5 are implemented with private sector supply chain stakeholders including private sector trade associations and agribusinesses with the incentives and resources to invest in SPS compliant supply chains, training service providers, and business service providers. The approximate number of direct beneficiaries from the public sector is 26,000

persons. Assistance for supply chains will addressing commodity-specific issues involving six baseline commodities in four selected provinces, namely in Batangas (hogs and broilers), Davao del Sur and Misamis Oriental (coconut sap sugar), Bukidnon (rice and corn), and Pangasinan (milkfish). Activity 5 on cold chain facilities improvement complements the supply chain work for perishable products namely meat products, milkfish, and coco sugar. B-SAFE expects to impact approximately 45,688 indirect beneficiaries.

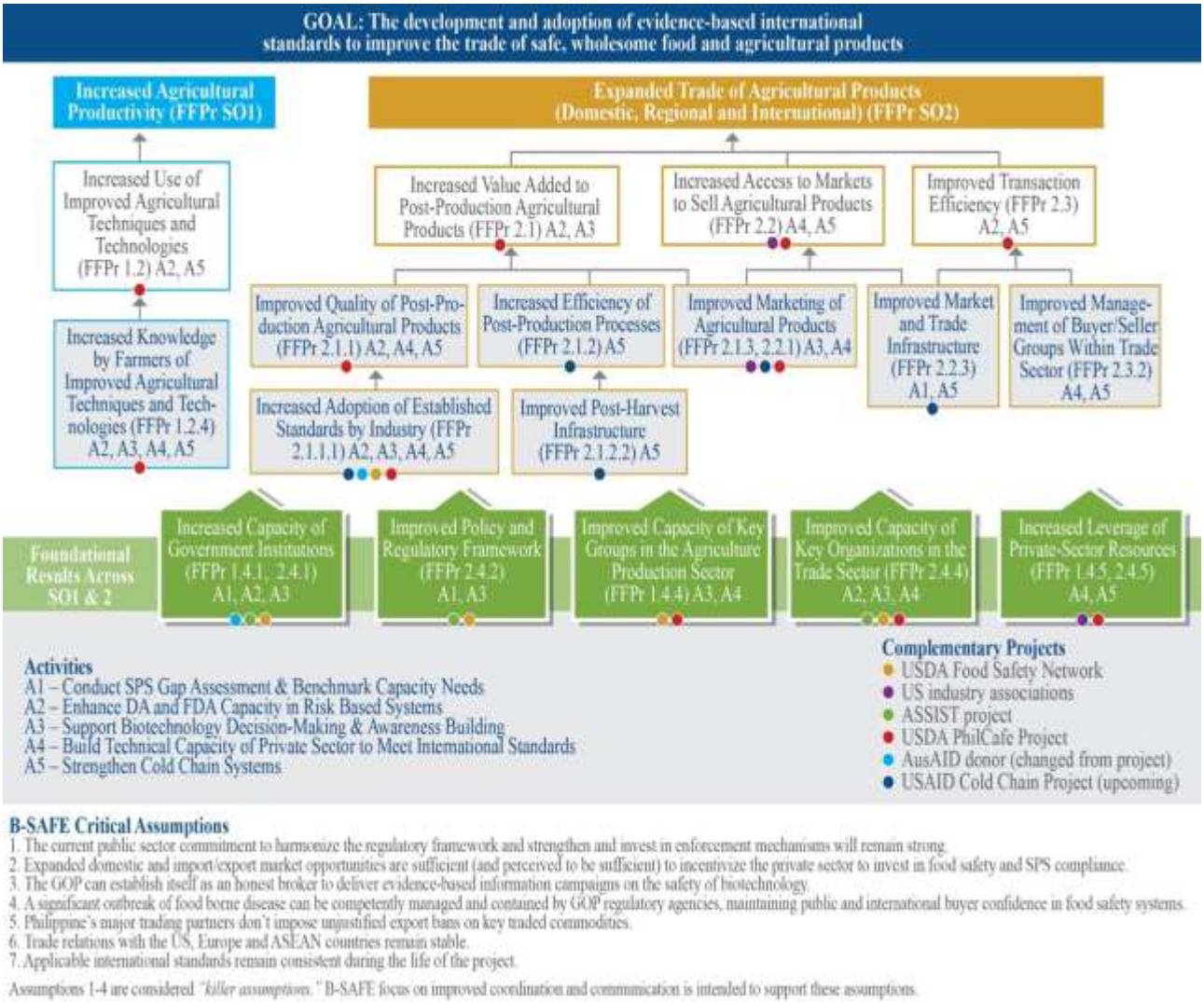


Figure 1. B-SAFE Results Framework

1.3. Purpose of the Evaluation

Principal Functions of the Evaluation

The study aimed to establish the baseline situation for the B-SAFE project. The four principal functions of the evaluation were as follows:

- Establish a baseline as points of comparison to support measurement of program impacts as part of future project evaluation activities;

- Validate targets for performance indicators to ensure realistic target setting;
- Conduct situational analysis as basis for assessing program design. Such analyses are those relevant to target beneficiaries' knowledge and capacities; access to quality and utilization of inputs and infrastructure; value chain diagrams; and, organizational capacity; and
- Identify and recommend responses to risks and constraints that may pose challenges to planned project implementation.

Indicator Measurement

A major focus of the analysis of the study are the following 12 FFPr standard indicators and two custom indicators (see **Table 3**). Of the fourteen outlined indicators, the study aimed to measure the quantitative baseline values of four standard indicators and the two custom indicators, with their respective disaggregates. Especially for SI-4 and CI-1, an individual is considered an adopter if he adopted at least 1 of the improved technology/practices (in the case of SI-4) or improved packaging, equipment, transportation or cold storage (in the case of CI-1).

Table 3. Indicator description, measurement and disaggregates

No.	Indicator Title	Measurement	Disaggregates
SI-4	Number of individuals in the agriculture system who have applied improved management practices or technologies with USDA assistance	Baseline values of indicator and disaggregates were calculated	Commodity; value chain actor; age; management or technology type/practices
SI-9	Number of technologies, practices, and approaches under various phases of research, development, and uptake as a result of USDA assistance	Baseline is zero.	Category of research; phase of development
SI-11	Number of host government or community-derived risk management plans formally proposed, adopted, implemented or institutionalized with USDA assistance	Baseline values of indicator and disaggregates were calculated	Type; phase of development
SI-12	Percent of USDA-assisted organizations with improved performance	Baseline is zero.	Numerator; denominator; Type of organization
SI-13	Number of public-private partnerships formed as a result of USDA assistance	Baseline is zero.	Type of partnership
SI-14	Value of new USG commitments and new public and private sector investment leveraged by USDA to support food security and nutrition	Baseline is zero.	Type of investment
SI-17	Number of policies, regulations and/or administrative procedures in each of the following stages of development as a result of USDA assistance	Baseline is zero.	Stage
SI-18	Value of annual sales of farms and firms receiving USDA assistance	Baseline values of indicator and disaggregates were calculated	Commodity; type of producer/firm; sex; age
SI-19	Volume of commodities sold by farms and	Baseline values of	Commodity by type of

No.	Indicator Title	Measurement	Disaggregates
	firms receiving USDA assistance	indicator and disaggregates were calculated	producer/ firm; sex; age
SI-21	Number of individuals who have received short-term agricultural sector productivity or food security training as a result of USDA assistance	Baseline is zero.	Sex; duration; type of Individual; type of training
SI-22	Number of individuals participating in USDA food security programs	Baseline is zero.	Sex; age; type of individual; size
SI-23	Number of individuals benefiting indirectly as a result of USDA assistance	Baseline is zero.	None
CI-1	Number of individuals using improved packaging, equipment, transportation, or cold storage as a result of B-SAFE investment	Baseline values of indicator and disaggregates were calculated	Technology type; sex
CI-2	Number of farms/firms/ laboratories with GAP, GMP, HACCP, or ISO certification as a result of USDA assistance	Baseline values of indicator and disaggregates were calculated	Type; phase of development

Baseline Commodities

The study covered the following commodities and provinces: rice and corn in Bukidnon; hogs and broiler chicken in Batangas; Milkfish in Pangasinan and coco-sugar in Davao del Sur and Misamis Oriental. The commodities and locations were preselected by B-SAFE.

2. Evaluation Design and Methodology

This study was designed to collect data to establish a baseline for a future performance evaluation; no control group was included, and no counterfactual was assessed. The design is non-experimental using a mix of household survey data to calculate descriptive statistics and Key Informant Interviews to provide qualitative data. Findings from this baseline study will be used to set targets for indicators, understand the context in which potential B-SAFE beneficiaries are operating, and, ultimately, provide values against which progress will be measured.

2.1. Evaluation Questions

The evaluation questions addressed to potential B-SAFE beneficiaries and stakeholders were intended to generate the baseline estimates for the B-SAFE indicators and answers to the B-SAFE evaluation questions related to: (1) level of postharvest losses, SPS conditions and risks; (2) organizational performance and risk management capacity of host government agency partners and communities; and (3) potential collaboration among value chain actors.

The questions addressed in the farm household baseline survey were on size of operation (e.g. area planted, number of animals raised, size of fish cages, number of production cycles, etc.); sources of inputs; farm practices and technologies, especially in relation to food safety (e.g. GAP, HACCP, GAHP, etc.); farm

performance (e.g. yield, volume and value of production, etc.); postharvest and marketing practices; access to support services such as extension or credit; socio-economic and demographic characteristics of the farmers; and problems encountered especially related to food safety.

The questions addressed to the traders (i.e., market functionaries) and processors include size of operation (volume and value of procurement); handling practices/technologies and standards used especially in relation to food safety; and major markets of the products. The questions addressed to value chain enablers (e.g., provincial and municipal local governments, trade associations, business service providers), which were asked through key KIIs, were on understanding of food safety, regulatory policies and framework, level of implementation and monitoring of food safety standards, facilities available, programs implemented, risk management plans, trainings attended on food safety and recommendations for improvement related to food safety.

2.2. Situational Analysis Framework

The value chain framework (**Figure 2**) was used to integrate the elements of the study. The analysis involved mapping the operators and functions along the value chain to provide context to the baseline and the calculated ex-ante values of the project's indicators. The study carried out situational analyses of the respective value chains of the study's selected baseline commodities. It (1) analyzed potential collaboration among chain actors; (2) assessed the risk management capacities of host local government agency partners and communities in the targeted project sites; (3) estimated the level of postharvest loss and examined the sanitary and phytosanitary conditions along value chains of each targeted commodity; (4) established the current state of adoption/use of improved management practices or technologies by agricultural producers and other value chain actors; (5) assessed the current organizational performance of targeted beneficiary organizations; and (6) specified the potential partners' capacities and gaps in terms of meeting compliance to GAP, GMP, HACCP, or ISO certification standards.

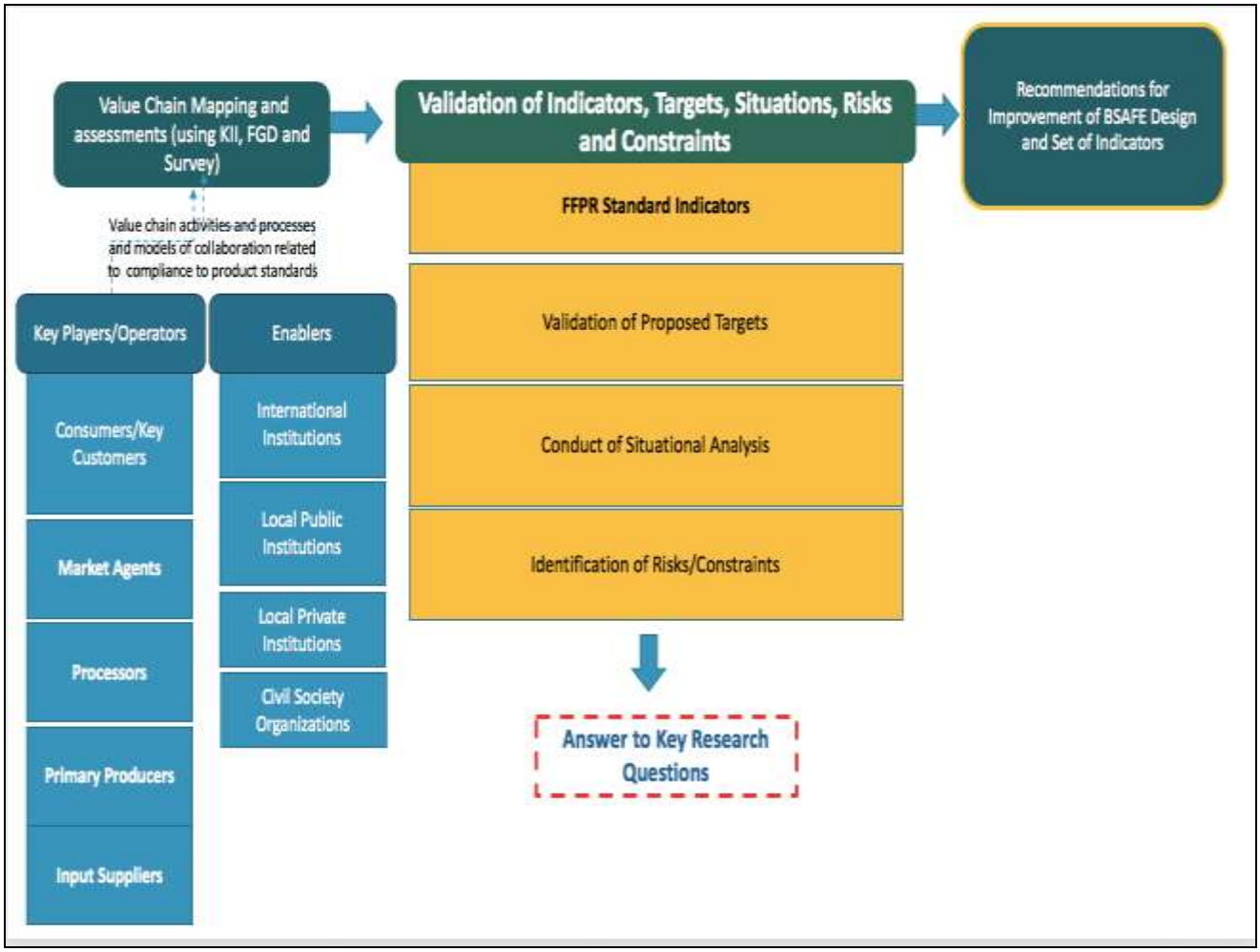


Figure 2. Framework of the baseline study

2.3. Sampling and Data Collection Methods

The study used a mixed method design which combined both quantitative and qualitative tools. For quantitative approach, the study surveyed the potential stakeholders and beneficiaries of the six commodity value chains, namely the producers and traders/processors. The sample size was established using the following sampling formula: $n_l = \frac{Z^2pq}{e^2}$; $n_s = \frac{n_l}{1+\left(\frac{n_l-1}{N}\right)}$; where n_l is the sample size; Z is the normal distribution value at 95% confidence level; p is the standard deviation (assumed as 0.5); q= 1-p; and e is the margin of error (7.5%). For a small population (i.e., sample size > 5% of the population), the sample size was adjusted using the formula for n_s. Due to the complex design, the calculated sample size was adjusted for design effect (2 was used). Total sample size calculated for the survey covering the six commodities was 2,008 (**Table 4**). The total sample size was allocated between producers and traders/processors using 0.9 and 0.1 as weights (using information from Briones, 2016 on relative proportions of agribusiness actors).

To determine the respondents in the study, a two-stage cluster design (barangays as clusters) with listing operation using fractional interval systematic sampling was employed (details shown in ***Annex 2***. *Selection of sample clusters using systematic sampling*). In addition to the survey and as part of value chain mapping, the study also gathered primary data through KIIs (29 KIIs were conducted) of key value chain

players covering production, trading/processing as well as value chain enablers such as trade associations, LGUs and NGAs, among others (***Annex 3.*** *List of organizations for key informant interviews***)**. Three sets of research instruments were used in the study. These included i) Farm Production Survey Questionnaires (FPSQ); ii) Trader/Processors Survey Questionnaires (TPSQ); and iii) Key Informant Guide Questions (KIGQ). The FPSQs and TPSQs were tailored to the commodity under consideration while the KIGQs were tailored to the type of key informants (i.e., LGUs, trade associations, business service providers). Research instruments are provided in ***Annexes 4****. Survey Questionnaires and* ***5****. Guide questions for key informant interviews.*

Table 4. Sample sizes by commodity and province

Commodity/ Province	Population 1/			Initial Sample Size	Adjusted for Small Population	Adjusted for Design Effect	Final Calculated Sample Size (Producers)	Final Calculated Sample Size (Traders/ Processors)	Actual Number of Producers Surveyed	Actual Number of trader /Processors Surveyed
	Total	Producer	Trader							
Rice/ Bukidnon	8333	7,500	833	171	171	342	308	34	330	36
Corn/ Bukidnon	38333	34,500	3,833	171	171	342	308	34	330	36
Hogs/ Batangas	28000	25,200	2,800	171	171	342	308	34	330	36
Chicken/ Batangas	7546	6,791	755	171	167	334	301	33	192	36
Milkfish/ Pangasinan	3270	2,943	327	171	162	324	292	32	300	33
Coco Sugar/ Davao del Sur and Misamis Oriental	3000	2,700	300	171	162	324	292	32	186	17
Total	88,482	79,634	8,848	1,026	1,004	2008	1809	199	1668	194

1/ From 2012 census of agriculture (latest census data).

2.4. Data Processing and Analysis Methods

The data were cleaned, encoded, and inputted to DevResults, Winrock's monitoring and evaluation database, for the calculation of the indicators' baseline values. The process involved calculating first the probability weights then the sample weights following the procedures outlined in the Sampling Guide for Beneficiary Based Sampling (Stukel and Friedman, 2016).

Probit models were also formulated and estimated to determine the factors affecting the adoption of select technologies of interest to B-SAFE.

2.5. Limitations of the Study

As a major limitation, the study was done at the height of the pandemic which limited the mobility of the study team. As a result, the actual number of surveyed producers was only 1668 (short by 141). This is due to the fact that many coco sap tappers ceased from supplying for coco sugar (they are now supplying for alternative products). The lower samples for coco sugar will not affect the integrity of estimates for this commodity as the actual number of surveyed respondents was almost a complete enumeration. There were difficulties encountered in surveying the growers of broiler chicken. It was estimated that the shortfall in the number of samples would have minimal effect and would just raise the margin of error for the broiler chicken survey by at most 1%.

3. Findings

3.1. Indicators

This section presents the estimated baseline values for the indicators by commodity and indicator disaggregates. The baseline values were established by determining each individual sample weight (the inverse of the probability weight) of each individual survey respondent. The calculation of baseline values of indicators was automated using DevResults.

3.1.1 Improved Management Practices and Technologies

(Baseline for Indicator SI-4: Number of individuals in the agriculture system who have applied improved management practices or technologies)

Application of improved management practices and technologies varied widely by commodity and specific farm activities. There are certain technologies and practices that are extensively applied, but there are others that only few farmers have utilized. Table 5 shows that majority (85%) of rice farmers in Bukidnon have applied improved crop genetics by planting hybrid rice. Nearly all (90%) of corn farmers in Bukidnon have likewise applied new production technologies such as the use of high yielding varieties of corn. Interestingly, most of these adopters have planted the genetically modified BT corn as it can effectively control the corn borer. Some farmers plant plain hybrid corn, which has higher yield than open-pollinated corn. Soil related fertility management and soil conservation is being practiced by 76% of the rice farmers and 53% of the corn farmers. The practice of sustainable farming is not quite as popular with only 45% of rice farmers and 38% of corn farmers who have been implementing it. Only a few of the rice and corn farmers in Bukidnon are into consolidated farming and value-added processing.

Most (90%) of the hog farmers in Batangas have applied improved agricultural practices, which include breed selection, farm record keeping, proper handling of animals, and use of tools to minimize animal stress. Almost all (98%) of them practice proper livestock management through regular sanitation and disinfection of pens, proper water drainage, and application of standard biosecurity measures. There is also a significant number (90%) of farmers who have applied natural resource and ecosystem management such as proper waste management and pest and disease management. The use of tunnel vent is a common climate mitigation practice among 84.5% of the hog farmers. However, the survey revealed that postharvest handling and storage are not widely practiced particularly for farmers with privately owned and operated slaughterhouses. Some of these disregarded practices are proper sanitation, use of UV lamp for flies, and proper use of storage freezer. Carcass chiller and blast freezer are not being used. Only 14% of hog producers are involved in value added processing.

About 89% of broiler chicken producers practice improved cultural management specifically feed quality control, safe use of antibiotics, and pest and disease management. Other practices applied by the producers are natural resource management or sustainable practices (91%), water management (86%), and climate mitigation especially the use of tunnel vent (83%). On livestock management, 89% practice proper hygiene and sanitation, biosecurity measures, and use of probiotics and prebiotics. Less than half (46%) applied climate adaptation practices such as natural ventilation, blower, and cooling pads. Only 12% of producers practice good postharvest handling and storage such as sanitation of crates and animal handling facilities and only 23% are into value-added processing.

In milkfish production, the study found that 64% of grow out operators have adopted the recommended stocking densities but not the necessary method of feeding. Of this, 45% were using semi-intensive stocking, 29% were using extensive, and 25% were using intensive stocking density. The same stocking densities are recommended in cage culture but only 12% have adopted the recommendation and used intensive stocking rate. Acclimatization of the stock (fry or fingerling) is another important aspect in milkfish production, but only 77% of the surveyed producers are aware of the technology yet only half of them have applied it.

For coco sugar, 90% applied cultural management practices, 88% followed natural resources or ecosystem management and 95.16% practice improved post-harvest handling and storage. Only 3.32% practice improved marketing and distribution. Postharvest handling and storage are practiced by 95.16% of producers and traders while only 5.88% conduct value-added processing.

Another level of disaggregation is by sex and age of value chain actors. The study showed that in the case of rice, 57% of those who applied improved management practices or technologies were male and 43% were females, and the large majority (97%) were 30 years old and above. In the case of corn, 51% of producers who applied improved practices or technologies were male and 96% were more than 30 years old. In the case of hogs, 63% of producers who applied improved practices or technologies were male and 99% were more than 30 years old. In the case of chicken, 62% of producers who applied improved practices or technologies were male and 96% were 30 years old and above. In the case of milkfish, 72% of producers who applied improved practices or technologies were male and 100% were 30 years old and above. In the case of coco sugar, 93% of producers who applied improved practices or technologies were male and 87% were 30 years old and above.

Table 5. Estimated number of individuals in the agriculture system who have applied improved management practices or technologies

	Description	Rice			Corn			Hogs			Chicken			Milkfish			Coco Sugar		
		Producer	Trader	Total	Producer	Trader	Total	Producer	Trader	Total	Producer	Trader	Total	Producer	Trader	Total	Producer	Trader	Total
1	No. of individuals adopting improved crop genetics	7,045	0	7,045	28,122	0	28,122	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	0	0
	Percent of total	84.54%	0.00%	84.55%	73.36%	0.00%	73.36%	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.00%	0.00%	0
2	No. of individuals adopting improved agricultural practices	7,500	0	7,500	34,186	0	34,186	25,200	0	25,200	6,721	0	6,721	2,708	0	2,708	2,700	0	2,700
	Percent of total	90.00%	0.00%	90.00%	89.18%	0.00%	89.18%	90.00%	0.00%	90.00%	89.06%	0.00%	89.06%	82.81%	0.00%	82.81%	90.00%	0.00%	90.00%
3	No. of individuals adopting improved livestock/poultry management	NA	NA	NA	NA	NA	NA	25,200	2,333	27,533	6,721	0	6,721	NA	NA	NA	NA	NA	NA
	Percent of total	NA	NA	NA	NA	NA	NA	90.00%	8.33%	98.61%	89.06%	0.00%	89.06%	NA	NA	NA	NA	NA	NA
4	No. of individuals adopting wild-caught fisheries management	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1,050	0	1,050	NA	NA	NA
	Percent of total	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	32.10%	0.00%	32.10%	NA	NA	NA
5	No. of individuals adopting improved aquaculture management	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2,766	0	2,766	NA	NA	NA
	Percent of total	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	84.60%	0.00%	84.60%	NA	NA	NA
6	No. of individuals adopting improved natural resource or ecosystem management (i.e. sustainable practices)	3,773	0	3,773	14,636	0	14,636	25,200	0	25,200	6,155	0	6,155	1,609	0	1,609	2,627	0	2,627
	Percent of total	45.27%	0.00%	45.27%	38.18%	0.00%	38.18%	90.00%	0.00%	90.00%	81.56%	0.00%	81.56%	49.20%	0.00%	49.20%	87.58%	0.00%	87.58%
7	No. of individuals adopting pest and disease management	7,500	0	7,500	33,559	0	33,559	25,200	0	25,200	6,721	0	6,721	1,324	0	1,324	0	0	0
	Percent of total	90.00%	0.00%	90.00%	87.55%	0.00%	87.55%	90.00%	0.00%	90.00%	89.06%	0.00%	89.06%	40.50%	0.00%	40.50%	0.00%	0.00%	0.00%
8	No. of individuals adopting soil-related fertility and conservation	6,295	0	6,295	20,386	0	20,386	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Percent of total	75.55%	0.00%	75.55%	53.18%	0.00%	53.18%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
9	No. of individuals adopting irrigation	5,682	0	5,682	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Percent of total	68.18%	0.00%	68.18%	0.00%	0.00%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10	No. of individuals adopting agriculture water management-non-irrigation based	5,432	0	5,432	12,232	0	12,232	21,687	0	21,687	5,801	0	5,801	2,551	0	2,551	NA	NA	NA
	Percent of total	65.18%	0.00%	65.18%	31.91%	0.00%	31.91%	77.45%	0.00%	77.45%	76.87%	0.00%	76.87%	78.00%	0.00%	78.00%	NA	NA	NA

	Description	Rice			Corn			Hogs			Chicken			Milkfish			Coco Sugar		
		Producer	Trader	Total	Producer	Trader	Total	Producer	Trader	Total	Producer	Trader	Total	Producer	Trader	Total	Producer	Trader	Total
11	No. of individuals adopting climate mitigation	7,113	0	7,113	30,213	0	30,213	23,673	0	23,673	5,624	0	5,624	0	0	0	0	0	0
	Percent of total	85.36%	0.00%	85.36%	78.82%	0.00%	78.82%	84.55%	0.00%	84.55%	74.53%	0.00%	74.53%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
12	No. of individuals adopting climate adaptation/climate risk management	7,204	0	7,204	31,154	0	31,154	17,869	0	17,869	3,466	0	3,466	0	0	0	0	0	0
	Percent of total	86.45%	0.00%	86.45%	81.27%	0.00%	81.27%	63.82%	0.00%	63.82%	45.94%	0.00%	45.94%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
13	No. of individuals adopting improved marketing and distribution	68	25	93	209	0	209	153	0	153	1,521	0	1,521	0	0	0	29	71	100
	Percent of total	0.82%	0.30%	1.12%	0.55%	0.00%	0.55%	0.55%	0.00%	0.55%	20.16%	0.00%	20.16%	0.00%	0.00%	0.00%	0.97%	2.35%	3.32%
14	No. of individuals adopting improved post-harvest handling and storage	6,568	808	7,376	34,186	3,833	38,019	76	856	932	920	0	920	628	327	955	2,555	300	2,855
	Percent of total	78.82%	9.70%	88.52%	89.18%	10.00%	99.18%	0.27%	3.06%	3.33%	12.19%	0.00%	12.19%	19.20%	10.00%	29.20%	85.16%	10.00%	95.16%
15	No. of individuals adopting value-added processing	0	732	732	0	0	0	1,451	2,489	3,940	990	713	1,703	245	327	572	0	176	176
	Percent of total	0.00%	8.79%	8.79%	0.00%	0.00%	0.00%	5.18%	8.89%	14.07%	13.13%	9.59%	22.57%	7.50%	10.00%	17.50%	0.00%	5.88%	5.88%

Note: +/- 7.5% Margin of Error; Coco sugar is based on complete enumeration

3.1.2 Adoption of Improved Packaging, Equipment, Transportation and Cold Storage

(Baseline for Custom Indicator CI-1: Number of individuals using improved packaging, equipment, transportation, or cold storage)

Improved Packaging. The application of improved packaging is very low among producers of rice (13%), corn (24%), chicken (2%), and coco sugar (40%). Improved packaging is not applicable to hogs as live animals are sold by growers. Harvested rice and corn are traditionally packed in sacks. However, the good agricultural practice of ensuring that recycled sacks are clean is not generally being practiced. Very few rice and corn traders also apply improved packaging, such as ensuring clean packaging materials and proper labeling. In the case of dressed broiler chicken, the traditional practice is packing it in unsealed plastics. Use of improved packaging material is high (90%) among milkfish growers and traders. At the milkfish production site, the harvests are packed in Styrofoam or metal container (locally termed “bañera”) filled with ice. Processed fish (e.g., deboned) are packed in well-sealed plastics.

Improved Equipment. The application of improved equipment is relatively high among producers of rice (75%), corn (62%) and milkfish (72%) **(Table 6).** In the case of rice producers, this includes the use of mechanized technologies such as tractors, mechanical transplanters and combine harvesters, although most of these are through the custom hiring service. For corn, improved equipment includes the use of chemical sprayers

and corn shellers, among others. In broiler chicken, about 3% use improved equipment. In the case of hogs, about 2% of producers and 25% of traders use improved equipment.

Improved Transportation and Cold Storage. All hog traders have used improved practices in transportation, particularly the use of vehicles and proper handling and restraining of animals and tools to minimize stress during transport. Approximately 8% of traders use dressing machines as a form of improved equipment. For coco-sugar, 24.20% of producers and traders use improved transportation while none used any cold storage facilities or improved equipment.

Table 6. Number of individuals using improved packaging, equipment, transportation, or cold storage

	Description	Rice			Corn			Hogs			Chicken			Milkfish			Coco Sugar		
		Producer	Trader	Total	Producer	Trader	Total	Producer	Trader	Total	Producer	Trader	Total	Producer	Trader	Total	Producer	Trader	Total
1	No. of individuals adopting Improved Packaging	818	303	1,121	7,318	1,859	9,177	0	0	0	141	0	141	2,609	327	2,936	885	300	1,185
	Percent of total population	9.82%	3.63%	13.45%	19.09%	4.85%	23.94%	0.00%	0.00%	0.00%	1.88%	0.00%	1.88%	79.80%	10.00%	89.80%	29.52%	10.00%	39.52%
2	No. of individuals adopting Improved Equipment	6,250	25	6,275	22,582	1,162	23,743	76	0	76	177	63	240	2,021	327	2,348	0	0	0
	Percent of total population	75.00%	0.30%	75.30%	58.91%	3.03%	61.94%	0.27%	0.00%	0.27%	2.34%	0.83%	3.18%	61.80%	10.00%	71.80%	0.00%	0.00%	0.00%
3	No. of individuals adopting Improved Transportation	3,454	480	3,934	9,827	2,556	12,383	305	700	1,005	248	0	248	177	327	504	479	247	726
	Percent of total population	41.45%	5.76%	47.21%	25.63%	6.67%	32.30%	1.09%	2.50%	3.59%	3.28%	0.00%	3.28%	5.40%	10.00%	15.40%	15.97%	8.24%	24.20%
4	No. of individuals adopting Cold storage	0	0	0	0	0	0	76	0	76	283	0	283	579	327	906	0	0	0
	Percent of total population	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.27%	0.00%	0.27%	3.75%	0.00%	3.75%	17.70%	10.00%	27.70%	0.00%	0.00%	0.00%

Note: +/- 7.5% Margin of Error; Coco sugar is based on complete enumeration

3.1.3 Farms, Firms and Laboratories with GAP, GMP, HACCP, or ISO certification

(Baseline for CI-2: Number of farms/firms/ laboratories with GAP, GMP, HACCP, or ISO certification)

The study found very limited number of farms and firms with GAP, GMP, HACCP or ISO certification, regardless of commodities (**Table 7**). This is not surprising especially for products sold in primary form as the market has not yet significantly incentivized compliance to the standards. Compliance to standards is higher among processors as products become more differentiated (such as in the case of coco sugar) and for large commercial farms such as in the case of most hogs, broiler chicken and milkfish growers.

In Bukidnon, the survey found only 0.32% GAP certified rice farms and none for corn. There were 49 corn producers who claimed they were applying GAP, but none is certified. To be certified for GAP, farmers must apply the complete package of practices prescribed under this

certification. The survey found that most farmers apply only certain components of the package, and there was no conscious effort to comply with all the requirements. In most cases, the GAP compliant practices being applied by farmers were actually part of their traditional practices which happened to be the same practices prescribed under GAP.

In the case of hogs, the estimated baseline proportion of farms/firms/laboratories that are HACCP certified is 0.91%. While 33% of farms are aware of the GAHP, survey results showed that 45% are actually practicing components of GAHP without realizing them. For broiler chicken, the standard applicable to raising poultry is embodied in PNS/BFAR 84:2016 Code of GAHP for Chickens – Broilers and Layers. Survey results of broiler farms revealed that 10.94% of respondents claimed to be GAHP-certified. The proportion of producers who are aware of GAHP is 32%, and those practicing GAHP but not all its components is around 30%. Almost all respondents are willing to adopt the standard. About 4.69% of farmers reported that they have HACCP-certification.

In the case of milkfish, there were 6 producers with certification for GAP and three processors with HACCP certification. Two of these three HACCP milkfish processors are actually the largest seafood processors in the Philippines, namely the Anjo Farms in San Fabian and Korea-Philippines Seafood Processing Complex in Dagupan, Pangasinan.

The standard for coco sugar is provided in PNS/BAFPS 76:2010 for Coconut Sap Sugar which establishes the system of grading and classifying commercial coconut sap sugar obtained from fresh sap tapped from unopened inflorescence of coconut trees. Other standards are on GAP, HACCP, Organic Agriculture (OA), and FDA. The baseline survey was able to document 62 producers and 4 traders that have standard certifications. All 62 producers certified OA, while some traders are HACCP and FDA certified.

Table 7. Number of farms/firms/laboratories with GAP, GMP, HACCP, or ISO certification

Certification	Rice		Corn		Hogs		Chicken		Milkfish		Coco Sugar	
	Producer	Trader	Producer	Trader	Producer	Trader	Producer	Trader	Producer	Trader	Producer	Trader
GAP	23	0	0	0	NA	NA	NA	NA	NA	NA	0	0
%	0.30	0.00	0	0.00	NA	NA	NA	NA	NA	NA	0.00	0.00
GAHP	NA	NA	NA	NA	535	0	743	0	NA	NA	NA	NA
%	NA	NA	NA	NA	2.12	0	10.94	0.00	NA	NA	NA	NA
GAqP	NA	NA	NA	NA	NA	NA	NA	NA	59	0	NA	NA
%	NA	NA	NA	NA	NA	NA	NA	NA	2.00	0.00	NA	NA
HACCP	0	0	0	0	229	467	318	0	0	0	0	2
%	0.00	0.00	0.00	0.00	0.91	16.67	4.69	0.00	0.00	0.00	0.00	11.76
Organic Agriculture	0	0	0	0	0	0	0	0	0	0	62	0
%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33.33	0.00
ECC	0	0	0	0	0	78	0	0	0	0	0	0
%	0.00	0.00	0.00	0.00	0.00	2.78	0.00	0.00	0.00	0.00	0.00	0.00
NMIS	0	0	0	0	0	700	0	147	0	0	0	0
%	0.00	0.00	0.00	0.00	0.00	25	0.00	19.44	0.00	0.00	0.00	0.00
FDA	0	0	0	0	0	0	0	0	0	99	9	2
%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.31	0.00	11.76

Note: +/- 7.5% Margin of Error; Coco sugar is based on complete enumeration

3.1.4 Volume and Value of Annual Sales of Farms and Firms

(Baseline for Indicator SI-19: Annual volume of production; and SI-18: Annual Value of sales of farms and firms)

The baseline value of total annual sales (**Table 8**) of rice producers in Bukidnon was estimated at USD 51,381,182 or an average annual sale of USD 6,851 per producer per year. For corn, the baseline total annual sale was USD 138,215,028 or USD 4,018 per individual. The total value of annual sales of producers for hogs in Batangas is USD 670,308,388 or USD 26,600 per individual grower, while that for broiler chicken is USD 463,126,838 or USD 68,911 per grower. There are many large commercial growers of hogs and broiler chicken in Batangas, which explains the large values of sales. For milkfish in Pangasinan, the baseline total annual value of sales from producers is USD 367,982,355 or USD 131,157 per individual grower. Production of milkfish is typically in large commercial operation, which explains the large value of sales per individual operator. For coco sugar in Davao del Sur and Misamis Oriental, total value of sales is USD 39,920,759 or USD 14,785 per individual.

The baseline values were generated from the baseline volume of production shown in **Table 9**. The data reflect the volumes of production per year per individual producer. In the case of rice and corn where there are two cropping cycles per year, the indicated volume may be divided by two to get the volume per cropping cycle, which may be further divided by the average farm size to get the volume per hectare. Using 1.5 and 1.2 as the respective average rice and corn hectarage in Bukidnon, the estimated baseline yield per hectare is 3.4 MT for rice and 3.6 MT for corn. The Philippines Statistics Authority (PSA) data on rice and corn from 2010 to 2020 showed that average yield may fluctuate between 3.5 MT/ha to 4.5 MT/ha for irrigated rice and 2.8 MT/ha to 3.2 MT/ha for rainfed rice. For yellow corn, the average yield in the Philippines may fluctuate from 3MT/ha to 4MT/ha. The estimated baseline for rice and corn in Bukidnon are very close to the actual values, attesting to the accuracy of the baseline estimation process employed in the study.

Table 8. Value of annual sales of farms and firms

Commodity	Producer		Trader		Total	
	Total Annual Sales, in USD	Average Sales per Individual, in USD	Total Annual Sales, in USD	Average Sales per Individual, in USD	Total Annual Sales, in USD	Average Sales per Individual, in USD*
Rice	51,381,182	6,851	79,086,014	94,907	130,467,197	15,656.68
Corn	138,215,028	4,018	157,709,634	41,142	295,924,662	7,719.84
Hogs	670,308,388	26,600	904,168,109	332,171	1,574,476,497	56,231.30
Chicken	463,126,838	68,911	374,838,104	525,957	837,964,942	111,047.56
Milkfish	367,982,355	131,157	190,742,586	583,311	558,724,941	170,863.89
Coco Sugar	39,920,759	14,785	39,942,751	133,143	79,863,511	26,621.17

Note: +/- 7.5% Margin of Error; Coco sugar is based on complete enumeration

***Computed as the total value of sales divided by the value chain population presented in Table 4.**

Table 9. Volume of commodities sold by farms and firms

Commodity	Producer		Trader		Total	
	Total Volume, in MT	Average Volume per Individual, in MT	Total Volume, in MT	Average Volume per Individual, in MT	Total Volume, in MT	Average Volume per Individual, in MT*
Rice	77,040	10.27	53,461	64.16	130,501	15.66

Commodity	Producer		Trader		Total	
	Total Volume, in MT	Average Volume per Individual, in MT	Total Volume, in MT	Average Volume per Individual, in MT	Total Volume, in MT	Average Volume per Individual, in MT*
Corn	298,113	8.67	267,800	69.86	565,913	14.80
Hogs	118,707	4.71	306,695	112.67	425,402	15.20
Chicken	108,915	16.21	58,535	82.13	167,450	22.20
Milkfish	90,804	32.36	36,924	112.92	127,728	39.06
Coco Sugar	7,878	2.92	4,309	14.36	12,187	4.06

Note: +/- 7.5% Margin of Error; Coco sugar is based on complete enumeration
***Computed as the total volume of sales divided by the value chain population presented in Table 4.**

3.1.5 Food Safety Risk Management Plans Implemented for the Industry (Baseline for Indicator SI-11: Number of host government or community-derived risk management plans formally proposed, adopted, implemented, or institutionalized)

The baseline study found there were 16 host government or community-derived risk management plans formally proposed, adopted, implemented, or institutionalized (**Table 10**).

Table 10. Number of host agencies with risk management plan

RMP Phase	Community	Government	Total
Adopted	1	0	1
Implemented	1	7	8
Institutionalized	0	5	5
Proposed	0	2	2
Total	**2**	**14**	**16**

3.2. Findings on Value Chain Assessment (Situational Analysis)

This section presents the value chain analysis by commodity focusing on the value chain maps; level of postharvest loss, SPS conditions and risks; organizational performance and risk management capacity of potential B-SAFE partners such as host government agencies and communities; and potential for collaboration among value chain actors.

3.2.1 Rice in Bukidnon

The rice value chain in Bukidnon is depicted in **Figure 3**. The various nodes include input provision, production, aggregation, milling/processing and various stages of trading up to final sales to consumers. Input provision and production are the upstream part of the chain.

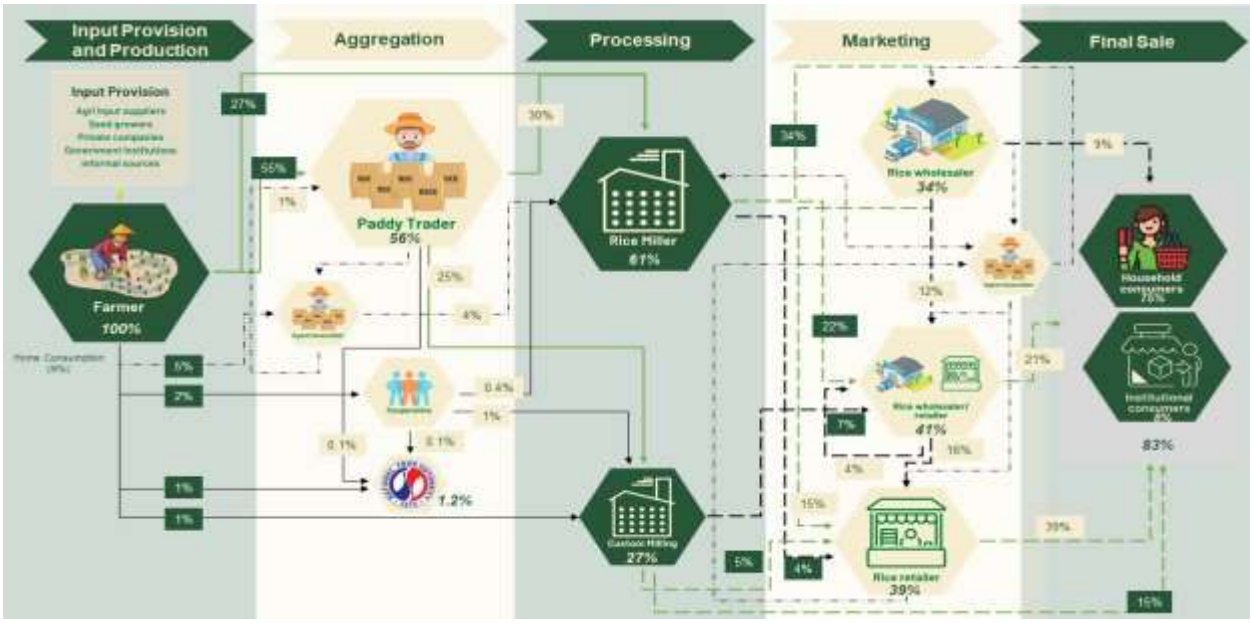


Figure 3. Rice value chain, Bukidnon, 2021

Input Provision. The major players are the seed growers, agri-input suppliers, private companies, and government organizations, particularly the DA which has been distributing hybrid and certified seeds as part of its support to farmers. There are farmers who also grow their own seeds. Among the popular inbred seeds in Bukidnon are RC 18, RC 216, RC 15 and RC 222, the genetic material of which are either from the local office of the DA or Philippine Rice Research Institute (PhilRice). A popular inbred sourced from agri-supply dealers is RC 358. For hybrid seeds, the popular ones include LP 937, TH 82, and US 88, all from DA and the M11 hybrid from PhilRice.

Production. Land preparation is done by farmers either using animal, machine or a combination of animal and machine labor. For machine labor, especially in the case of smallholder rice producers, this is usually through the custom hiring services. Large rice producers often have their own farm machineries. Cultural management include fertilizer application and pesticide spraying. Most farmers mainly use inorganic fertilizer. Other farmers use organic fertilizer such as bagasse from the sugar central which is applied before planting. In addition, 2 bags of 46-0-0, then 2 bags of 16-20-0 are applied at flowering stage. Carbonized rice hull is also used, which is effective in controlling snails. Foliar fertilizer is used after flowering. Rice is harvested after 100 to 110 days, dried to 14% moisture content mostly using solar dryers, while others, especially the large ones, use mechanical dryers. About 4 metric tons is produced per hectare with about 5 percent losses from harvesting to drying. There are commonly two cropping cycles per year.

Aggregation. Paddy traders dominate the aggregation part of the value chain buying as much as 56% of total output. Other players at the paddy aggregation stage include agents/assemblers, cooperatives, and the local National Food Authority (NFA), albeit the volume that passes through this channel is small.

Milling. Large rice millers who buy paddy, mill this and sell rice to wholesalers in various parts of the province and even outside the province dominate the processing stage of the value chain. There are also smaller custom millers who just offer milling services to farmers. Rice from Bukidnon is sold and consumed mostly in the province, but a significant portion is also sold to other provinces and reaches as far as Manila.

Government Rice Procurement. For the government rice procurement through the NFA, there are five existing warehouses in Bukidnon. The NFA Warehouse in Aglayan, City of Malaybalay has a capacity of 50,000 bags, the warehouse located in Valencia has 100,000-bag capacity and another in Kalilangan with 50,000 bags. There are three NFA Warehouses located in Maramag: the Musuan Triplex has a capacity of 500,000 bags, Maramag-Main with 100,000 bags and Maramag Annex with 250,000 bags.

Level of Postharvest Losses, SPS Conditions and Risks

Postharvest Losses. – Based on the survey, the level of annual postharvest losses in rice in Bukidnon is about 3.2 percent from harvest to drying. Based on KIIs, it is estimated that another 4 percent is lost in milling and trading (**Table 11**). Thus, total losses from harvest to final sale to consumer can be around 7.2 percent. This approximates the losses reported in earlier studies (Dela Cruz, R. and G. Calica, 2016). Post-production losses occur during threshing and drying (especially using pavement in drying) while in milling it is primarily due to spillage and machine inefficiency. Decay and pest infestation are the major causes of losses during storage.

Table 11. Percentage of postharvest losses, rice, Bukidnon

Cropping	Harvest to Drying (%) 1/	Milling to Final Sale (%) 2/	Total
1st	**1.83**	**2**	**3.83**
2nd	**1.37**	**2**	**3.37**
Annual	**3.20**	**4**	**7.20**

1/ Values are based on farm survey; 2/ Values are based on KIIs

Food Safety Risks. – There are food safety risks along the entire rice value chain that should be given adequate consideration. Contaminants in rice include agricultural chemicals, foreign materials such as glass, metal, sticks, stones, and unwanted grains. In addition, the rice might be contaminated with insects, molds, mycotoxins, or bacteria. The Bureau of Agriculture and Fisheries Standards (BAFS) prescribes a national standard for rice. The standard moisture content should be 14% or lower to prevent bacterial and molds infestation. For heavy metals, the maximum safety levels for rice were set for arsenic (0.20-0.35 mg/kg), cadmium (0.40 mg/kg), lead (0.20 mg/kg), and for aflatoxin (20 ug/kg). The maximum residue limits for pesticides was also set for microbial contaminants such as *Bacillus cereus* at 100 CFU/g (Food Safety Measures for Rice: Memorandum Circular 2020). Examples of maximum residue limits for common pesticides include bentazone (0.10mg/kg), and carbosulfan (0.20mg/kg).

GAP Awareness and Adoption. – The primary SPS for rice is PNS/BAFS 141:2019 which is the Code of Good Agricultural Practices for Rice. It prescribes a set of good practices in all operations including farm location, environment, structures and facilities, farming practices, worker's health, and farm management. However, only 0.30 % of rice farms in Bukidnon are GAP certified. About half of the surveyed farmers claimed to be aware of GAP and 32% claimed they were adopting GAP practices **(Table 12)**. When asked if they are willing to adopt GAP, majority (76%) of the surveyed farmers answered in the affirmative. This begs the question of why there is very limited GAP certification despite the various programs to promote GAP.

Table 12. Awareness, practice, certification, and willingness to adopt GAP, rice farmers, Bukidnon

Awareness/Practice/Certification	Number Reporting	Percentage
Aware of GAP		
Yes	166	50.3
No	161	48.8
Practicing GAP		
Yes	105	31.8
No	207	62.7

Awareness/Practice/Certification	Number Reporting	Percentage
GAP Certified		
Yes	7	2.1
No	315	97.9
Willing to Adopt GAP		
Yes	251	76.1
No	76	23.0

The study found that those who claimed to be adopting GAP are often just practicing a few components of it, which happened to be their traditional practices. It was obvious that farmers did not know that

GAP is a package of good practices and that adoption of just one or two components of it would not merit certification. On area assessment for instance, which is integral to the GAP package of best practices, a majority (58%) of farmers do not know how to do the assessment **(Rice Appendix Table 1)**. A large majority (65%) also lack knowledge on agricultural water management. More information campaigns and even trainings would be needed to improve farmer's understanding of the GAP standard.

Factors Affecting GAP Adoption. – To enhance the chance of success of promoting GAP, the study examined what characteristics of farms/farmers would have greater likelihood of adopting GAP certification. This was done by specifying and estimating a Probit model relating willingness to adopt with some farmer's and farm's characteristics. Results showed that farmers are more likely to adopt GAP if they own their farm; the farm is irrigated; they have access to agricultural insurance; farm-to-market roads are in good condition; and if the farmer is a member of a farmers' organization (see **Rice Appendix Table 2** for the probit model and results).

Organizational Performance and Risk Management Capacity of Host Government Agency Partners and Communities

Organizational Performance. – From the KIIs, there were at least 3 government institutions with risk management plans being implemented: the Provincial Agricultural Office (PAO) of Bukidnon, the DA Regional Field Office of Region 10 (DA RFO 10), and the City Agricultural Office (CAO) of Valencia City. The Bukidnon provincial and city LGUs are promoting GAP and OA as part of their food security programs. Trainings on GAP are conducted in collaboration with the Agricultural Training Institute (ATI). On GAP certification, the PAO provides coaching/advise and technical guidance while the Municipal LGUs, specifically the Municipal Agricultural Office (MAOs) assist farmers in having their farms certified. Despite these initiatives, only 2.1 % of rice farms are GAP certified.

Other Food Safety/Quality Risks. – Other production and food safety/quality risks identified in Bukidnon include rice black bug (RBB) infestation and improper branding of rice (rice presented/sold as organic). In response, local agencies and government units have implemented various initiatives. For RBB infestation, the regulatory division of DA RFO 10 undertakes the following: (a) continuous monitoring of RBB infestation; (b) dissemination of information to farmers and public, including the results from surveillance and monitoring of RBB; (c) training and information dissemination on Integrated Pest Management (IPM); (d) conduct of ocular inspection and surprise farm visits; and (e) promotion of synchronized planting in irrigated rice areas threatened by RBB, as practiced in most areas in the cities of Valencia and Malaybalay. Synchronized planting is practiced by farmers in contiguous areas/ farm lots included in lateral irrigation canals and organized by the National Irrigation Administration, whose farmer members own the farms near or around the canals. Current practice of synchronized planting with improved or scheduled release of water for irrigation 14 days before and 14 days after planting, enables farmers to plant/harvest rice twice a year.

The CAO - Valencia also has rice monitoring teams conducting ocular inspection, monitoring, and reporting of pest incidence and providing advice to farmers. The CAO conducts massive information dissemination before the full moon for farmers to be vigilant in protecting their crops. Once infested, farmers are advised to get rid of RBB using the solar dryers which are converted to covered court with lights that attract RBB. It also distributes bio-control agents such as *Trichogramma spp.* for stem borers and green muscardin. The CAO supports the *Bantay Peste* Brigade (Pest Guards) composed of trained farmers on IPM in rice, corn, vegetables in upland/lowland areas, and monitors pest infestation in the barangays.

The PAO promotes and implements IPM in rice to prevent RBB infestations. Budgets for IPM trainings at the local levels are sourced from DA's Rice Competitiveness Enhancement Fund. Topics include the *PalayCheck* system in rice production as developed by PhilRice, cultural practices in management of RBB, and use of rice varieties resistant to tungro, among others. The PAO also conducts Information, Education and Communication (IEC) campaign on the importance/ benefits of IPM to discourage farmers from applying toxic chemicals and pesticides in their farms.

In the case of organic rice, an important issue is the practice of some farmers to claim their produce as organic although their farms have no OA certification. To address this, the CAO established an internal control system for still-to-be certified claims of organic rice, calling the output of these farms as "organically grown rice". The certifiers for first-party organic certification visit/monitor the farms and output of farmers and conduct surprise visits.

Risk Management Capacity. – The technical capacity of local agencies and LGUs in Bukidnon to deal with the identified risks appears adequate. From the KIIs, the major limitation is with the budget needed to fund the field personnel involved in GAP promotion and pest monitoring, training support for farmers on GAP, OA and other food safety concerns, and provision of assistance to farmers and communities in terms of needed pre and postharvest facilities and equipment. This includes support to farm storage facilities (GAP requires farms to have storage areas for farm inputs, pesticides, etc.), mechanical dryers to minimize losses especially during inclement weather and to minimize use of pavement in drying. The DA has been providing support to DA RFO 10, LGUs and farmers associations from the Rice Productivity Enhancement Fund under the Rice Tariffication Law. However, the support is still inadequate to meet the needs of the farmers.

Potential Collaboration Among Value Chain Actors

Among Local Government Agencies and LGUs. – Partnerships and collaboration among DA agencies and DA RFO 10 are implemented through the DA's national banner programs. Collaboration exists among DA, ATI, National Irrigation Administration, Fertilizer and Pesticide Authority (FPA) and LGUs; and among DA RFO 10, Department of Science and Technology (DOST), Department of Health (DOH), and FDA.

Among Government Agencies and the Private Sector. – The LGUs and the private sector companies and farmers' associations collaborate in many areas, including the following: inter-agency collaboration on food safety at the regional level (DA, DOST, DOH, FDA, etc.) and on training and orientation on GAP and OA; education of farmers on the dangers of chemicals; provision of farm inputs such as seeds, biocontrol agents, fertilizers and farm machinery; assistance to farmers' association in the establishment of Rice Processing Center, organic certification through first party certification (or Participatory Guaranty System) and marketing support through Organic Trading Post. The DA's assistance to cooperatives in terms of postharvest machineries/equipment are well acknowledged but not sufficient to address the needs of farmers. For seed production, the provincial DA also collaborate with the Bukidnon Seed Growers Association, MU Seed Net, Hybrid Seeds Companies and PhilRice CMU are partners for seed production. The Provincial Local Government Unit (PLGU) also provides such facilities as: Techno Demo Center, Technology Livelihood Development Center, Mini Nursery, and Vermi Compost Demo. On the other hand,

the Municipal and City Local Government Units (M/CLGUs) provide the soils laboratory, Bio-N mixing plant, nurseries, and vermi compost.

Among Private Entities. – One collaboration uncovered in the KIIs was the case of a lead firm model of value chain collaboration. This is an interesting model especially for its potential to pave the way for consolidated rice farming. The collaboration is between a large rice miller (the Acosta Rice Mill in Maramag, Bukidnon) and about 35 small rice farmers. The rice miller organized 35 small rice farmers (total of 60 hectares) and provides them with PhP15,000 loan every cropping season. She also provides all the production inputs as an in-kind loan. She hired agricultural technicians as extension workers to work closely with the farmers, supervise all the technical aspects of production and ensure that inputs are properly applied. She encourages minimal use of inorganic inputs and pesticides although the farms are still employing conventional (not organic) production systems. The farmers provide the needed labor and manage their own farms. The harvest is sold to the miller. The model appears successful as the miller reported during the KII that the farms have been generating high yields and lower production cost, therefore higher profits for the farmers and for her.

This may be considered as a lead firm model of value chain collaboration. Large private firms in the value chain which exert much influence on the smaller players may be tapped to lead value chain improvement measures, especially in ensuring food safety and productivity of the entire value chain.

3.2.2 Corn in Bukidnon

The value chain map of corn in Bukidnon is shown in **Figure 4**. The value chain functions include input provision, production, and aggregation at the barangay and municipality levels, primary and secondary processing, trading, and final sales.

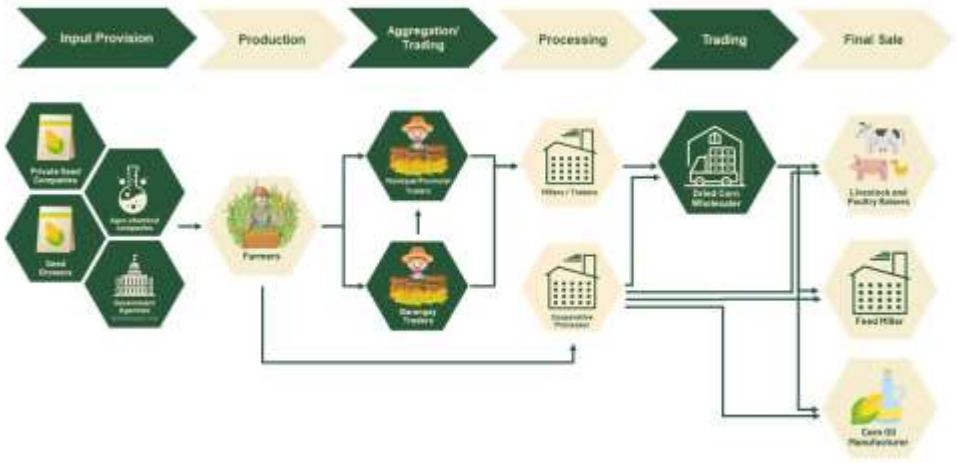


Figure 4. Value chain of corn, Bukidnon, 2021

Input Provision. The major inputs in producing yellow corn in Bukidnon are seeds, fertilizers, and chemicals. The popular brands of seeds are Pioneer, Bioseed, Evogene and Maharlika. Seeds of Pioneer and Bioseed are registered at the National Seed Industry Council (NSIC) as genetically modified organisms, while the others are not but are also resistant to corn borer and glyphosate herbicide. Fertilizer and pesticides are easily sourced from a large number of agro-chemical dealers/stores all over the province.

Production and Post-Production. This stage includes land preparation (i.e. plowing and harrowing), planting, nutrient management, water management and pest management (including weeds), among others. The crop is harvested 95-120 days after planting. Post-production practices include shelling, drying and storage.

Aggregation. There are many types of yellow corn traders in Bukidnon depending on scale of procurement and business set-up. Relatively small traders are known as barangay or village level traders while the larger ones are known as municipal/provincial traders. An important intermediary or facilitating agency of the yellow corn supply chain in Bukidnon is the cooperative-processor. An example of this is the Farm Cooperative Incorporated, which owns and operates several postharvest facilities such as mechanical driers and trucks. It offers drying and trucking services to its farmer members for a fee.

Marketing. Dried corn is sold by farmers and traders to local feed millers. These feed millers, such as BMeg, CJ Feeds, and Mambatangan Milling Corporation have business operations in the province of Bukidnon. Others are sold outside Bukidnon, such as the Bounty Agro Ventures and Pronatural Feed Corporation, which are operating in Cagayan de Oro City.

Level of Postharvest Losses, SPS Conditions and Risks

Postharvest Losses. – Based on the survey, the level of annual postharvest losses in corn in Bukidnon is about 8 percent from harvest to drying and storage. It was also learned, albeit from KIIs that another 4 percent is lost in milling and trading (this is just an estimate). Post-production losses occur during threshing and drying (especially using pavement in drying) while in milling it is primarily due to spillage and machine inefficiency. Decay and pest infestation are the major causes of losses during storage (**Table 13**). The estimated losses approximate those reported in earlier studies (Dela Cruz, R. and G. Calica, 2016)

Table 13. Percentage of postharvest losses, corn, Bukidnon

Cropping	Harvesting, Milling, Drying and Storage (%) 1/	Milling, Storage, Transport to Final Sale (%) 2/	Remarks
1st	4	1 to 3	Major losses occur during shelling and drying (especially during inclement weather). Storage losses are due mainly to rat infestation or when the pile gets wet.
2nd	4	1 to 3	
Annual	8	2 to 6	

1/ Values are based on farm survey; 2/ Values are based on KIIs

Food Safety Risks. – The main food safety risk in corn is aflatoxin. This is a group of highly poisonous and carcinogenic compounds which are produced by strains of the fungi, *Aspergillus flavus* Link and *Aspergillus parasiticus* Speare. The Code of Practice for the Prevention and Reduction of Aflatoxin Contamination in Corn (PNS/BAFS 27:2018) was developed to provide uniform guidance for all corn stakeholders, as well as serve as common reference for compliance to GAP for corn, both for human and animal consumption.

Other food safety concerns include the lack of separate structure for the safe storage of farm inputs such as pesticides and fertilizers; improper use of herbicide especially for the round-up ready genetically modified corn, which is a concern in terms of pesticide residues and adverse effect to the environment especially in sloping areas due to soil erosion and landslides; and the use of 'sigue-sigue' seeds (cross pollinated genetically modified corn with the traditional varieties), with round-up ready genes from genetically modified corn but did not pass the usual regulatory system.

The relevant standards and regulations on corn are the GAP Corn, OA Certification, and the Philippine National Standards for Corn Grits (PNS/BAFPS 15: 2004). The GAP Corn is a consolidated safety and quality

standards for the production, harvesting and on-farm postharvest handling and storage of corn. The OA Certification is a set of production and handling practices prescribed for those who would like to produce and market organic corn. The PNS/BAFPS 15:2004 prescribes the classification of corn grits based on physical characteristics and practices existing in the sector. It includes sections on the essential composition and quality features, classification and grading, sampling and methods of analysis, determination of moisture content, packing, marking, contamination, and hygiene **(Corn Appendix Table 1).**

There is no GAP certified farm in Bukidnon. Certification of farms for GAP is based on a package of practices that have to be complied. While some farmers claim that they are applying GAP, they usually fail during inspection as there are components in the package which have not been adopted. The Bureau of Plant Industry (BPI) has a GAP inspection team for the GAP certification; they pre-assess, monitor, and inspect the farms that are applying for GAP certification.

The reasons for low adoption of GAP among corn farmers is similar to those of rice farmers. There were a very limited number (only 7.3%) of corn farmers who have attended GAP trainings **(Table 14)**, and very few have also attended trainings on OA and Farmer Field Schools where GAP and other food safety compliant production practices are discussed.

Table 14. Food safety and productivity related trainings attended by corn farmers and traders, Bukidnon

Trainings Attended by Corn Farmers (n=191)	Number	Percent of population
GAP	14	7.3
Organic Agriculture	12	6.3
Farmer Field School	33	17.3
Food Handling	18	35.3

Other Risk Factors in Corn Production. – An important risk factor in corn production is the FAW infestation. The pest is an enormous threat as it could devastate an entire production. However, the problem remains under control due to the effort of the DA RFO 10 on surveillance, monitoring and timely control measures. Synchronizing production may be necessary for more effective control. Consolidated farming is not yet being practiced but may prove to be a viable measure in the future to synchronize operations, especially on pest management and to avail of economies of scale.

Assistance Needed by Corn Farmers. – A large majority (70%) of corn farmers in Bukidnon expressed their need for trainings and farm demonstrations on GAP and other practices that can improve productivity. A significant percentage also said they need assistance for the procurement of corn shellers (21%); seeds, chemicals, and fertilizer (16.7%) and tractors (14.5%). There were also those (14.5%) who need agricultural loans to finance their operation (**Table 15**).

Table 15. Assistance needed by corn farmers, Bukidnon

Assistance Needed	Number	Percent of Population
Seeds/Chemicals/Fertilizer	55	16.7
Training/Farm Demonstration	231	70.0
Shellers	68	21.0
Tractor	48	14.5
Agricultural Loans	48	14.5
Crop Insurance	8	2.4
Dryer	25	7.6

Organizational Performance and Risk Management Capacity of Host Government Agency Partners and Communities and Potential Collaboration Among Value Chain Actors

Corn and rice farmers face almost identical production and post-production challenges as well as food safety and quality risks. Hence in Bukidnon, the local government agencies and local government units always place these commodities under a single program. The possible government agency partners of B-SAFE will therefore be the same for the two commodities. The discussion on organizational performance and risk management capacity of host government agency partners in rice (see earlier section) also applies for corn. As supplementary information though, this section highlights the role of PhilMaize and its representative organization in Bukidnon, which is the *Impasugong Samahang Nayon* (ISN).

PhilMaize and ISN. PhilMaize is a national corn farmers association which significantly contributed to the formulation of GAP in corn production seven years ago. In Bukidnon, its member cooperative is ISN. This cooperative organized a cluster of 350 hectares of adjacent corn farms from its 250 members. The cooperative provides post-harvest facility, up to date market information, and gives advice to members to improve their capacity. The farmer members of the cluster still manage their own farms, but much coordination and synchronization of activities is realized as a result of clustering. There is still no consolidated farming model for corn in Bukidnon, albeit this model may pave the way for widespread adoption in the province.

3.2.3 Hogs in Batangas

The hogs value chain in the province of Batangas is made up of four major nodes: input suppliers, producers, traders and processors, and consumers (**Figure 5**).

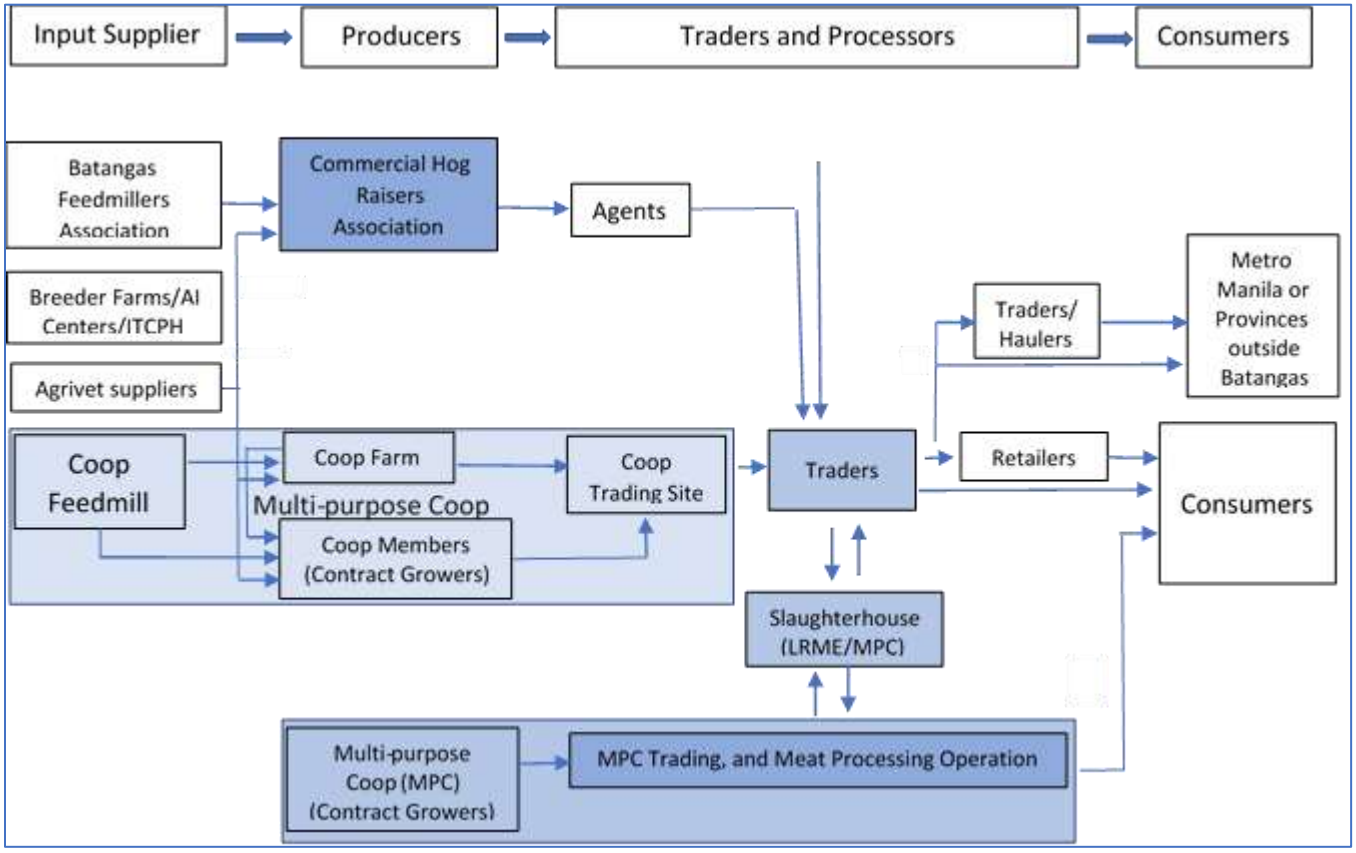


Figure 5. The supply chain of hogs and the three identified value-chain maps

Input suppliers. The chain starts with input suppliers, which are the feed mills and breeder farms. Feed constitutes 65% to 80% of the cost of production while breeding stock or piglets account for 15-25%.

About three fourths of hog raisers source their feed from commercial feed millers which are members of the Batangas Feed Millers Association; 23% from cooperatives and associations who operate their own feed mills; and 2% have their own feed mills. A small number of smallholder farmers give swill feeds sourced from within the locality or neighborhood. Farmers use both AI and natural breeding practices. Semen for AI for may come from ITCPH, AI centers of LGUs, and in Europhil Swine Genetics in Ibaan as the main commercial source. Producers source other inputs such as biologics from agrovets and agrodealers.

Pig Producers. Smallholder farmers are either independent producers or members of producer organizations or cooperatives which help in providing technical support, input supplies, logistics, and market facilitation, among others. Backyard raisers who are members of cooperatives, such as the SIDC serve as contract growers, locally dubbed as the '*paiwi*' system. The cooperatives provide farmers with the grower stock, sometimes with other inputs such as feed and other supplies, and buys back the market/finishing hogs, sells the animals, and takes their share, which is usually about 40 to 50% of net income. Large hog raisers are independent producers, contract growers or integrators. Some are members of hog raisers association, such as the UNIBAT or connected to large companies. Integrators are those involved in hog production and post-production operations such as trading and primary or secondary meat processing activities. Majority of the farmers use improved breeds, while only 5% use native breeds.

Traders and Processors. Majority (94%) of farmers sell their hogs live to traders, while the rest venture into direct selling of carcass and meat cuts (**Hogs Appendix Table 1**). Survey data showed that 75% of traders slaughter the hogs in abattoirs within the province before distributing them within the province (**Hogs Appendix Table 2**). Other traders are agents or animal haulers who transport live animals to other parts of the province, neighboring provinces, and Metro Manila.

Pork Trading Standards and Regulations. A number of standards for meat quality and safety have been set by the government, including the PNS for Organic Agriculture; Good Animal Husbandry Practices; Pork Cuts; and Slaughtering Hogs Grading. Regulations are also in place such as the Rules and Regulations on Hygienic Handling of Newly Slaughtered Meat in Meat Markets; Guidelines on Good Hygienic Slaughtering Practices of LRMEs; Rules and Regulations on Humane Handling in the Slaughter of Animals for Food; and the Meat Inspection Code of the Philippines.

Level of Postharvest Loss, SPS Conditions and Risks

African Swine Flu. – ASF is a devastating and highly contagious hemorrhagic viral disease of domestic and wild pigs of all ages. Mortality can be as high as 100%, and there is currently no vaccine or any form of treatment. The Bureau of Animal Industry (BAI) has formulated the ASF Contingency Plan of 2019 to prevent and counter the spread of ASF. The Plan spells out protocols for risk analysis, preventive strategies, early warning, and control and eradication, among others. Survey results have shown that affected farms can lose up to 70% of their hogs due to the disease.

Compliance to GAHP. – While the survey results showed that many are aware of GAHP in production, trading, and processing, many are not practicing them. Regular inspections by LGU Veterinary Offices are needed to ensure biosecurity measures are in place in the backyard farms, as well as ensuring that they adopt GAHP. According to the KII in Tanauan, more than 50% of livestock growers in the area are now GAHP certified. They are targeting a 75% milestone with the DA Repopulation Program. Before the end of 2021, they target to repopulate all farms, with 75% following GAHP.

Movement of animals and the threat of ASF. – To ensure disease-free animals, the Provincial LGU conducts the following activities: accreditation and certification of farms in close coordination with BAI; weekly monitoring of farms, with BAI issuing certification on ASF/disease free status of farms; issuance of

veterinary clearance and veterinary health certificates as well as shipping permits for animal transactions going out of the province; and issuance of trader's pass and temporary veterinary license to transport carriers. At the local level, Bantay ASF sa Barangay program is being implemented. The Barangay Animal Health Workers conduct disinfection and monitoring of biosecurity measures of the farms in their jurisdiction. Checkpoints are set up in entry/exit points, supported by disinfection systems.

Discrepancies in veterinary clearances, certificates and passes. – Cases of false documentations and forged signatures are reported in check points. These are reported to BAI and the National Veterinary Quarantine Services to validate the certificates. Confiscated products are returned to their originating locations.

Contamination in slaughtered meat. – The NMIS regularly inspects meat brought to NMIS accredited slaughterhouses. They are sometimes accompanied by LGUs, where random checks for the presence of E. coli and salmonella on meat are done before they are released. Another potential source of contamination are the LRMEs regulated by LGUs which are visited thrice a year. Filipino consumers also prefer "warm" or freshly slaughtered meat. However, meat should be consumed 8-10 hours after slaughtering when all the blood has been drained from the meat.

Transport and storage of meat products. – The ITCPH points out the need for cold chain facilities to be managed by cooperatives, as many of the hog raisers are members of cooperatives. With the "rebooting" of the swine industry after the ASF, the government is planning to relocate slaughterhouses from the National Capital Region to Central and Southern Luzon, thus transporting carcasses instead of live animals. According to ITCPH Head and concurrent DA National Livestock Program Lead, DA is looking at Batangas to be a "showcase of something vibrant and new farm to table concept." The concept will follow a contract growing model wherein a group of farmers with an aggregated pig population of 600 in an all-in all-out operation and complete with bio-secure facilities will have their pigs slaughtered and processed in AAA slaughterhouses and meat cutting facilities before being brought to Metro Manila.

SPS and food safety issues related to the adoption of GAHP. – The survey inquired on the level of farmer awareness, current adoption, and willingness to adopt specific GAHP requirement. Results show that there is a high level of awareness on these specific GAHP, and in some cases, farmers are not even aware that they are already practicing these, particularly the use of probiotics, water quality monitoring, and animal handling (**Hogs Appendix Table 3).** For those who are not adopting, however, there is a low level of willingness to adopt, most notably on waste management with Environmental Compliance Certificate permit and food assurance system, among others. The same trend is also observed for traders (**Hogs Appendix Table 4**).

The probability of hog farmers adopting ASF management, biosecurity measures and GAHP certification was determined using probit regression (**Hogs Appendix Tables 5, 6 and 7**). Results show that independent growers or those without contractual arrangements and those raising hogs with improved breed are more likely to adopt ASF management practices. For biosecurity measures, the variables likely to affect adoption are age, education, and improved breed. Finally, adoption of GAHP practices is affected by level of inventory of hogs, particularly weanlings to finish; distance of farm to the markets and access to agriculture insurance and sex, with males more likely to adopt than females.

Organizational Performance and Risk Management Capacity of Host Government Agency Partners and Communities (related to food safety; agency partners)

DA Regional Office 4. – The DA Regional Office conducts assessments, inspection, and monitoring for food safety to ensure farms practice GAHP. The DA Regional Office has a Regulatory Division which takes charge of farm registrations, quality control and inspection of food safety with Quality Control inspectors who conduct monitoring and surveillance of animal diseases and early warning. It also has an Integrated

Laboratory Division and a Feed Lab that tests feed samples submitted to monitor adulteration of feeds. The DA National Strategic Plan on Food Safety has been drafted but not yet cascaded to the local level. There is low level of funding for the DA Regional Office, hence no separate budget for food safety implementation and the activities are lumped along with the other programs, projects, and activities. Several staff have undergone trainings on PNS, and these learnings have been cascaded to LGUs, but there has been no training specific for food safety. The DA staff are also deputized by BAI to perform regulatory function as Regional Inspectors, Provincial Animal Feed and Biological Control Officer, Regional Welfare Officer and GAP inspectors. These Inspectors are trained on GAP, GAHP, antimicrobial resistance (AMR) practices and inspects commercial and non-commercial manufacturers to ensure Good Animal Feeding Program, inspect livestock facilities and establishments, monitor compliance to standards and environmental laws.

National Meat Inspection Service – NMIS is the government regulatory agency in-charge of inspection and regulation of "AA" or "AAA" slaughterhouses and meat cutting plants to ensure proper implementation of ante-mortem and post-mortem inspections, and the hygiene and sanitation. The NMIS evaluates the slaughterhouses in terms of adequacy of facilities and operational procedures to ensure that the meat processed therein are eligible for sale in the target markets depending on the classification of the slaughterhouse or dressing facilities. Non-accredited slaughterhouses are regulated by the Local Government Units through their city or municipality veterinary offices. The NMIS operates at the regional level. In Region 4A where Batangas is located, there are 88 meat establishments being handled by 38 NMIS meat inspectors. Twelve of these are meat establishments are found in Batangas.

Provincial and City/Municipal LGU. – The Provincial Veterinary Office (PVO) of Batangas has four divisions dealing with animal health services, animal regulatory services, animal planning and production, and administration. It implements regulatory functions for animals, meat and LRMEs; accreditation and certification of farms; and issuance of veterinary health certificates, shipping permits, trader's pass, veterinary clearance. The Office also conducts orientation on animal welfare for transportation carriers and meat inspectors as part of BAI requirements for permits of transport carriers, including treatment of animals going into slaughterhouses.

The PVO implements the Bantay ASF, an information dissemination on ASF in all LGUs. This is done through conduct of monthly meat handling seminars in all municipal LGUs; issuance of guidelines on *BalikBaboy* program in support of DA's repopulation program, together with the city and municipal LGUs; implementation of the DA Repopulation Program which includes orientation on ASF, clustering all backyard farms and testing them, depopulate if needed and repopulate. The commercial farms conduct their own testing, depopulation, and repopulation.

The city and municipal veterinary offices also implement ordinances on meat inspections and animal treatment. The Tanauan City LGU implements the repopulation of pigs covering their jurisdiction, Lipa City, and other sentinel areas. The City conducts trainings on GAHP and GMP for farmers and producers. In 2020 it formulated the LGU Plan on Food Safety which includes trainings on meat inspections, distribution of plastic chopping boards and scabbards for meat dealers. The LGU has four meat inspectors and ensures that their personnel are trained on GMP for slaughterhouses.

International Training Center on Pig Husbandry. – The ITCPH is the focal agency for all swine training and extension. It is the training arm for swine of the DA-Agricultural Training Institute. It offers both short- and long-term courses on pig farming. It promotes improved techniques and technologies in farm biosecurity, feeds and feeding management, artificial insemination, management of breeders and fatteners and other services. ITCPH conducts two trainings on pig husbandry every year for extension workers and other government entities using a standard module. One of its programs is the AI sa Barangay

which involves two boars and equipment (microscope, spermiodensimeter, refrigerator, etc.) per site, serving as a techno-demo farm and venue for training of farmers. The program is being implemented in 70-80 barangays in the country. Each barangay is required to have a 200-sow level.

Potential Collaboration Among Value Chain Actors

Based on the value chain analysis, the potential areas of collaboration among the value chain actors may revolve around 1) the repopulation program of government which will open opportunities to introduce technologies and practices related to SPS and food safety; 2) Pork-in-a box scheme, which will lessen transportation of live animals and facilitate preparations for the eventual relocation of slaughterhouses outside of the National Capitol Region; 3) capability building of regulatory agencies, LGU and stakeholders; and 4) formulation of a Food Safety Plan. Actionable and more detailed recommendations are provided in the recommendations.

3.2.4 Broiler Chicken in Batangas

The chicken value chain in the province of Batangas is made up of four major nodes: input suppliers, producers, traders and processors, and consumers (**Figure 6**).

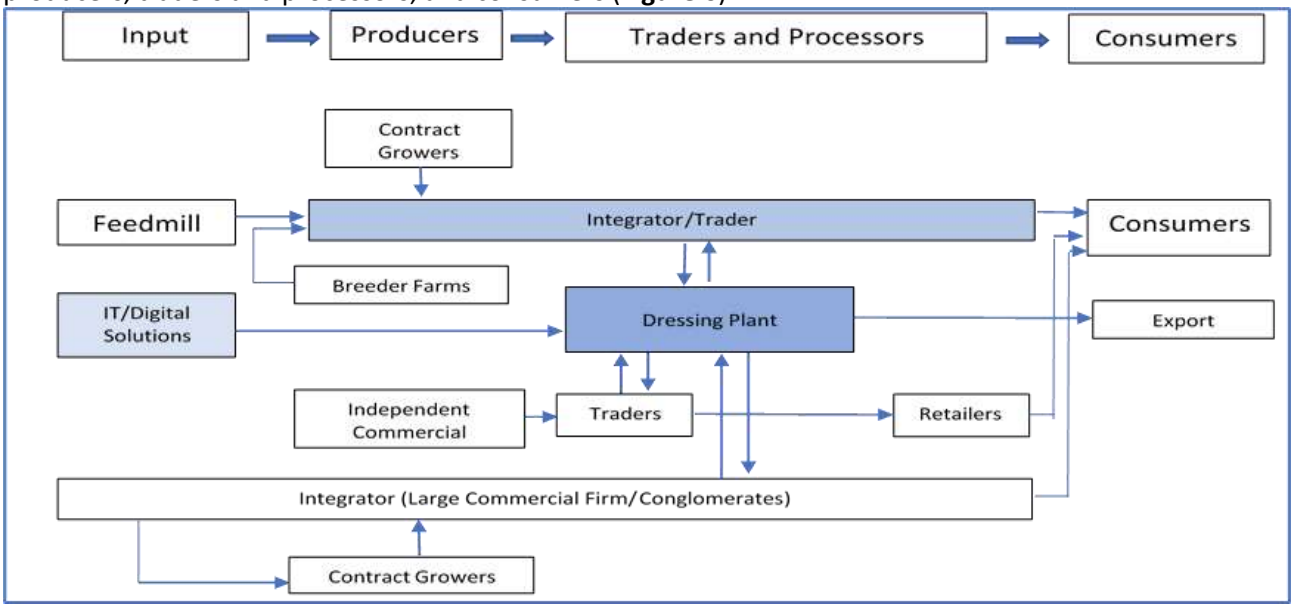


Figure 6. Broiler value chain in Batangas

Input Suppliers. – The broiler supply chain starts with input suppliers to broiler farms. These are the feed mills and breeder farms which supply feeds and day-old chicks (DOCs) to broiler producers. Producers revealed that 91% of them use 45-days (Cobbs) type of chicks, 3% use 30-35 days maturing chicks, and the rest use the chicks supplied by their contractors (**Chicken Appendix Table 1**). Majority (82%) source their chicks from registered hatcheries, 3% use chicks from their own farms/hatcheries, 7% from poultry or veterinary stores, and 4% from agents. and 4% use the chicks provided to them by the integrators whom they have contract growing arrangements with, such as Bounty Chicken, Magnolia, San Miguel, Integra, and YCP.

Feed constitutes 65 to 80% of the production cost while the DOCs account for 20 to 25%. Some broiler farms use commercial feed, but most of the big commercial broiler farmers/producers have their own feed mills or have their feed mixed by feed millers through toll mixing arrangements. An IT company also provides forecasting services to dressing plants that helps them program its operations.

Producers. – Most broiler producers in Batangas province are commercial raisers, where about 90% are classified as non-smallholder producers. Some of them are independent producers, while many are contract growers of either big companies or traders. About 83% of producers sell live chickens, while the rest undertake primary processing (dressing) (**Chicken Appendix Table 2**). Producers sell their live chickens directly to consumers (33%), processors (25%), public markets (13%), and traders (8%), and the remaining are under contract with integrators (21%). Producers sell dressed chicken to public markets (85%) and processors (15%). In this node of the chain, the stall owners and processors do the dressing of the chicken within their own facilities.

Traders and Processors. – Traders and processors take care of the post-production operation of the broiler supply chain. Traders are either agents or animal haulers (viajeros) that bring chickens to dressing plants, take the dressed chickens and pass them to the retailers in various public markets of Batangas and neighboring provinces before reaching their target consumers. Processing operations involve primary processing such as dressing of chickens, cutting, and packaging; as well as secondary processing such as marinating or adding of other ingredients or preservatives. From the survey, data show that 83% of traders sell the chicken in dressed form while 17% of traders bring live chicken to stall owners in public markets (**Chicken Appendix Table 3).**

Level of Postharvest Loss, SPS Conditions and Risks

Supply of DOCs. – The problem on the supply of pork because of the ASF outbreak in the Philippines resulted in a shift in demand for poultry meat. The increase in demand for chicken meat led to corresponding increase in broiler production. Consequently, the demand for DOCs increased and the cost went up by 250%, from PhP20 to as much as PhP50 per chick.

The survey revealed several SPS issues on chicks brought to the farm such as crippled chicks (39%), mortality (26%), diarrhea (17%), and other forms of sickness (13%). To address these, the practices of producers include culling (47%), use of antibiotics (26%), isolation (15%), and cleaning/showering (10%) **(Chicken Appendix Table 4).**

Diseases in production. – In the course of broiler production, the main risks are sickness, particularly cough/cold as reported by 67% of respondents, risk of avian flu (17%), and feed adulteration (12%). Floods and typhoons (30%) and earthquakes (9%) were also reported. Other important risks identified were the Taal Volcano eruption, increase in the prices of inputs (particularly the chick), output price stability, and government support (**Chicken Appendix Table 5**).

Use of growth prominent in chicken. According to a study in Batangas by Pabuayon et al (2017) contract growers follow the medications and health programs which usually include antibiotic supplementation in water and the inclusion of growth promotant (AGP in feeds) for fast growth and early harvest of broilers. Small-scale raisers who buy mixed feed could also avail of feeds with AGPs. Although the PNS for Veterinary Drug Residues in Food: Maximum Residue Limits (MRLs) has been issued, government regulatory agencies have limited capacity to monitor and test samples in sufficient sampling quantities to ensure safety of local meat products.

Lack of modern facilities for postharvest processing. – Majority of smallholder processors still use traditional methods of dressing chickens such as scalding, use of knives and tweezers; packing in plastic bags without vacuum sealing; use of styro boxes and ice for storage; and transporting live animals by binding their feet and hanging them in tricycles and jeepneys.

Lack of accredited dressing facilities for independent commercial growers. – Most if not all AAA dressing plants in Batangas have exclusive contracts with big integrator companies. Independent commercial growers and smallholder players find their way to LRMEs where food safety standards are not always

followed and monitored. Based on survey results, many producers and traders do traditional methods of dressing using their own facilities.

Lack of cold storage facilities. – Most of the time, the blast and storage freezers in the dressing plants are being operated beyond its capacity, hence the desired freezing condition is not usually met.

Other food safety issues. – KIIs surfaced a number of issues, including 1) the difficulty of broiler producers in complying with GAHP certification due to the strict provisions such as the discharge permit; 2) organic methods being more expensive than conventional methods; 3) standards are not mandatory; 4) need to clearly define the definitions and application of food safety law relative to size of farms; 5) no subsidy and incentives for GAHP certified farms; 6) real inventory of livestock and poultry farms, as the real numbers are not reported by raisers; not all raisers are registered and this has implications in monitoring of diseases; 7) inadequate resources or regulatory agencies, particularly lack of mobility for monitoring and the lack of training on food safety; 8) political favor, where repeat offenders are friends/relatives of local executives who get away with their offenses; 9) lack of cold chain facilities such as refrigerated vans (small producers have small storage facilities for slaughtered and fabricated meats); and 10) political support for food safety implementation where priorities change with changes in leadership.

Based on the survey, the major risk factors reported by producers are diseases especially cough and colds (67%), natural calamities such as volcanic eruption (40%) and typhoon/floods (30%), feed adulteration (12%), avian flu (17%) and other factors such as increase in prices of inputs (20%), lack of government support (20%) and price instability (20%).

SPS and food safety issues related to adoption of GAHP. – When asked about level of awareness and practices of GAHP in general, only around 30% of respondents said they are aware and are practicing this. However, when asked about the technologies or individual GAHP practices, it turned out that there is a high level of awareness and adoption, particularly for feeding standards and technologies, food safety assurance systems including feed quality control, food defense systems and use of antibiotics, water management, disease management program, hygiene and sanitation and biosecurity measures in general. Lower awareness and adoption are for those pertaining to use of pre and probiotics, animal genetics and breed selection, avian flu management (no reported cases), availability of operations manual, use of vehicle dip, shower, and downtime and personal protective equipment, as well as the use of tunnel ventilation in poultry houses. Willingness to adopt for those who are not currently adopting the GAHP component technology or practice is high, except for tunnel vent where only about 50% of expressed willingness (**Chicken Appendix Table 6).**

For traders, they are aware of the practice of recording with 68% practicing this. Traders also practice proper handling of animals and sanitation of crates, but only about 18% use BAI accredited transportation facilities (**Chicken Appendix Table 7**).

The probability of broiler growers adopting avian flu management, biosecurity measures and GAHP certification was determined using probit regression (**Chicken Appendix Tables 8, 9, and 10**). The factors affecting probability of producers adopting avian flu management practices are household monthly income, distance to market, access to extension services, access to insurance and having traders as their major markets. The likelihood of adopting biosecurity measures is affected by years in school, monthly household income and access to credit, while adoption of GAHP is likely to affected by years in chicken production, and access to insurance.

Organizational Performance and Risk Management Capacity of Host Government Agency Partners and Communities (related to food safety; agency partners)

DA Regional Office 4. – The structure for organizational performance and risk management capacities for broiler under DA Regional Office 4 is similar to that described for hogs. The DA Regional Office conducts assessments, inspection, and monitoring for food safety to ensure that the broiler farms practice GAHP. Its Regulatory Division also takes charge of the broiler farm registrations, quality control and food safety through its Quality Control Inspectors who conduct monitoring and surveillance of diseases and early warning, including avian flu. The same Integrated Laboratory Division and Feed Lab test feed samples.

As mentioned in the discussion under hogs, the DA has no specific plan that implements the Food Safety Act, as their National Strategic Plan for Food Safety has not been cascaded to the LGUs so that it can be harmonized. Also, the DA staff have undergone trainings on PNS for broiler chicken, and this has been shared with the LGU counterparts. Deputation by BAI to perform regulatory functions is also the same for chicken: Regional Inspectors, Provincial Animal Feed and Biological Control Officer, Regional Welfare Officer and GAP inspectors are trained on GAP, GAHP and AMR. These trainings help in the implementation of their functions to inspect manufacturers to ensure good animal feeding program, inspect facilities and establishments, and monitor compliance to standards and environmental laws.

National Meat Inspection Service. – The mandate of NMIS also covers poultry dressing plants (PDPs). As such, the Agency performs the same functions for PDPs as they do for slaughterhouses and meat cutting plants. There are two PDPs in Batangas that are under the jurisdiction of NMIS. As mentioned, the 38 Meat Inspectors of NMIS in Region 4A monitor 88 meat establishments all over Region 4A.

Provincial, City, and Municipal LGUs. – The structure and functions of the Office of the Veterinary Office of Batangas encompass livestock and poultry. Thus, the details mention under the section on hogs are also applicable for broilers. The Divisions on animal heath, regulatory, and animal planning and production also in charge of the chicken. As mentioned, the PVO implements regulatory functions for animals, meat and LRMEs, accredits and certifies farms, issues veterinary health certificates, shipping permits, trade passes, veterinary clearances, monitors compliance of LRMEs to food safety standards and collects meat samples for testing. The LGUs are also mandated under the Food Safety Act to issue business permits to operators who comply with the Sanitation Code, GMP and HACCP.

Potential Collaboration Among Value Chain Actors

Based on the value chain analysis, the potential areas of collaboration among the value chain actors may revolve around 1) provision of facilities and equipment for chicken primary processing, including model LRMEs and cold storage facilities; 2) capability building of regulatory agencies, LGU and stakeholders; and 3) formulation of a Food Safety Plan. Actionable and more detailed recommendations are provided in the recommendations.

3.2.5 Milkfish in Pangasinan

Key players in the value chain are the input suppliers, producers, traders, and processors (**Figure 7**).

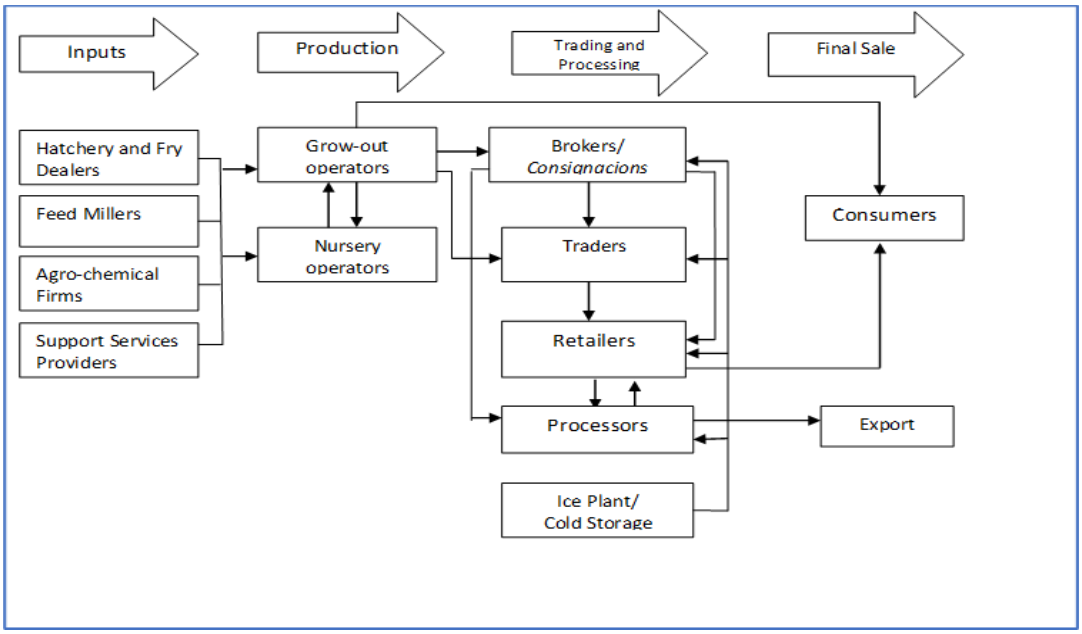


Figure 7. Supply chain of milkfish in Luzon

Input suppliers. – Inputs are fry sourced from local hatcheries and dealers of imported fry from Indonesia. The brood stock and fry hatchery of the BFAR provide the seed stock to existing hatcheries in Sual, Infanta, and Lingayen which then supply fry to nursery and grow-out operators in the province. Most producers (78%) use fry for stocking. They use locally bred fry (81.5%), while 18 % used the imported fry sold by fry dealers in the area. One producer used both locally bred and imported fry **(Milkfish Appendix Table 1).** Two major feed millers (San Miguel and Cargill) are the sources of aquafeeds. Fertilizers such as urea and 14-14-14, lime and organic pesticides like teeseed powder are purchased from local agrochemical stores. BFAR provides aquaculture extension and training services. Most producers surveyed (88%) have not attended BFAR-sponsored productivity improvement trainings. 68% have no access to extension services and 96% have not attended training related to food safety. One forth has access to formal credit **(Milkfish Appendix Table 2).**

Producers. – Grow-out pond and cage operators are the main producers of the milkfish value chain. Twenty five percent practice extensive stocking density (1,500-3000 fingerlings/ha) in their fishpond operation, 37% follow semi-intensive (3,001-10,000/ha), and 35% use intensive (10,001-20,000/ha) stocking. Extensive stocking is dependent on endogenously/naturally supplied nutrients like plankton and algae produced through fertilization, but this is practiced by only 14%. Majority (68%) provide both natural and external feeds while 11% use external feeds alone. In semi-intensive stocking, fish production is dependent on the endogenously supplied nutrients and externally supplied fish feed. This is practiced by 47% while 24% provide external feeds alone. Intensive stocking is completely dependent on externally supplied feeds but only 11% use this practice; majority (78%) use both natural and external feeds, and the rest rely on naturally supplied nutrients.

Fry are reared in nursery ponds until they reach the fingerling size. Ponds are acclimatized for an hour, usually in early morning to ensure that the temperature and salinity of water is suited to the fry. Manual observation, checking of temperature and taste test of water quality are likewise conducted **(Milkfish Appendix Table 3).** Stocking density is 25-30 pieces/square meter of fry and survival rate is 63% for

imported fry, 67% for locally produced fry, and 69% for fry gathered from the wild **(Milkfish Appendix Table 4).** Industry experts like Mr. Wilfredo Yap of the PCAARRD Fisheries Experts' Pool and Santeh Foundation and Dr. AisaSalayo of SEAFDEC Aquaculture Department calculate the mortality at 40-50%. Fry mortality can be attributed to the water quality in the pond and the condition of the fry upon arrival. Twenty-four percent reported that they handle their stocks delicately to avoid mortality while 29% opt to just replace their stock. Duration of rearing from fry to fingerling is 30 days or until the stock reach the desired size of 30-40 grams. While the stocks are in the nursery, rearing ponds are being prepared simultaneously. Twenty percent of operators prefer to buy fingerlings from a local nursery as it is more convenient. The stock is reared for about 5 months until it reaches its full marketable size. Full grown milkfish are classified as small (250 grams and below), medium (300 grams) and large (500 grams and above).

There was low awareness of GAqP except for pond preparation (96%), soil conditioning (74%) and natural food production (72%) (**Milkfish Appendix Table 5).** More than one third (37%) are aware that water quality should be regularly monitored to ensure suitability and safety. The survey indicated that 62% of producers have problem on poor water quality (**Milkfish Appendix Table 6**). For a few (4.1%), water quality is monitored through observation. No one indicated using an equipment or quick test kit to measure water quality. Other mitigating measures to improve water quality is by draining and changing the water (34%), proper water management and sanitation (16%) as it is a common practice among the caretakers in the province to relieve themselves right in the fish farms since they believe that human waste contributes to the production and growth of planktons and lablab much like organic fertilizer; proper water management (9.8%); checking the dikes and screen to ensure that suitable water free from waste enter the farm (9.2%) and use of water pumps (11%). Others do nothing (2.3%) while an equal proportion (2.3%) pre harvest their stock to avoid losses; There are those who wait for the rainfall (2.9%) or just let the water in to improve the water quality (8.1%).

On water management, 57% are aware of the use of pumps to improve water quality. One fifth (20%) are aware of the importance of aeration and 38% of them practice it. Most of them are not aware nor do they practice effluent discharge. Only 11% discharged ammonia build up in the pond, 30% are aware of the importance of dissolved oxygen which at a lower level could result to fish kill, 23.7 % are aware of monitoring water temperature and half of them are practicing it. Presence of predator is reported by many (67%). Diseases may also affect the stock **(Milkfish Appendix Table 7).** Symptoms like bruises and white spots, lack of appetite, and gasping are observed and these can happen not only during grow out stage (as reported by 34%) but also during fry to fingerling stage (34%), fingerling stage (30%), and fingerling to grow out stage (3%). Deformities were reported by 47%. Overall, the probable cause of mortality in milkfish is the quality of water (reported by 40%), climate change (23%), predators like snakes and birds (28%), temperature of water (14.3%) and lack of oxygen (12%)**(Milkfish Appendix Table 8)**.

The likelihood of producers adopting improved practices were statistically tested using probit analyses (**Milkfish Appendix Table 9)**. Results of the probit analysis on management of pests and diseases showed that producers' willingness to adopt disease control measures is positively correlated with years in school, age of farmers, farm size, proximity of farms to brackish ponds, and if farms are using imported fries **(Milkfish Appendix Table 10).**

Overall, grow out pond operators incurred operational expenses per cycle of P83,095/ha, cage operator, P29,955/cage and nursery operator, P95, 630/ha. Feeds are the biggest expenditure item, 47% for pond operation, 70% for cage culture and 52% in nursery operation **(Milkfish Appendix Table 11).** Production per cycle is 2,005.63 kg/ha in grow out pond of which 92% are sold, 1,154.06 kg in cage operation of which 88% are sold and 70,752 pieces of fingerlings. Net income is biggest in nursery operation, P222,754/ha. Pond and cage operation generated an income of P86,596/ha and P68,484.49/cage, respectively.

Buyers. – Milkfish trading involved the brokers, traders, retailers, and processors. Grow out operators sold the produce either to brokers/consignaciones, traders (wholesalers) or directly to consumer. Processors source their milkfish requirement from any of these buyers. As observed during the survey in Dagupan which is the major trading center in the province, the produce is delivered to the trading post by boats coming from Binmaley while those from other towns are delivered by trucks. Binmaley, Bolinao, Lingayen, Alaminos and Dagupan and the main supply areas of milkfish which are brought to their respective public markets (BAS, 2014). Supplies from Bani and Sual were sold in Alaminos and Lingayen, respectively. Outside destinations were the provinces of La Union, Benguet, Ilocos Norte, Abra, Isabela, Zambales, Tarlac and Metro Manila.

The grow out operators usually entrust their produce to brokers who in turn pass on the fish to the traders on credit. Brokers get 4-5% commission from producers upon payment by traders. Brokers in the province handle about 75% of the total milkfish fresh harvest, rest by traders who directly purchase from producers.

Processing Facilities. – There are over 100 establishments engaged in milkfish processing in the province, five are exporters to Asian countries, the United States, EU, and Middle East as halal foods. Anjo Farms in San Fabian and Korea-Philippines Seafood Processing Complex in Dagupan are the biggest in the area. Anjo Farms Incorporated primarily deals with seafood processing, shrimp paste production, and milkfish processing. The product lines are shown in **(Milkfish Annex 1).**

Accredited ice plants in the province are registered with DA. Among these are Pangasinan Cold Storage and Pamar Foods Inc. Ice Plant & Cold Storage both located in Calasiao, Urdaneta City Ice Plant and Cold Storage, Pangasinan Ice plant And Cold Storage Inc. the Kenwood Cold Storage/San Vicente Dressing Plant in Alaminos, and Kabayan Ice plant & cold storage in Labrador.

While cold storage facilities are present for use by producer, results of the probit analysis show that age, ethnicity, household size, grow out operation and sea cage operation, along with origin of the fry may significantly influence the adoption of cold storage services in the locality. The younger the producer and the smaller the household size, the more likely is the adoption of cold storage services. Ethnicity, pond operation and fry origin have positive influence on adoption **(Milkfish Appendix Table 12).**

Level of Postharvest Loss, SPS Conditions and Risks

Fresh milkfish delivered at the trading post are iced in metal containers. These are quickly sorted by size and immediately passed on to traders who then have their purchase hauled to their delivery trucks to minimize losses. The trading post bustles with activities as brokers, sorters, traders, porters with carts, and sellers/suppliers of crushed ice are making their respective transactions. The post is operated round the clock but not all brokers operate at the same time. This is to stabilize the price and not to compete with each other. Cleanliness is observed in the trading post especially during this pandemic but there may be sanitation issues with presence of laborers who sleep in their carts within the vicinity as well as business establishments operating near the post.

The 33 traders are also processors of deboned and marinated milkfish. Not all are practicing GAqP. Pre-chilling is reported by 64%, icing by 45%, use of refrigerated van by 58%, labeling by 70%, and use of rigid wooden containers when shipping in commercial cargo trucks by 70% (**Milkfish Appendix Table 13).** They sell frozen prime cuts prepared under controlled conditions. They use cold storage facilities. No one however can afford canning and bottling operation. All sourced ice from ice plants in their area, practice grading and sorting, minimize contact in dirty spaces and prevent physical damage of their purchase milkfish.

Transportation is the major marketing cost incurred by traders which is estimated at 15 to 20 percent of total marketing cost. The study conducted by German and Catabay in Dagupan indicates that volume of ice, volume of milkfish and type of water in the container being used by brokers and the timing/selling period are important considerations in trading and marketing of milkfish.

Organizational Performance and Risk Management Capacity of Host Government Agency Partners and Communities (related to food safety; agency partners)

BFAR Region 1 and the local government units at the provincial, municipal, and city levels have the capacity to implement food safety regulations in their respective localities. There are personnel/officers responsible for mandated tasks, operating on limited budget (BFAR Region 1) but regularly allocated (LGUs).

BFAR Region 1. – Two units are involved: 1) the Fisheries Management Regulatory and Enforcement Division which takes care of enforcement, patrolling, surveillance of commercial fishing vessels, and coastal resources management and 2) the Fisheries Inspection and Quarantine Unit which focuses on food safety, fish inspection, quarantine and certification.

It implements the registration of aqua farms/hatcheries/nurseries and the monitoring of antibiotic residues and conduct analysis as part of production-related activities. In implementing food safety regulations during processing, the regional office conducts monitoring and inspection of processing plants, fishing boats, and cold storage facilities. For marketing, it monitors and ensures compliance to food safety requirements including those of importing countries.

Food safety monitoring during primary production stages is implemented by Fish Health Officers trained on the registration system and how to process registration of aqua farms, inspection of aqua feed millers on use of banned antibiotics and aflatoxins. Monitoring of major aquaculture farms on harmful algal bloom are undertaken by Fish Health Officers who maintain the laboratory and conduct sampling, testing/analysis on red tide at the BFARs Marine Biotoxin Laboratory. Inspection of processing plants/establishments, fishing boats, and cold storage facilities are conducted by Fish Inspectors trained on food safety regulations such as GAqP, HACCP as well as on the requirements of importing countries such as Halal food international certification, and the BFAR Region 1 designated Certifying Officers certify fish products sold in local markets and assigned Quarantine Officers to monitor and inspect in border posts (airports, seaports) to ensure no entry or no introduction of adulterated food/related products that may affect consumer health and safety.

A Risk Management Plan is in place and a functioning alert system for the introduction of outside species as part of bio-security measures on food safety. There is also a stricter processing of documentation requirements from importing countries, e.g. health certification, product analysis, sampling, etc. before imported products (live, processed, frozen) are brought in, risk assessments are also conducted before new species are introduced into the country. There is also a BFAR program on legislated hatcheries to produce milkfish and not depend on Indonesia fry. In BFAR's list of registered farms, there are very few importers, only from Binmaley and Lingayen.

The Provincial Agriculture Office (PAgO)-Fishery Division is adequately manned by 19 staff. They were trained by BFAR Region 1 on good aquaculture practices GAQP, technology and management practices in bangus culture including salient features of the Food Safety Act. The Fisheries and Aquatic Resources Management Councils, with a functional core team at the provincial level and active municipal councils, support the over-all work of the PAgO and MAO. The PAgO budget for 2021 for fishery/food production is Php 6 Million and another Php 2.5 Million is reserved for coastal resources management including sea fishing and bangus culture. The target beneficiaries are the marginalized fishpond operators.

Potential Collaboration Among Value Chain Actors

With inadequate supply of fry, potential collaboration among value chain players may revolve around fry hatchery establishment and operation by the private sector with BFAR providing the seedstock. It has already established a program to support existing hatcheries by increasing its brood stock inventories and initiates dispersal programs where eggs and/or yolkfish can be distributed in small hatchery operations. Public investment is needed to establish integrated brood stock and hatcheries in major milkfish production areas to ensure continuous supply of eggs and larvae at early stages of milkfish value chain. This will guarantee continuous supply of fry to other subsequent enterprises such as hatchery, nursery and grow out production.

3.2.6 Coco Sugar in Misamis Oriental and Davao de Sur

The key players in the coconut sap sugar industry are sap collectors (tappers), processors such as cooperatives and farmers associations, private companies who both process and market the product, and traders (consolidators/integrators, retailers, and exporters). Tappers are usually members of cooperatives, associations, or employed by private companies. The recent entry of another product derived from coconut sap syrup has changed the landscape of the industry. This particular product is coco aminos, a food seasoning similar to soy sauce. As such, four value chains have been identified in Misamis Oriental and Davao del Sur as presented in the map below (**Figure 8**).

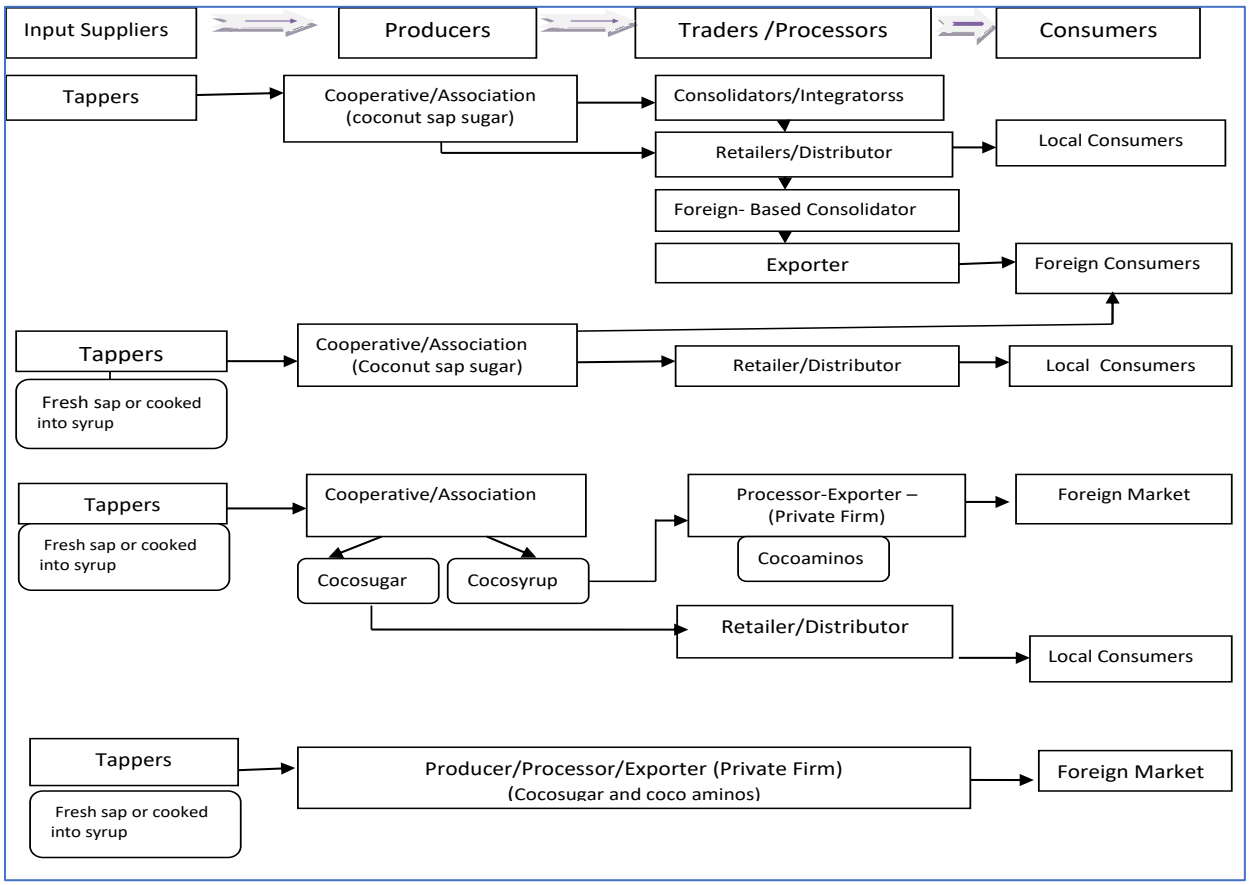


Figure 8. Value chain map of coco sugar

The first value chain is derived from the supply chain map prepared by Philippine Coconut Authority (PCA). It involves tappers who bring the sap to the processing plant of cooperatives/associations. The processed product (coco sugar) is brought to consolidators/integrators who then sell it to retailers and foreign-based consolidators. Retailers sell the product to local consumers.

The second value chain involves cooperatives/associations, e.g., Linabu Agrarian Multi-Purpose Cooperative (LAMPCO), whose members do the tapping and sell the sap to the coop/association for processing into coco sugar. The produce is directly exported to other countries and also sold in part to local retailers.

In the third value chain, the cooperative/association produces both coco syrup and coco sugar. Coco syrup is sold to a private firm, in particular the Spythe Global Enterprises, which processes the syrup into coco aminos for export. Coco sugar is for local consumption sold through the retailers. Spythe Global, established in 2006, used to be the major coco sugar producer in Mindanao. It decided to shift to coco aminos three years ago due to competition and increasing number of coco sugar producers in Misamis Oriental. Today, many tappers in the study areas have also been selling sap through the intermediaries which process and export coco aminos. Tappers find it convenient to sell sap for coco amino production as it requires an 8 to 12-hour interval for sap collection compared to 4 hours required in coco sugar production.

The fourth value chain involves tappers and a private firm (e.g., Lao Integrated Farm, Inc.) which is a central processing hub in Davao del Sur for coco sugar, coco syrup, coco aminos and other coconut by-products like coco honey, coco teriyaki, and chocolate with coco sugar sweeteners. The firm exports these products to the United States and Germany.

The tappers collect toddy with the help of laborers who clean the trees to be tapped and carefully bending the unopened inflorescence to be tapped. Average daily sap collection is 29 liters. Almost half of the tappers (49%) cook the sap to syrup in improvised ovens in their home. The cooked syrup is then sold to their cooperative/association for processing into coco sugar. For fresh sap, processors require the sap to have a pH not lower than 5. In the processing of syrup, a temperature at least more than the boiling point at 120 degrees centigrade is required. This will be undergoing heat evaporation until the syrup has a Total Soluble Solid of 75-79 degrees Brix to have a longer shelf life prior to processing into coconut sap sugar. In all these processes, more than half (53%) of the surveyed respondents in Misamis Oriental and Davao del Sur, are not aware of the practices and certification requirements for coco sugar set by Philippine National Standards. About 38% are adopting the standards and 24% are organic certified. About 80% are willing to adopt the standards, 42% are into sap production, 43% are producing syrup and the rest are producing both. Production of syrup per day among them is 14 liters on the average.

Level of Postharvest Loss, SPS Conditions and Risks

All tappers, having been trained by the PCA, comply to sanitation requirement on the use of clean knives, use of opaque plastic as container of collected sap, and collection of sap every 4-5 hours for coco sugar production. Rejection however is still experienced by 16%. Average rejection rate is 8.7% due to weather condition which delayed the delivery of sap to processing area (27%), two producers reported fermentation, one each reported contamination, yellowish color, and oversupply of sap in the processing center. Half of the tappers are aware that the sap should not be acidic yet only 15% of them use the pH meter. While they would like to use a pH meter, it is not available in their area. They rely on odor and color to in determining sap acidity.

Boiling the sap into syrup is practiced by 60% of tappers. The scam is removed to avoid formation of dark residues as reported by 81% yet about 19% of them do not. They say it adds to the weight of the syrup

and eventually to the finished product, though it actually darkens the product. The syrup is delivered to the cooperative/association's processing area and this is where tappers may experience rejection of their syrup. Tappers use improvised oven with no thermometer since cooking is done their kitchen. They say they already know and are familiar with the consistency of syrup when this is already cooked. Tappers who are members of the cooperative/ association in the community also sold sap for coco aminos no matter what the acidity is. Intermediaries of the processing firm can purchase any volume no matter the quality of the sap, e.g., higher acidity, which in a way may incentivize the tappers to focus more on collection of sap for coco aminos rather for coco sugar.

Despite the preference of tappers to practice heat evaporation using their own method, most of them (91%) practice proper waste disposal. About 80% are aware of the need to sanitize the sap delivery room if there is one in the processing site. Their usual practice is to deliver the sap or syrup in the cooking area of the cooperative or association or directly to the cooking bin for immediate processing. Almost all sanitize their sap containers. On the other hand, the 17 traders surveyed mostly comply to GMP and HACCP systems wherein 14 of them sanitized the sap delivery room and all practiced the proper waste disposal and sanitation of containers.

Probit analysis on adoption of PNS show that producers are more likely to adopt PNS regardless of what they produce, either sap or syrup. They are less likely to adopt if the condition of the road is poor. They are also less likely to adopt if the product goes to the trader. They are more likely to adopt if the product directly goes to the market. If they have access to extension, credit, and insurance, the more likely that they will adopt the standards (**Coco sugar Appendix Table 1**).

All producers/tappers do not perform grading and classification of their product (**Coco sugar Appendix Table 2**). Majority (66%) do not comply with standard on packaging as almost all (99%) use plastic bags. Less than five percent rejection is reported by 98% and this is caused by overcooking, fermentation, oversupply, and contamination. Producers (94%) deliver their product to the buyers and the mode of payment is mostly in cash (60%). Among traders, packaging standards are compiled in the handling and storing the packaging materials (16 traders), use of prescribed food grades (17) and the prescribed condition of the packaging areas (14). For handling and storage, 13 adhere to the appropriate storage facility for finished products and 14 on transport of product from processing plant to market.

The road from the farm to the buyer/market is fairly good and distance is about 9 km hence these are not much of a constraint. Most of the producers are challenged by the low yield of sap and fermentation (**Coco sugar Appendix Table 3**). Limited number of dwarf coconut trees is reported by 22% and the high risk in collecting sap due to tall trees is reported by one third of them. Generally, the producers do not have suggestions on mitigating measures on the problem low sap yield. A few suggested applying organic fertilizer (**Coco sugar Appendix Table 4**). The producers have less concern on mitigating risk factors like high labor cost and price competitiveness. Almost all (99%) who need assistance and support on coco sugar business would suggest the provision of working capital while 77% need technical assistance (**Coco sugar Appendix Table 5**).

There are 12 reported coco sugar processors in Misamis Oriental and five in Davao del Sur. Spythe Global used to be the biggest processor/trader but shifted to coco amino production three years ago. One of the owners, Ms. LA Adalia cited the increasing number of coco sugar producers in the province as its main reason for the shift. Instead of competing with them, Spythe Global has found another product that can be manufactured out of coco sap. It was able to get a big contract in the United States to supply coco aminos produced in its Cagayan de Oro manufacturing plant. These are shipped to its warehouse in Valenzuela, Bulacan and from there, exported to the U.S.

Spythe Global maintains its own coconut farm and at the same time partners with other plantation owners/tappers who are willing to supply them with quality sap. With the change in priority of Spythe Global, tappers who used to supply coco sap for coco sugar production to the company shifted to supplying the raw material for coco aminos which is rather convenient to them. This change has been observed in Medina and Balingasag. Whether for coco sugar or syrup production, the price received by the tappers for coco sap remains the same at P28/gallon. Ms. Adalia says it used to be P27 before the pandemic.

Despite this, however, all other coco sugar processors in Misamis Oriental continue producing coco sugar. In fact, the LAMPCO, a producer and exporter of coco sugar, is renewing its organic certification of their coco sugar processing enterprise with EcoCert with a financial support of Php 206 thousand from the provincial government. The Department of Trade and Industry (DTI) also requires LAMPCO to remove the logo of its original certifier in its labels and packaging materials but this too entails some cost. LAMPCO hopes to resume exporting as soon as it gets a new organic certification and the logo of the certifying body. On the other hand, Tup-on Integrated Farmers Association in Medina is involved in both coco sugar and coco syrup processing. Its members are grouped into two - the coco sap collectors and the coco sugar/syrup processing group. They were trained by PCA in 2018 on coco syrup processing. There are 80 coco sap collectors in Medina attached to Tup-on Integrated of which 30 comes from six barangays in Medina. They supply coco sap syrup to Spythe Global and sell coco sugar to local traders.

In Davao del Sur, Lao Integrated Farms Inc. (LIFI), the biggest processor and trader/exporter in the region, similarly produce coco aminos but its major product is still coco sugar. The farm has a pool of tappers who regularly collect the coco sap which are processed to coco aminos and coco sugar.

In terms of marketing according to PCA, retailers of coco sugar comprise a small percentage of traders in coco sugar marketing considering that the bulk of the produce is targeted for export. There are local brands in the country at a retail price of P300/kg. According to PCA, retailers purchased unbranded coco sugar from consolidators for P200/kg. They provide their own branding and labels and do their own promotion. With this, product branding and labelling has to level up to be at par to the commercially available sweeteners or even highly competitive being a natural and organic coconut-based high value product line.

Results of the Probit analysis on adoption of improved packaging show that producers are more like to the adopt improved packaging if they are younger, have higher incomes, the road condition is better, and have access to insurance. They are less likely to adopt if the distance of their farm area is far from the market (**Coco sugar Appendix Table 6).**

Organizational Performance and Risk Management Capacity of Host Government Agency Partners and Communities (related to food safety; agency partners)

PCA and LGUs have strengths and some inadequacies to fully implement the food safety regulations as per Food Safety Law of 2013. In general, the inadequacies are in terms of budget and staff (number and competency). PCA is Chair of the Philippine National Standards for coco-sugar Technical Working Group of the BAFS. Its strengths are in coconut production and technology development; weakness is in trade and marketing. It knows the technologies involved in the production/processing in the whole value chain and is familiar with the hazard analysis critical control points (HACCP) in processing such as collection of sap, collection of syrup, and the actual cooking of sugar. It is already working on the FDA-cited capacity gaps and has already come up with the PCA Transformation Roadmap to be firmed up in March 2021 that include building the capacity of PCA Trade and Market Development Department, the Product Development Division and Quality Laboratory Division in order to ensure quality of coconut-based processed foods.

In Davao del Sur, the Office of the Provincial Agriculturist (OPAg) has 3-4 staff involved in organic agriculture. Its P15 M budget does not include fund support for coco sugar production but OPAg has a designated focal person for coco sugar to join government agencies such as DA/ATI, DTI, PCA in the conduct of regular monitoring and plant visits every 2 weeks to the coco sugar processing plant at LIFI. OPAg coordinates all field trips and tours at LIFI since it is registered as ATI learning site, DTI agri tourism site, and DA organic farms. In Misamis Oriental, the OPAg is composed of 60 staff focused on commodities – each person assigned on a commodity, including one Food Technologist trained on food safety (former work in mango processing), focused on FDA research on coco water. An OA Program Coordinator with 1 staff to assist implementation of OA program activities. OPAg convenes quarterly meetings of Organic Practitioners Team.

Major risk factors include food adulteration, poor product quality, use of chemicals in coconut farms, as well as mislabeling or claims as organic produce. PCA and LGUs act and plan accordingly. On food adulteration and poor product quality, deputation of PCA by FDA is planned and targeted for implementation in March 2021 so PCA can inspect the plants and monitor compliance. PCA plans to be strict in giving license and apply sanctions /penalty for non-compliance. In addition, PCA reported the need for a marketing strategy that will highlight the clean processing of coco sugar from the Philippines and make it more competitive in the international market.

For the certification of coco sugar processing, OPAg Misamis Oriental endorses individual processors to DA. In Medina, the farmers' association ensures that no chemicals are used in coconut production areas; reject coco sap which are not processed within 4 hours after collection and delivered in coco sugar processing plant as they will result to poor quality coco sugar. President of Tup-on Integrated FA (trained by PCA) serves as quality control officer in ensuring quality of coco sap and quality of coco sugar produced. In Davao del Sur, MAO Bansalan monitors and inspects coconut farms on use of chemicals especially during meetings held in areas where coco-sap is collected with specific advice to farmers to not use pesticides; however, frequency of monitoring is not regular.

Potential Collaboration Among Value Chain Actors

One successful model of collaboration is that of LIFI and the Office of the MAO of Bansalan, OPAg Davao del Sur, DA, ATI, PCA and DTI. During the start-up of LIFI, the MLGU/MAO of Bansalan assisted in developing the project proposal and business plan and provided the necessary endorsements to DA Region 11 for fund support and technology assistance in the coco sap sugar processing. DA National also provided equipment support and the improvement of farm to market roads in Bansalan in coordination with the Provincial LGU. LIFI is now the only company engaged in large-scale/commercial processing of coco sugar in Bansalan. Other than coco sap sugar, LIFI also has other processed coconut by products e.g., coco honey, coco teriyaki, turmeric, chocolate with coco sugar sweeteners. The sweetener used in all LIFI's bakery products is coco sugar. It is duly registered and certified farm by the PLGU/OPAg and DA with international certification for export of its coco sugar under the brand name *Donnabelle*.

There are 12 coco sap collectors (with varying numbers of coconut trees in their farms) supplying to LIFI. They are organized into an association and are now in the process of transforming it to Toddy Collectors' Cooperative. LIFI also sources out their coco sap from other municipalities. MAO is not involved in quality inspection of coco sap sugar produced but sometimes joins other government agencies in their visit to LIFI farms coco sugar processing plant. It continues its promotion of OA in the whole municipality of Bansalan to sustain coconut production grown without pesticides, coco sap of which are brought to LIFI for processing. MAO provides OA practitioners/farmers with materials, concoctions, vermi casts etc. for organic fertilizer production.

4. Conclusions

It was established from the data gathered that for the six commodities covered, 98.8 % of potential B-SAFE beneficiaries have applied at least one improved management practice or technology; 36.5% applied improved packaging, 30.2% use improved equipment, 36.4% use improved transportation, and 10.3% use improved cold storage. The value of annual sales of farms and firms amounted to USD 4, 178, 159,067, which was generated from the sales of 2,564,854 MT of products. It was also found that there are at least 261 farms/firms/laboratories with GAP, GMP, HACCP, or ISO certification and 16 host government or community-derived risk management plans either formally proposed, adopted, implemented, or institutionalized **(Table 2).** The indicators for which baseline values were set at zero are given in **Table 2A**.

Disaggregating the results by improved management practices and technologies, the study found that there are important practices and technologies which are not being applied by a significant proportion of potential beneficiaries, hence could be good entry points for B-SAFE:

- Among rice and corn farmers in Bukidnon, only 45% and 38% respectively, are using sustainable practices and technologies. Also, there are no rice or corn farmers who have engaged in consolidated farming;
- Among hog raisers in Batangas, there is low application (only 3%) of improved practices on postharvest handling and storage, especially those with privately owned and operated slaughterhouses (low application of sanitation, use of UV lamp for flies, storage freezer, etc.). Carcass chillers and blast freezers are not being used. In addition, only 14% are involved in value added processing;
- Among broiler growers in Batangas, there is low application (only 46%) of climate adaptation practices such as natural ventilation, blower, and cooling pads. Only 12% of producers are applying good postharvest handling and storage such as sanitation of crates and animal handling facilities and only 23% are into value-added processing;
- Among milkfish growers in Pangasinan, the study found that while 64% of grow out operators are adopting the recommended stocking densities the accompanying necessary method of feeding is not being applied. Moreover, while 77% of milkfish growers are aware of the need to acclimatize the fry/fingerling stock, only half of them are practicing it; and
- Among coco sugar producers in Davao and Misamis Oriental, only 3% are practicing improved marketing and distribution. This includes better product packaging, labeling and promotion.

On the application of improved packaging, equipment and transportation, the study highlights the following:

- Application of improved packaging is very low among producers of rice in Bukidnon (13%), corn in Bukidnon (24%), broiler chicken in Batangas (2%) and coco sugar in Davao and Misamis Oriental (38%);
- Only 3% of broiler chicken growers in Batangas, 2% of hog raisers and 25% of hog traders in Batangas use improved equipment; and
- Only 8% of traders use dressing machines for broiler chicken in Batangas;

The study found very limited number of farms and firms with GAP, GMP, HACCP or ISO certification, regardless of commodities. This is not surprising especially for products sold in primary form as the market has not yet significantly incentivized compliance to the standards. Compliance to standards is higher among processors as products become more differentiated (such as in the case of coco sugar) and for large commercial farms such as in the case of most hogs, broiler chicken and milkfish growers. The study highlights the following:

- There is only 1 rice farm in Bukidnon with GAP certification. In addition, there is no corn farm in Bukidnon which is GAP certified;
- The survey found that most rice and corn farmers apply only certain components of GAP and there is really no conscious effort to comply with all the requirements. In most cases, the GAP compliant practices being applied by farmers were actually part of their traditional practices which happen to be the same practices prescribed under GAP;
- In hogs in Batangas, the estimated baseline number of farms/firms/laboratories with GAP, GMP, HACCP, or ISO certification was 26;
- In broiler chicken in Batangas, 10% of respondents claimed to be GAHP-certified. The proportion of respondent-raisers who are aware of GAHP is 32%, and those practicing GAHP but not all its components is 30%;
- In milkfish, there were 6 producers with certification for Good Aquaculture Practices (GAqP) and three processors with HACCP certification; and
- There are 62 producers and 31 traders of coco sugar that have standard certifications.

The baseline situation analysis of the six commodity value chains highlights the following:

- Postharvest losses are high: 7.2%/year for rice from harvest to final sale; 8%/year for corn from harvest, shelling, drying and storage and another 2% during milling, storage to final sale; production and postproduction losses in hogs are due mainly to ASF and can reach as high as 70%; production and postproduction losses in broiler chicken are due mainly to avian diseases such as cough/cold and threat of avian flu; and 8.7% in coco sugar particularly due to rejected sap resulting from delayed delivery;
- The technical capacity of potential B-SAFE host government partners in addressing the various food safety, quality and productivity risks is generally adequate, but support may be needed to augment financial capacity, especially in providing trainings, facilities and equipment support to potential beneficiaries;
- Potential collaboration should revolve around promoting and capacitating potential beneficiaries to comply to the relevant SPS standards; reducing production and post-production losses and ensuring the application of more sustainable practices.

5. Recommendations

Rice and Corn in Bukidnon

1. Facilitate training farmers on GAP and assist them in complying and certifying to the standards. This may also necessitate provision of assistance in the conduct of farm area assessment, building farm

storage facilities for fertilizer and chemical inputs and improved farm equipment for threshing and drying (to avoid pavement drying), among others, to reduce contamination and postharvest losses.

2. Establish models of consolidated farming to facilitate compliance to standards, greater effectiveness in combatting risks of pest infestation (e.g., RBB in rice and FAW in corn), adoption of more sustainable practices and realize the benefits of economies of scale. As exploratory steps, B-SAFE may examine the potential of building on existing collaborations and models such as the lead firm model of collaboration being practiced by the Acosta Rice Mill in Maramag, Bukidnon for rice and the farm clustering model being pursued by the *ISN* for corn in Bukidnon.
3. Support the effort of local government agencies and LGUs in pest monitoring and surveillance against RBB in rice and FAW in corn. While there is local technical capacity on this, financial as well as facilities and equipment support are needed.

Hogs and Broiler Chicken in Batangas

1. In hogs, work with LGUs and DA in the repopulation program to rebuild the industry devastated by ASF. Collaboration may be in the following: a) work with ITCPH in providing genetic materials for AI and semen through its program on AI Sa Barangay where AI training and equipment are provided; b) link with LGUs and DA, such as the Tanauan City LGUs in requiring beneficiaries of the repopulation program to apply for GHAP certification, or if not possible, to ensure food safety practices in their farms.
2. In hogs, promote model LRMEs with the private sector to showcase good practices. LRMEs play an important role in ensuring food safety of meat and meat products, and their number is greater than the NMIS accredited facilities.
3. In hogs, facilitate access to cold storage and transport facilities to cooperatives such as SIDC, organizations such as UNIBAT and farmers and traders/retailers. This may be in the form of cold storage rooms, large freezers, and refrigerated vans and similar facilities that will allow for the transport of pork to Metro Manila and other areas. This is also in preparation for the plan of the DA to move slaughterhouses out of the national capital to minimize transport of live animals.
4. In broiler chicken, facilitate access to appropriate facilities and equipment for primary processing of chicken for small hold and independent growers. This could include provision of poultry dressing machines and related equipment; vacuum drying equipment; cold storage facilities such as blast freezers, chillers, and freezers; refrigerated vehicles; and others.
5. In broiler chicken, promote model LRMEs with the private sector to cater to producers and traders who have limited access to NMIS accredited poultry dressing plants.

Milkfish in Pangasinan

1. The study noted low access to extension services and training on food safety among the traders/processors. A program on provision of these services may be formulated and implemented in coordination with BFAR Region 1 and the LGU. Similarly, training program on productivity improvement for producers may be packaged and implemented with particular attention to water management, effluent discharge, and other food safety concerns.
2. Provision of assistance to traders and processors in getting BFAD, HACCP and GMP certification as all these entail time, effort, and resources. Likewise, assistance in packaging and labeling of manufactured products should be provided particularly to small processors in coordination with the Department of Trade and Industry.

3. Encourage the provision of public and private investment for local hatchery establishment to ensure fry supply free of contaminants. BFAR Region 1 has proposed to DA/World Bank
4. Support organizing community level milkfish processing projects focusing on deboning and marinating, packaging, and labeling of the products, and link the projects to major market centers.
5. Lobby for the expansion of community fish landing terminal in Bani to service fishpond and cage culture operator. Freezers/coolers should be provided. These may also serve as hub of brokers and traders involved in milkfish marketing.
6. Coordinate with the Cold Chain Association of the Philippines for the establishment of blast freezing facilities in the province.

Coco Sugar in Davao and Misamis Oriental

1. Help in the development of a grading system to encourage farmers to achieve better quality products and conduct of capacity building to achieve product quality development and pursue the concept that "Food Safety and Quality is the Product Standard".
2. Spearhead the formulation of an International Product Standard and Trading System for Coco sap Sugar in agreement with other member countries of the International Coconut Community (ICC) to protect the product position in the global market.
3. For coco sap tappers, facilitate access to equipment such as pH meters and facilitiest such as common service facility for the boiling of coco sap.

Cross-Cutting Recommendations

1. Initiate and support the development of market models that will incentivize farmer's compliance to food safety and quality standards. Especially for products sold in primary form, there is still generally no premium price for products produced following existing product standards.
2. Support consumer and producer awareness campaigns of government entities (e.g., FNRI, DA, FDA, etc.) and CSOs on the importance of food safety, quality and reduced postharvest losses and wastage in the food system.

Annexes

Annex 1. Bibliography

Catelo, M.A.O, Narrod, C.A., and Tiongco, M.M. (2008). Structural Changes in the Philippine Pig Industry and Their Environmental Implications. IFPRI Discussion Paper. Retrieved March 15, 2016 from https://books.google.com.ph/books?id=RhIu95FwSuUC&pg=PA13&lpg=PA13&dq=types+of+hog+operations+catelo+philippines&source=bl&ots=JdmZQCWBOD&sig=gSpDNZ3m-q-B9BRxVm5abg-4C9o&hl=en&sa=X&ved=0ahUKEwjIwI2J_MHLAhWhnqYKHVU4A-cQ6AEIIjAB#v=onepage&q=types%20of%20hog%20operations%20catelo%20philippines&f=false

City Government of Batangas. (n.d.). About: General Information. Retrieved from Batangas City: https://www.batangascity.gov.ph/web/about-the-city/general-information/introduction

DA Communications Group. (2020, August 31). *Home: News*. Retrieved from Department of Agriculture: https://www.da.gov.ph/batangas-province-receives-p272-5m-worth-of-interventions-to-boost-agri-sector/

DA Communications Group. (2020, August 30). *Home: News*. Retrieved from Department of Agriculture: https://www.da.gov.ph/phls-1st-govt-owned-triple-aaa-slaughterhouse-soon-to-operate-in-tanauan-city/

DA Strategic Communications. (2020). *Philippine Agriculture Rises to the Challenges of the Times.* Department of Agriculture.

Dela Cruz, R. and G. Calica. (2016). Postharvest Losses in Paddy and Maize in Major Producing Provinces in the Philippines. Philippine Center for Postharvets Development and Mechanization. 2016.

Elarmo, J. (2020, November 1). *Home: Press Release*. Retrieved from Province of Batangas: http://www.batangas.gov.ph/portal/pinsala-ni-quinta-sa-livestock-poultry-sa-batangas-province-umabot-ng-mahigit-%e2%82%b11m/

Macaraig, M. J. (2020, March 3). *Home: Press Release*. Retrieved from Provincial Government of Batangas: http://www.batangas.gov.ph/portal/kampanya-laban-sa-asf-mas-pinaigting-pa-sa-batangas-province/

National Meat Inspection Service. (2021). *Home: Accredited List*. Retrieved from National Meat Inspection Service: https://nmis.gov.ph/menu-accr-list

National Meat Inspection Services. (n.d.). Retrieved February 26, 2021, from https://nmis.gov.ph/images/pdf/accredited_list/Poultry_Dressing_Plant.pdf

Pabuayon, I.M. et. al., 2017. Analysis of S&T-related Institutional Capacity and Readiness to Effectively Implement the Philippine Food Safety Act. Terminal Report. UPLB-PCAARRD.

Philippine Statistics Authority. (2021). *Backyard Livestock & Poultry Survey (BLPS), Commercial Livestock & Poultry Survey (CLPS).* Quezon: PSA.

Philippine Statistics Authority. (2021). *Swine Situation Report: October to December 2020.* Quezon: PSA.

Philippine Statistics Authority. (n.d.). Retrieved February 25, 2021, from https://openstat.psa.gov.ph/PXWeb/pxweb/en/DB/DB__2E__LP/?tablelist=true&rxid=bdf9d8da-96f1-4100-ae09-18cb3eaeb313

Philippine Statistics Authority. (n.d.). Retrieved February 26, 2021, from https://openstat.psa.gov.ph/PXWeb/pxweb/en/DB/DB__2M__FG/0032M4AFP10.px/chart/chartViewLine/?rxid=42d56361-16c4-4301-9e96-c388fe7cafc7

Philippine Statistics Authority. (n.d.). Retrieved February 26, 2021, from https://openstat.psa.gov.ph/PXWeb/pxweb/en/DB/DB__2M__FG/0032M4AFP11.px/table/tableViewLayout1/?rxid=42d56361-16c4-4301-9e96-c388fe7cafc7

Simeon, L. M. (2020, September 25). *Home: News Clippings.* Retrieved from Department of Agriculture: https://www.da.gov.ph/wp-content/uploads/2020/12/CLIPPINGS-FOR-SEPTEMBER-25-2020.pdf

Annex 2. B-SAFE Baseline Indicator Table: Proportions and Means

Notes:

1. Proportions/percentage values of estimated number of adopters of improvement management practices under column A are calculated relative to total population of value chain actors covering all 6 commodities (i.e., numerator: value for disaggregate; denominator: population of 6 VCs).
2. Means/average values under column A for volume and value are calculated relative to total estimated number of producers and firms adopting improve management practices covering all 6 commodities (i.e., numerator: value for disaggregate; denominator: total number of producers and firms adopting improve management practices in all 6 VCs).
3. Proportions/percentage values of estimated number of adopters of improved management practices under column B are calculated relative to population of value chain actors of respective commodities (i.e., numerator: value for disaggregate; denominator: population of respective VCs)

No.	INDICATOR TITLE	Proportions and Means					
		Calculated Relative to Either Total Population or Adopters of 6 VCs			Calculated Relative to Population of Respective VCs		
		A			B		
		TOTAL	PRODUCER	TRADER, PROCESSOR	TOTAL	PRODUCER	TRADER, PROCESSOR
SI-4	Number of individuals in the agriculture system who have applied improved management practices or technologies with USDA assistance						
	Disaggregation by commodity type:	**99.51%**	**99.61%**	**98.65%**	**99.51%**	**99.61%**	**98.65%**
	✓ Rice	9.42%	9.42%	9.42%	100.00%	100.00%	100.04%
	✓ Corn	43.20%	43.19%	43.32%	99.73%	99.70%	100.01%
	✓ Swine	31.56%	31.64%	30.77%	99.72%	100.00%	97.22%
	✓ Broiler Chicken	8.40%	8.44%	8.05%	98.51%	98.96%	94.39%
	✓ Milkfish	3.54%	3.52%	3.70%	95.80%	95.33%	100.00%
	✓ Coco sugar	3.39%	3.39%	3.39%	100.00%	100.00%	100.00%
	Disaggregation by Value chain actor type:	**99.51%**	**99.61%**	**98.65%**			
	✓ Smallholder producers	68.67%	76.30%	0.00%			
	✓ Non-smallholder producers	20.98%	23.31%	0.00%			
	✓ People in government	0.00%	0.00%	0.00%			
	✓ People in private sector firms	9.86%	0.00%	98.65%			
	✓ People in civil society	0.00%	0.00%	0.00%			
	✓ Others	0.00%	0.00%	0.00%			
	Disaggregation by sex:	**99.51%**	**99.61%**	**98.65%**			
	✓ Male	58.27%	59.22%	49.74%			
	✓ Female	41.24%	40.38%	48.91%			
	Disaggregation by age:	**99.51%**	**99.61%**	**98.65%**			
	✓ 15-29	3.37%	2.92%	7.39%			
	✓ 30+	96.14%	96.69%	91.26%			

No.	INDICATOR TITLE	Proportions and Means					
		Calculated Relative to Either Total Population or Adopters of 6 VCs			Calculated Relative to Population of Respective VCs		
		A			B		
		TOTAL	PRODUCER	TRADER, PROCESSOR	TOTAL	PRODUCER	TRADER, PROCESSOR
	Disaggregation by Management practice or technology type						
	✓ Crop genetics	39.75%	44.16%	0.00%			
	✓ Cultural practices	89.30%	99.22%	0.00%			
	✓ Livestock management	38.71%	40.08%	26.37%			
	✓ Wild-caught fisheries management	1.19%	1.32%	0.00%			
	✓ Aquaculture management	3.13%	3.47%	0.00%			
	✓ Natural resource or ecosystem management	61.03%	67.81%	0.00%			
	✓ Pest and disease management	83.98%	93.31%	0.00%			
	✓ Soil-related fertility and conservation	30.15%	33.51%	0.00%			
	✓ Irrigation	6.42%	7.13%	0.00%			
	✓ Agriculture water management-non-irrigation based	53.91%	59.90%	0.00%			
	✓ Climate mitigation	75.30%	83.66%	0.00%			
	✓ Climate adaptation/climate risk management	67.46%	74.96%	0.00%			
	✓ Marketing and distribution	2.35%	2.49%	1.08%			
	✓ Post-harvest handling and storage	57.70%	56.42%	69.21%			
	✓ Value-added processing	8.05%	3.37%	50.15%			
	✓ Other	0.00%	0.00%	0.00%			
CI-1	Number of individuals using improved packaging, equipment, transportation, or cold storage as a result of B-SAFE investment						
	Disaggregation by technology type:						
	✓ Packaging	16.46%	14.78%	31.52%			
	✓ Equipment	36.94%	39.06%	17.82%			
	✓ Transportation	21.25%	18.20%	48.70%			
	✓ Cold storage	1.43%	1.18%	3.70%			
	Disaggregation by sex:	**48.49%**	**47.40%**	**58.29%**			
	✓ Male	26.95%	26.50%	31.05%			
	✓ Female	21.53%	20.90%	27.24%			
SI-18	Value of annual sales of farms and firms receiving USDA assistance						
	Disaggregation by commodity type:	**39,300.89**	**21,736.12**	**197,387.79**			
	✓ Rice	1,474.51	645.22	8,938.29	15,656.69	6,850.82	94,941.19
	✓ Corn	3,344.46	1,735.63	17,824.33	7,719.84	4,006.23	41,145.22
	✓ Swine	17,794.31	8,417.36	102,188.98	56,231.30	26,599.54	322,917.18
	✓ Broiler Chicken	9,470.46	5,815.69	42,364.16	111,047.57	68,197.15	496,474.31
	✓ Milkfish	6,314.56	4,620.92	21,557.71	89,126.71	34,217.38	583,310.66
	✓ Coco sugar	902.60	501.30	4,514.33	26,621.17	14,785.47	133,142.50

No.	INDICATOR TITLE	Proportions and Means					
		Calculated Relative to Either Total Population or Adopters of 6 VCs			Calculated Relative to Population of Respective VCs		
		A			B		
		TOTAL	PRODUCER	TRADER, PROCESSOR	TOTAL	PRODUCER	TRADER, PROCESSOR
	Disaggregation by type of producer/firm	39,300.89	21,736.12	197,387.79			
	✓ Producer-smallholder	9,940.13	9,940.13				
	✓ Producer-non-smallholder	60,102.63	60,102.63				
	✓ Firm-microenterprise	192,602.97		192,602.97			
	✓ Firm-small and medium enterprise	238,264.65		238,264.65			
	✓ Firm-large enterprise or corporation.						
	Disaggregation by sex of producer or proprietor	39,300.89	21,736.12	197,387.79			
	✓ Male	26,950	16,313	122,691			
	✓ Female	12,351	5,423	74,697			
	✓ Mixed	0	0	0			
	Disaggregation by age:	39,300.89	21,736.12	197,387.79			
	✓ 15-29	461	250	2,362			
	✓ 30+	38,840	21,486	195,026			
	✓ Mixed	0	0	0			
SI-19	Volume of commodities sold by farms and firms receiving USDA assistance						
	Disaggregation by commodity type:	16.15	8.81	82.25			
	✓ Rice	1.47	0.97	6.04	15.66	10.27	64.18
	✓ Corn	6.40	3.74	30.27	14.76	8.64	69.87
	✓ Swine	4.81	1.49	34.66	15.19	4.71	109.53
	✓ Broiler Chicken	1.89	1.37	6.62	22.19	16.04	77.53
	✓ Milkfish	1.44	1.14	4.17	39.06	30.85	112.92
	✓ Coco sugar	0.14	0.10	0.49	4.06	2.92	14.36
	Disaggregation by type of producer/firm	16.15	8.81	82.25			
	✓ Producer-smallholder	6.05	6.05				
	✓ Producer-non-smallholder	17.83	17.83				
	✓ Firm-microenterprise	42.40		42.40			
	✓ Firm-small and medium enterprise	292.30		292.30			
	✓ Firm-large enterprise or corporation.						
	Disaggregation by sex of producer or proprietor	16.15	8.81	82.25			
	✓ Male	10.80	6.11	53.04			
	✓ Female	5.35	2.70	29.21			
	✓ Mixed	0.00	0.00	0.00			
	Disaggregation by age:	16.15	8.81	82.25			
	✓ 15-29	0.30	0.12	1.99			
	✓ 30+	15.85	8.69	80.26			
	✓ Mixed	0.00	0.00	0.00			

No.	INDICATOR TITLE	Proportions and Means					
		Calculated Relative to Either Total Population or Adopters of 6 VCs			Calculated Relative to Population of Respective VCs		
		A			B		
		TOTAL	PRODUCER	TRADER, PROCESSOR	TOTAL	PRODUCER	TRADER, PROCESSOR
	Number of **producer/firm** in the agriculture system who have applied improved management practices or technologies (not an official indicator; needed for averaging of volume and value data)						
	Disaggregation by type of producer/firm	**99.51%**	**99.61%**	**98.65%**			
	✓ Producer-smallholder	68%	76%	0%			
	✓ Producer-non-smallholder	21%	24%	0%			
	✓ Firm-microenterprise	8%	0%	82%			
	✓ Firm-small and medium enterprise	2%	0%	16%			
	✓ Firm-large enterprise or corporation.	0%	0%	0%			
SI-11	Number of host government or community-derived risk management plans formally proposed, adopted, implemented or institutionalized with USDA assistance						
	Disaggregation by type:						
	✓ Government	14					
	✓ Community	2					
	Disaggregation by Phase of development:						
	✓ Proposed - has started working on or designing a risk management strategy in conjunction with the community or host government	2					
	✓ Adopted - has been officially accepted by the stakeholders	1					
	✓ Implemented - elements of the plan are being actively implemented	8					
	✓ Institutionalized - host government or community internalizes the risk management plan and take over administration, financing, and implementation	5					
CI-2	Number of farms/firms/ laboratories with GAP, GMP, HACCP, or ISO certification as a result of USDA assistance						
	Disaggregation by type:						
	✓ Farm	109	109				
	✓ Firm	40		40			
	✓ Laboratory						
	Type of certification:						
	✓ GAP	23	23	0			
	✓ GHAP	1277	1277	0			
	✓ GAqP	59	59	0			
	✓ GMP	0	0	0			
	✓ HACCP	1016	547	469			
	✓ ISO	0	0	0			
	Others (if there other types of certification)						

No.	INDICATOR TITLE	Proportions and Means					
		Calculated Relative to Either Total Population or Adopters of 6 VCs			Calculated Relative to Population of Respective VCs		
		A			B		
		TOTAL	PRODUCER	TRADER, PROCESSOR	TOTAL	PRODUCER	TRADER, PROCESSOR
	✓ ORGANIC AGRICULTURE	62	62	0			
	✓ ECC	78	0	78			
	✓ NMIS	847	0	847			
	✓ FDA	101	0	101			

Annex 3. Selection of Sample Clusters Using Systematic Sampling

1. Steps using two-stage cluster design with listing operation and systematic sampling of producer respondents:

   Create a First Stage Cluster Frame (in the study cluster refers to barangay with significant production of the subject commodity).

Cluster Number	Name of Cluster (Barangay)	Location of Cluster (GPS coordinate)	Municipality	Province
1				
2				
3…				
N				

1.1. Calculate the number of sample clusters using the following formula:

$$m = \frac{TSPP}{15}$$

Where: m = Number of sample clusters
TSPP = Total sample size for producers per province
15 = Sample size per cluster

1.1. Calculate the sampling interval using the following formula:

$$k = \frac{M}{m}$$

Where: k = Sampling interval
M = Total number of clusters in cluster frame
m = Number of sample clusters

1.2. To determine the specific clusters to survey, follow the steps below:

1.2.1. Generate the random start:

RS = RN X k

Where:
RS = Random start
RN = Random number (generate using excel)
k = Sampling interval

Note: Generate random number using excel function: =rand(). Do not round off the number (at least get up to 4 decimal points)

1.2.2. Cluster Selection:

First cluster = RN X k = RS
Second cluster = RS + k
Third cluster = RS + 2k
Forth cluster = RS + 3k
…… continue up to the last sample cluster

Example:

Assuming random number = 0.3146 and k = 3.63 therefore RS = 1.14
First cluster to select is cluster number 2
Second cluster to select is 1.14 + 3.63 = 4.77 = cluster number 5
Third cluster is 1.14 + 2(3.63) = 8.69 is cluster number 9
….continue up to the last cluster

Cluster Number	Name of Cluster (Barangay)	Cluster Sample
1	A	
2	B	First cluster
3	C	
4	D	
5	E	Second cluster
6	F	
7	G	
8	H	
9	I	Third cluster
10	J	
…N		

1.3. To determine the respondents to sample per cluster, follow the steps below:

1.3.1. Create the beneficiary (i.e. producers) frame. This can be done by asking the names and location of producers of the subject commodity in the selected cluster. The barangay captain or other barangay officials can probably provide a list or information on this.

Name of Producer	Sample Cluster Number	Municipality
1		
2		
3…		
N		

1.3.2. Use systematic sampling as follows:

1.3.2.1. Calculate the sampling interval:

$$k = \frac{M}{m}$$

Where k = sampling interval

M = Total number of producers of the subject commodity in the cluster/barangay

m = Total number producers to sample

Note: Round-off k to nearest integer

4.5.2.1. Generate the random start:

RS = RN X k

Note: RN should be an integer (use excel function: = randbetween(1,k)

1.3.2.2. Selecting the survey respondent

Follow procedure 4.4.2, but this time use survey respondent instead of cluster.

Example of randomly selecting respondents in a selected cluster (say cluster B) and assuming that the cluster has 100 producers of the subject commodity from which 15 will be randomly selected as survey respondents:

k = 100/15 = 6.67 = 7 (when rounded off)

Calculate random number using excel function: =randbetween(1,7). Suppose the random number generated is 4, then:

RS = RN X k = 4 X 7 = 28 (therefore, respondent number 28 will be the first sample

RS +k = 28+7 = 35 (respondent number 35 is the second sample)
RS +2k = 28+14 = 42 (respondent number 42 is the third sample)
….continue to last sample

5.0. Systematic Sampling of Traders/Processors

5.1. Create the traders/processors sampling frame. This can be created by asking producers of the names and locations/contact information of producers and processors they know in the province. Note that we are not clustering the traders/processors. We just try to identify as exhaustively as possible the names of traders and processors at the province level from which samples can be drawn.

List of traders/processors (of subject commodity) in the province

ID Number	Names of traders/processors	Locations	Contact Information
1			
2			
3…			
N			

5.2. Follow procedures for systematic sampling in 4.5.2. this time at the provincial level

Annex 4. List of Organizations for Key Informant Interviews

1. Philippine Coconut Authority
2. Provincial Agriculture Office, Bukidnon
3. Bureau of Fisheries and Aquatic Resources Region 1
4. Office of the Provincial Agriculturist, Davao del Sur
5. Department of Agriculture Field Office 4-A
6. Office of City Veterinarian-Tanauan City, Batangas
7. Municipal Agriculture Office-Bansalan, Davao del Sur
8. Department of Agriculture Field Office 10
9. Office of the Provincial Agriculturist, Misamis Oriental
10. City Agriculture Office-Valencia City, Bukidnon
11. Municipal Agriculture Office-Bani, Pangasinan
12. Batangas Office of the Provincial Veterinarian
13. Municipal Agriculture Office-Medina, Misamis Oriental
14. Provincial Agriculture Office, Pangasinan
15. Philippine Maize Federation, Inc
16. Cold Chain Association of the Philippines
17. United Broilers and Raisers Association
18. International Training Center on Pig Husbandry

Annex 5. Survey Questionnaires

Annex 5.1 Chicken

Production period: October 2019 – September 2020

Interviewer/Enumerator: _____ Date of Survey: _____

Reviewed by: _____

A. RESPONDENT'S LOCATION	
1. Province	
2. City/Municipality	
3. Barangay	
4. GPS Coordinate	Latitude:
	Longitude:

B. PROFILE OF RESPONDENT	
1. Name of Respondent (Last Name, First Name, M.I.)	
2. Contact Number and Email	
3. Sex	[1] Male [2] Female
4. Age as of last birthday	
5. Ethnicity	
6. Number of years in school/Level	
7. No. of years engaged in chicken production	
8. Household Size	
9. Household monthly income (PhP)	
10. Non-farm monthly income (PhP) Source:	
11. Membership to Organization	[1] Yes [0] No (Proceed to No. 13)
12. Type of organization	[1] Farmer's Organization [2] Cooperative [3] Others, specify: _____
13. Farm/Firm Lead's Name (Last Name, First Name, M.I.)	
14. Farm/Firm Lead's Sex	[1] Male [2] Female
15. Farm/Firm Lead's VC Actor Type	[1] Smallholder Producers (at least 1 head of bird) [2] Non-Smallholder Producers (1K broilers; 100 layers & 100 broilers) [3] People in Private Sector Firm [4] People in Civil Society [5] Others, please specify: _____
16. Type of Producer/Firm	[1] Producer-Smallholder (Php 180K and below of sales) [2] Producer-Non-Smallholder (Php 180K and above of sales) [3] Firm-Microenterprise (Php 3M and below asset size) [4] Firm-Small and Medium Enterprise (Php 3M to Php100M asset size) [5] Firm-Large Enterprise or Corporation (Php 100M and above asset)
17. Arrangement	[1] Integrator [2] Contract Grower [3] Not applicable
18. Adopter Unit	[1] Individual [2] Organization/Firm [3] Not Applicable
19. Total No. of Poultry Houses	
20. Number of Birds per house	
21. Number of cycles from October 2019 – September 2020	
22. Type of breed	[1] Native[2] Non-native or Exotic
Capacity building and support services received:	

23. Have you attended trainings related to productivity improvement?	[1] Yes [0] No If Yes, please identify three (3) trainings 1. _____ 2. _____ 3. _____ If No, state reasons for not being able to attend/participate in related trainings. _____
24. Have you attended trainings related to food safety?	[1] Yes [0] No If Yes, please identify three (3) trainings 1. _____ 2. _____ 3. _____ If No, state reasons for not being able to attend/participate in related trainings. _____
25. Do you have access to extension services?	[1] Yes [0] No
26. Do you have access to credit?	[1] Yes [0] No (Proceed to No. 28)
27. What are your sources of credit?	[1] Formal [2] Informal [3] Both
28. Do you have access to agricultural insurance?	[1] Yes [0] No If yes, please specify the source: [1] Government programs, please specify: _____ [2] Other source: _____

C. TECHNOLOGY ADOPTION		
1. Are you aware of the Good Animal Husbandry Practices (GAHP)?	[1] Yes	[0] No
2. If yes, are you practicing GAHP?	[1] Yes	[0] No
3. Is your farm certified under GAHP?	[1] Yes	[0] No
4. After explaining the benefits, are you willing to adopt GAHP?	[1] Yes	[0] No

	Awareness/ knowledge of the technology/ practices	Adopting the technology/ practice?	Level of adoption Rating Scale: 1-5 (With remarks)	Reason for non-adoption	If NOT adopting what are the current farmer's practice	Willing to adopt the technology/ practice?	State your reason
5. Good Animal Husbandry Practices (GAHP)							
5.1. Farm Components							
5.1.1. Type of animal housing (describe and rate)							
5.1.2. Location (describe and rate)							
5.2. *Feed, Veterinary Inputs, and Water*							
5.2.1. Water quality monitoring	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.2.2. Waste management (w/ ECC) *Put a remark if with ECC or none	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.2.3. Food safety assurance, please specify:	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
a. Feed quality control	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
b. Food defense systems (threats of sabotage, hazards)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	

	Awareness/ knowledge of the technology/ practices	Adopting the technology/ practice?	Level of adoption Rating Scale: 1-5 (With remarks)	Reason for non-adoption	If NOT adopting what are the current farmer's practice	Willing to adopt the technology/ practice?	State your reason
c. Safe use of antibiotics	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
d. Others, specify:	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.3 Farm Management							
5.2.4. Production operation manual	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.2.5. Hygiene and sanitation program (SPS program)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.2.6. Biosecurity measures	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
a. use of vehicle dip	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
b. shower (describe)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
c. downtime	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
d. use of PPE	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
e. others, specify:	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.2.7. *Climate Mitigation*	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	

	Awareness/ knowledge of the technology/ practices	Adopting the technology/ practice?	Level of adoption Rating Scale: 1-5 (With remarks)	Reason for non-adoption	If NOT adopting what are the current farmer's practice	Willing to adopt the technology/ practice?	State your reason
a. Use of tunnel ventilation	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
b. Other climate adaptation (specify)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.3. Animal genetics/breed selection	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
	a. Breed/strain of day-old chicks used						
	b. Source of day-old chicks			[1] Registered hatchery [2] Own farm/hatchery [3] Others, pls. specify_____			
	c. Issues on the quality of day-old chicks						
	d. SPS issues in bringing day-old chicks to the farm						
	e. How do you address SPS issues?						
5.4. *Chicken Health Management*							
5.4.1. Feeding standard/ technologies	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
a. Use of prebiotics	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
b. Use of probiotics	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.4.2. Disease management program	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
a. Avian Influenza Management	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	

	Awareness/ knowledge of the technology/ practices	Adopting the technology/ practice?	Level of adoption Rating Scale: 1-5 (With remarks)	Reason for non-adoption	If NOT adopting what are the current farmer's practice	Willing to adopt the technology/ practice?	State your reason
b. Vaccination	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
c. Presence of Veterinarian	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.4.3. Animal welfare	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.5. *Transportation and Storage*							
5.5.1. Use of BAI accredited transport vehicles	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.5.2. Appropriate use of animal crates	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.6. Record-keeping							
5.6.1. Production Record	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.6.2. Others, please specify:	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
6. Postharvest Practices							
6.1. Dressing Plant							
6.1.1. NMIS accreditation	[1] Yes [0] No If yes, what class? [1] Locally Registered Meat Establishment [2] AA [3] AAA						
6.1.2. Description of dressing plant (status of ownership, operator, etc.)	[1] LGU owned and operated [2] Leased from LGU [3] Privately-owned and operated						
6.1.3. Biosecurity measures	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	

	Awareness/ knowledge of the technology/ practices	Adopting the technology/ practice?	Level of adoption Rating Scale: 1-5 (With remarks)	Reason for non-adoption	If NOT adopting what are the current farmer's practice	Willing to adopt the technology/ practice?	State your reason
a. use of vehicle dip	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
b. shower	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
c. use of PPE	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
d. others (specify)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
6.1.4. Sanitation of crates	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
6.1.5. Animal holding facilities (specify innovation)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
6.1.6. Operation manual	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
6.1.7. Hygiene and sanitation program (SPS program), SSOP, GMP	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
6.1.8. Quality management system, HACCP, ISO, etc.	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
6.1.9. Water quality monitoring	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	

	Awareness/ knowledge of the technology/ practices	Adopting the technology/ practice?	Level of adoption Rating Scale: 1-5 (With remarks)	Reason for non-adoption	If NOT adopting what are the current farmer's practice	Willing to adopt the technology/ practice?	State your reason
6.1.10. Pest control	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
6.1.11. Line dressing operation	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
a. Capacity, (birds/hour)							
b. No. of labor							
c. Meat control officer/inspector	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
6.1.12. Cold storage facilities	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
a. Blast freezer	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
b. Storage freezer	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
6.1.13. Improved packaging	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
6.1.14. Improved equipment, please specify:	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
6.1.15. Carcass cutting facilities	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
	Production output	[1] Whole carcass [2] Cut-ups					
	Room temperature	_____ °C					
6.1.16. Packaging system	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
	Type of packaging	[1] Vacuum packed [2] Modified atmosphere [3] Skintight [4] No packaging					

	Awareness/ knowledge of the technology/ practices	Adopting the technology/ practice?	Level of adoption Rating Scale: 1-5 (With remarks)	Reason for non-adoption	If NOT adopting what are the current farmer's practice	Willing to adopt the technology/ practice?	State your reason
	Packaging system (if applicable)		[1] Automated [2] Manual				
6.1.17. Improved products transportation facilities, NMIS accredited van	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
	NMIS accredited?	[1] Yes [0] No					
	Refrigerated?	[1] Yes [0] No					
	Status of meat	[1] Frozen [2] Chilled [3] Warm					
7. Marketing System	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
8. Meat Shop Operation	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
9. Wet market	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	

D. FARM PRODUCTION VOLUME AND VALUE (Average)	
1. Total No. of Poultry Houses	
2. Number of Birds per house	
3. Number of cycles from October 2019 – September 2020 (per house)	
4. Volume of production/cycle (kg)	
5. Volume sold (%)	
6. Volume consumed (%)	
7. Volume wasted (%)	
8. No. of birds/cycle	
9. Average weight/bird (kg)	
10. Farmgate price (P/kg)	
11. Value of Sales (if paid in PHP)	
12. Input Cost (in PHP) (Cost per bird)	
a. Feeds	
b. Materials/Biologics	
c. Utilities	
d. Labor Cost	
13. Income/bird (PHP)	
14. Feed conversion ratio	

E. CHICKEN FARM PERFORMANCE										
1. On Scale of 1-10 (10 being the highest) rate the performance in terms of Productivity	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
2. On Scale of 1-10 (10 being the highest) rate the performance in terms of Food Safety	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
3. Existing public-private partnership	[1] Yes [0] No									
4. Certification to standards (eg. GAHP, Animal Welfare, others)										
5. Investment in productivity improving technologies (PhP)										

6. Investment in food safety technologies (PhP)	

F. MARKETING OF PRODUCTS	
1. What are the major products being sold?	[1] Live chicken [2] Poultry Meat [3] Others, please identify: _____
2. Major market for the products (identify traders/markets where produced are sold)	
3. Distance of Farm to Market	
4. Farm to Market Road Conditions	[1] Poor – Totally unpaved (earthen, gravel) [2] Fair – Partially paved (with earthen, gravel and concrete parts) [3] Good – Totally paved (concrete, asphalt)

G. PROBLEMS ENCOUNTERED		
Risk Factors	Have you encountered these problems?	What are the mitigating measures adopted to address the problems?
1. Feed Adulteration	[1] Yes [0] No	
2. Feed Misbranding	[1] Yes [0] No	
3. Avian Flu	[1] Yes [0] No	
4. Other Diseases (Specify)	[1] Yes [0] No	
5. Earthquake	[1] Yes [0] No	
6. Landslide	[1] Yes [0] No	
7. Typhoon and/or Flood	[1] Yes [0] No	
8. Labor Dispute	[1] Yes [0] No	
9. Others, please specify:		

H. ASSISTANCE NEEDED	
Assistance needed:	Agencies involved: (Government, private, NGO, etc.)
1. Technical assistance	
2. Equipment and machineries	

3. Financial assistance	
4. Market assistance	
5. Others, please specify: _____	

Annex 5.2. Coco Sugar

Production period: October 2019 – September 2020

Interviewer/Enumerator: _____ Date of Survey: _____
Reviewed by: _____

A. RESPONDENT'S LOCATION	
1. Province	
2. City/Municipality	
3. Barangay	
4. GPS Coordinate	Latitude:
	Longitude:

B. PROFILE OF RESPONDENT	
1. Name of Respondent (Last Name, First Name, M.I.)	
2. Contact Number and Email	
3. Sex	[1] Male [2] Female
4. Age as of last birthday	
5. Ethnicity	
6. Number of years in school/Level	
7. Number of years engaged in sap/syrup production	
8. Household size	
9. Household monthly income (PHP)	
10. Non-farm monthly income (PHP) Source	
11. Membership to organization	[1] Yes [0] No (Proceed to No. 13)
12. Type of organization	[1] Farmer's Organization [2] Cooperative [3] Others, specify: _____
13. Farm/Firm Lead's Name (Last Name, First Name, M.I.)	
14. Farm/Firm Lead's Sex	[1] Male [2] Female

15. Farm/Firm Lead's VC Actor Type	[1] Smallholder Producers (Php 180K and below of sales) [2] Non-Smallholder Producers (Php 180K and above of sales) [3] People in Private Sector Firm [4] People in Civil Society [5] Others, please specify: _____
16. Type of Producer/Firm	[1] Producer (Sap)-Smallholder (Php 180K and below of sales) [2] Producer (Sap)-Non-Smallholder (Php 180K and above of sales) [3] Producer (Syrup)-Smallholder (Php 180K and below of sales) [4] Producer (Syrup)-Non-Smallholder (Php 180K and above of sales) [5] Firm-Microenterprise (Php 3M and below asset size) [6] Firm-Small and Medium Enterprise (Php 3M to Php100M asset size) [7] Firm-Large Enterprise or Corporation (Php 100M and above asset size)
17. Adopter Unit	[1] Individual [2] Organization/Firm [3] Not Applicable
18. Actual production capacity from September 2019 – October 2020 (%)	
Capacity building and support services received:	
19. Have you attended trainings related to productivity improvement?	[1] Yes [0] No If Yes, please identify three (3) trainings 1. _____ 2. _____ 3. _____ If No, state reasons for not being able to attend/participate in related trainings. _____
20. Have you attended trainings related to food safety?	[1] Yes [0] No If Yes, please identify three (3) trainings 1. _____ 2. _____ 3. _____ If No, state reasons for not being able to attend/participate in related trainings. _____
21. Are you adopting voluntary sustainability standards?	[1] GAP [2] Organic Certification, If yes, what stage of certification? [1] Completed [2] Ongoing [3] Philippine National Standards [4] FDA Certification (license to operate)

	If yes, what stage of certification? [1] Completed [2] Ongoing [5] Others, please specify: _____
22. What are the difficulties in getting permits/certification?	
23. Do you have access to extension services?	[1] Yes [0] No
24. Do you have access to credit?	[1] Yes [0] No (Proceed to No. 26)
25. What are your sources of credit?	[1] Formal [2] Informal [3] Both
26. Do you have access to agricultural insurance?	[1] Yes [0] No If yes, please specify the source: [1] Government programs, please specify: _____ [2] Other source: _____

C. TECHNOLOGY ADOPTION		
10. Are you aware of the Philippine National Standard for Coco Sap Sugar?	[1] Yes	[0] No
11. If yes, are you practicing PNS for Coco Sap Sugar?	[1] Yes	[0] No
12. Is your farm certified under Organic Agriculture?	[1] Yes	[0] No
13. After explaining the benefits, are you willing to adopt the PNS for Coco Sap Sugar?	[1] Yes	[0] No

	Awareness/ knowledge of the technology/ practices	Adopting the technology/ practice?	Level of adoption Rating Scale: 1-5 (With remarks on rating)	Reason for non-adoption	If NOT adopting what are the current farmer's practice	Willing to adopt the technology/ practice?	State your reason
I. Philippine National Standards for Coco Sap Sugar							
a. Harvesting Techniques							
i. Collection of coconut sap	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
i.a. Sanitation of tapping knife	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
i.b. Collection of liquid sap out with the use of a plastic vessel	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
i.c. Collection every 5 hours after tapping to avoid fermentation	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
i.d. Use of pH meter (not below 6)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
i.e. What percentage of product rejection encountered?							
i.f. What are the causes of product rejection?							
b. Heat Evaporation							
i. Boil the collected sap up to 115 degrees Celsius using a brick-fabricated oven	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
ii. Removal of scum to avoid the formation of dark residues on the final product	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
iii. Boiling and continuous stirring until syrup form	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	

	Awareness/ knowledge of the technology/ practices	Adopting the technology/ practice?	Level of adoption Rating Scale: 1-5 (With remarks on rating)	Reason for non-adoption	If NOT adopting what are the current farmer's practice	Willing to adopt the technology/ practice?	State your reason
iv. Transfer of syrup to low fire for initial granulation	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
c. Sugar granulation							
i. Natural cooling of thick syrup for granulation	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
ii. Manual crushing of sugar granules for powder form to break the lumps	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
d. Sieving and drying the coconut sap sugar							
i. Sieving of sugar to have a uniform particle size to produce quality product	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
ii. Putting the sugar granules in a food grade stainless tray and let dry for 1 hour to lessen the moisture content	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
iii. Use of drying facilities (e.g. oven)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
iv. Use of protective clothing/gear by workers (apron, working gloves, head caps/hair nets)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
v. Handwashing facilities (entry and exit)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
vi. Regular cleaning of utensils	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
e. Documentation and record keeping *(e.g. records for schedule of harvest, pH, boiling time, etc.)*	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
II. Good Manufacturing Practices and HACCP System (Hazard Analysis Critical Control Point) (This is a Food Safety Management System as required by Codex Alimentarius Commission)							
a. Environmental Hygiene							
i. Waste disposal	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
ii. Sanitation in sap delivery room	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	

	Awareness/ knowledge of the technology/ practices	Adopting the technology/ practice?	Level of adoption Rating Scale: 1-5 (With remarks on rating)	Reason for non-adoption	If NOT adopting what are the current farmer's practice	Willing to adopt the technology/ practice?	State your reason
iii. Sanitation of sap containers	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
b. Packaging							
i. Materials should be handled in a sanitary manner and stored in a clean, dry place.	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
ii. Use of prescribed food grade and suitable for intended use	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
iii. Packaging activities should be done in a separate room under conditions that preclude the introduction of contamination into the product.		[1] Yes [0] No				[1] Yes [0] No	
c. Handling, storage and transport							
i. Appropriate storage facility for finished product	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
ii. Transport of products from processing plant to market	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	

D. FARM PRODUCTION VOLUME AND VALUE (Average)			
15. Products produced	[1] Sap [2] Syrup [3] Sugar		
16. Average daily sap collection in liters			
17. Number of trees tapped per day			
18. Amount of syrup produced per day (liters)			
19. Volume of sugar produced per day (kg)			
	Sap (liters/day)	Syrup (liters/week)	Sugar (kg/month)
20. Quantity Sold			
21. Quantity Wasted			
22. Average price received (P/unit)			
23. Average number of days per month in operation			
24. Average number of months in operation			
25. Input Cost	Sap (P/liter)	Syrup (P/liter)	Sugar (P/kg)
e. Materials			
f. Utilities			
g. Labor Cost			

E. COCOSUGAR BUSINESS PERFORMANCE										
1. On Scale of 1-10 (10 being the highest) rate the performance in terms of Productivity	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
2. On Scale of 1-10 (10 being the highest) rate the performance in terms of Food Safety	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
3. Existing public-private partnership	[1] Yes [0] No									
4. Compliance to certification (eg. GAP, HACCP, Organic, PNS)										
5. Investment in productivity improving technologies (Php)										
6. Investment in food safety technologies (Php)										

F. MARKETING OF PRODUCT (COCO SAP SUGAR)	
1. Do you perform grading and classification?	[1] Yes [0] No
2. If yes, what are the grades/classification of coco sugar sold?	[1] Light color [2] Slightly brown [3] Brown [4] Others, please specify _____

3. Do you comply to the product packaging and labelling requirement of buyer?	[1] Yes [0] No
4. What is the usual packaging material used?	[1] Paper [2] Plastic [3] Carton [4] Bottle [5] Sachet
5. Compliance to Philippine National Standards	
6. Major market for the products (identify traders/markets where produced are sold)	
7. Are there issues on product development, branding and labeling? If yes, please specify.	
8. What percentage of product rejection encountered?	
9. What are the causes of product rejection?	
10. Distance of farm to market road (in kilometers)	
a. Farm to market road condition	[1] Poor – Totally unpaved (earthen, gravel) [2] Fair – Partially paved (with earthen, gravel and concrete parts) [3] Good – Totally paved (concrete, asphalt)

G. PROBLEMS ENCOUNTERED		
Risk Factors	Have you encountered these problems?	What are the mitigating measures adopted to address the problems?
1. Low yield of sap from existing coconut varieties in the area	[1] Yes [0] No	
2. Limited number of dwarf coconut trees in the area	[1] Yes [0] No	
3. Limited skilled manpower in collecting sap	[1] Yes [0] No	
4. High risk in collecting sap due to tall trees	[1] Yes [0] No	
5. High labor cost	[1] Yes [0] No	
6. Fermentation problem due to delays in collection and contamination	[1] Yes [0] No	
7. Adulteration due to high cost of labor	[1] Yes [0] No	
8. Lack of sanitation in storage facilities	[1] Yes [0] No	
9. Price competitiveness	[1] Yes [0] No	

Follow-up Questions	
10. If coco sap is fermented, what other by-products can be processed?	
11. Are these by-products commercially viable?	

H. ASSISTANCE NEEDED		
Assistance needed:	Please specify assistance needed	Agencies involved: (Government, private, NGO, etc.)
1. Technical assistance (e.g. Capacity building and technology upgrading)		
2. Equipment and machineries		
3. Infrastructure and storage facilities		
4. Financial assistance (Capital, Loans)		
5. Market assistance and linkaging		
6. Training on GMP-HACCP		
7. Seal of Quality Assurance/Trade marking		
8. FDA/Organic Certification		

Annex 5.3. Corn

Production period: October 2019 – September 2020

Interviewer/Enumerator: _____ Date of Survey: _____
Reviewed by: _____

A. RESPONDENT'S LOCATION	
1. Province	
2. City/Municipality	
3. Barangay	
4. GPS Coordinate	Latitude:
	Longitude:

B. PROFILE OF RESPONDENT	
1. Name of Respondent (Last Name, First Name, M.I.)	
2. Contact number and Email	
3. Sex (by birth)	[1] Male [2] Female
4. Age as of last birthday	
5. Ethnicity	
6. Number of years in school/ Level	
7. Number of years engaged in farming	
8. Household size	
9. Household monthly income (PHP)	
10. Non-farm monthly income (PHP) Source	
11. Membership to Organization	[1] Yes [0] No (Proceed to No. 13)
12. Type of organization	[1] Farmer's Organization [2] Cooperative [3] Others, specify: _____
13. Farm/Firm Lead's Name (Last Name, First Name, M.I.)	
14. Farm/Firm Lead's Sex	[1] Male [2] Female

15. Farm/Firm Lead's VC Actor Type	[1] Smallholder Producers (Php 180K and below of sales) [2] Non-Smallholder Producers (Php 180K and above of sales) [3] People in Private Sector Firm [4] People in Civil Society [5] Others, please specify: _____
16. Type of Producer/Firm	[1] Producer-Smallholder (Php 180K and below of sales) [2] Producer-Non-Smallholder (Php 180K and above of sales) [3] Firm-Microenterprise (Php 3M and below asset size) [4] Firm-Small and Medium Enterprise (Php 3M to Php100M asset) [5] Firm-Large Enterprise or Corporation (Php 100M and up asset)
17. Adopter Unit	[1] Individual [2] Organization/Firm [3] Not Applicable
18. Total No. of Hectares Planted	
19. Tenurial status	[1] Farm Owner [2] Lease Holder [3] Tenant
20. Type of production system	[1] Non-organic [2] Organic
Capacity building and support services received:	
21. Have you attended trainings related to productivity improvement?	[1] Yes [0] No If Yes, please identify three (3) trainings 1. _____ 2. _____ 3. _____ If No, state reasons for not being able to attend/participate in related trainings: _____
22. Have you attended trainings related to food safety?	[1] Yes [0] No If Yes, please identify three (3) trainings 1. _____ 2. _____ 3. _____ If No, state reasons for not being able to attend/participate in related trainings: _____
23. Are you adopting voluntary sustainability standards?	[1] GAP [2] Organic [3] Others, please specify: _____
24. Do you have access to extension services?	[1] Yes [0] No
25. Do you have access to credit?	[1] Yes [0] No (Proceed to No. 27)

26. What are your sources of credit?	[1] Formal [2] Informal [3] Both
27. Do you have access to agricultural insurance?	[1] Yes [0] No If yes, please specify the source: [1] Government programs, please specify: _____ [2] Other source: _____

C. TECHNOLOGY ADOPTION		
1.	Are you aware of the Good Agricultural Practices (GAP)?	[1] Yes [0] No
2.	If yes, are you practicing GAP?	[1] Yes [0] No
3.	Is your farm certified under GAP?	[1] Yes [0] No
4.	After explaining GAP, are you willing to adopt GAP?	[1] Yes [0] No

	Awareness/ knowledge of the technology/ practices	Adopting the technology/ practice?	Level of adoption Rating Scale: 1-5 (With remarks on rating)	Reason for non-adoption	If NOT adopting, what are the current farmer's practices	Willing to adopt the technology/ practice?	State your reason
5. Good Agricultural Practices (GAP)							
5.1. Farm Location. Assessment of farm for suitability for agricultural land use. The farmer needs to know the history of the land to determine potential hazards such as chemical (heavy metals) and physical (plastic, glass) hazards.							
5.1.1. Conduct of farm location assessment.	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.2. ***Farm Environment***. The production, post-harvest, and storage areas shall be kept clean and organized at all times. Field sanitation shall always be practiced.							
5.2.1. Soil and nutrient analysis: a. Use of color chart for fertilization	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
b. Others (Please specify):	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.2.2. Farm sanitation (farm waste mgt and sanitation, cleaning of sprayers, distance of composting and HH wastes from water supply)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.2.3. Agri water management to check to check for possible contamination	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.3. ***Farm Structure and Facility Maintenance***. Farm structures and facilities should be appropriately designed for the intended purpose and constructed separately from one another to minimize contamination.							
5.3.1. Risk assessment of storage/warehouse area (contamination from	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	

	Awareness/ knowledge of the technology/ practices	Adopting the technology/ practice?	Level of adoption Rating Scale: 1-5 (With remarks on rating)	Reason for non-adoption	If NOT adopting, what are the current farmer's practices	Willing to adopt the technology/ practice?	State your reason
chemicals and vehicle exhaust; kept dried; proper lighting – non-breakable lights/with protection)							
5.3.2. Signages for all facilities (e.g. storage areas for chemicals, harvests, tools, etc.)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.3.3. Storage/warehouse safety practices e.g..available facilities for handwashing, CR, cleaning schedule)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.3.4. Warehouse/storage maintenance	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.3.5. Warehouse/storage hygiene and sanitation; General cleanliness/waste mgt; water quality	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.3.6. Storage of pesticides and fertilizers (designated storage, away from house, preferably non-porous shelves, separate liquid/non-liquid, properly ventilated, secure)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.3.7. Pest control of facility (birds, rodents – use of traps not poison; flying insects, etc.)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.3.8. Equipment cleaning and maintenance (scheduling and recording)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	

	Awareness/ knowledge of the technology/ practices	Adopting the technology/ practice?	Level of adoption Rating Scale: 1-5 (With remarks on rating)	Reason for non-adoption	If NOT adopting, what are the current farmer's practices	Willing to adopt the technology/ practice?	State your reason
5.3.9. Sanitation of sacks and containers (appropriate and clean – free from chemical and microbial contaminants	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.3.10. Transport facility cleaning and maintenance (records)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.4. ***Farming Practices***.							
5.4.1. Crop Variety/seed selection (source of seeds, type of seeds (hybrid, inbred, farmer)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.4.2. Use of pesticides and other agrochemicals	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
a. Use of appropriate registered chemicals	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
b. Use of recommended rates	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
c. Use of recommended frequency of application	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
d. Disposal of containers of and expired pesticides and other agrochemicals	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.4.3. Integrated nutrient management	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
a. Use of manure	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
b. Use of compost	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
c. Use of straw	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
d. Others (Please specify: ____)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.4.4. Natural Resource or Ecosystem Management (e.g. SALT, organic farming, protection of water	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	

	Awareness/ knowledge of the technology/ practices	Adopting the technology/ practice?	Level of adoption Rating Scale: 1-5 (With remarks on rating)	Reason for non-adoption	If NOT adopting, what are the current farmer's practices	Willing to adopt the technology/ practice?	State your reason
system, watershed management)							
5.4.5. Integrated Pest Management (e.g. Cultural mgt, variety, water mgt., attractants, repellants, pest monitoring, chemical)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.4.6. Weed management (use of herbicide, water management)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.4.7. Water management (Protection of water quality, filtration system)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.4.8. Soil-Related Fertility and Conservation (composting, fallow period, use of crop rotation, use of different/ alternating varieties)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.4.9. Climate Mitigation (burning of straw, alternate wetting and drying, use of chemical fertilizer & pesticide, use of organic fertilizer, weed management)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.4.10. Climate Adaptation (varieties, time of planting, transplanting age, others)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.4.11. Harvesting practices (correct maturity, use of manual and mechanical harvesting)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.4.12.Shelling	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	

	Awareness/ knowledge of the technology/ practices	Adopting the technology/ practice?	Level of adoption Rating Scale: 1-5 (With remarks on rating)	Reason for non-adoption	If NOT adopting, what are the current farmer's practices	Willing to adopt the technology/ practice?	State your reason
5.4.13. Selling in cobs to processing plant/center	[1] Yes [0] No	[1] Yes [0] No					
5.4.14. Hauling (farm to dryer, proper worker attire, clean vehicle)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.4.15.Drying practices (solar, mechanical drying, proper moisture content (13%-14%)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.4.16.Hauling (dryer to storage, proper worker attire, clean vehicle, etiquette – smoking, spitting)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.4.17.Piling system (Distance from wall, use of pallets)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.4.18. Labelling (minimum GAP standard; variety, date of harvest)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.5. Worker's health and safety							
5.5.1. Worker's health and safety (e.g. proper training, use of PPE, below 18 y/o, protocols when staff are sick)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.5.2. Personnel training and records	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.6. Farm Management/farm records							
5.6.1. Proper documentation and record keeping. Farm records (all practices are recorded, financial records)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.6.2. Warehouse/storage records (inventory, etc.)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	

	Awareness/ knowledge of the technology/ practices	Adopting the technology/ practice?	Level of adoption Rating Scale: 1-5 (With remarks on rating)	Reason for non-adoption	If NOT adopting, what are the current farmer's practices	Willing to adopt the technology/ practice?	State your reason
5.6.3. Record keeping of use of pesticides	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.6.4. Record keeping of fertilizer usage	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.6.5. Traceability (where harvested, when harvested – lot numbers, etc.)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.6.6. Product recall procedures	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.6.7. Improved Packaging	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.6.8. Stock maintenance and preservation (PNS for warehousing – inventory and sampling)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	

D. FARM PRODUCTION VOLUME AND VALUE						
1. Number of production periods from September 2019 to October 2020: _____						
	First Cropping:			Second Cropping:		
Duration Period:						
Area planted (ha)						
2. Quantity Produced (metric tons)						
3. Quantity Sold (metric tons)						
4. Quantity Consumed (metric tons)						
5. Quantity wasted (metric tons)						
6. Price per kg						
7. Value of Sales (if paid in PHP)						
	No. of MD/MAD/MMD	Cost/Unit (P)	Total Cost (P)	No. of MD/MAD/MMD	Cost/Unit (P)	Total Cost (P)
1. Land Preparation						
2.1. Plowing						
2.2. Harrowing						
2.3 Furrowing						
2. Transplanting/ Planting						
3. Fertilization						
4. Pesticide Application						
5. Water Management/ Irrigation						
6. Weeding						
7. Harvesting						
8. Drying						
9. Shelling						
10. Hauling						
11. Storage						
12. Others:						
MD – Mandays (1 Manday = 8 hrs of work) MAD – Man-Animal Day (with draft animal e.g. carabao) MMD – Man-Machine Day (with rental or use of farm machineries e.g. tractor)						

	Amount (Unit)	Cost/Unit (P)	Total Cost (P)	Amount (Unit)	Cost/Unit (P)	Total Cost (P)
1. Seeds						
a. Genetic material	[1] GMO [2] Conventional Hybrid [3] OPV [4] Others, specify_____			[1] GMO [2] Conventional Hybrid [3] OPV [4] Others, specify_____		
b. Variety, please specify						
c. Source of genetic material. Please identify supplier in the locality.						
2. Fertilizers						
3. Chemicals:						
a. Pesticides						
b. Herbicides						
4. Packaging materials: please specify: _____						
5. Others: (Pls. specify) _____						
6. Where do you source your inputs? Please, identify inputs supplier in the locality.						

E. CONSOLIDATED FARMING	
1. Do you practice consolidated farming? (Enumerator to explain consolidated farming)	[1] Yes [0] No (If No, go to 3)
2. If Yes, a. What type of consolidation?	[1] consolidation at production [2] consolidation at the marketing level [3] complete consolidation, from production to marketing
b. Total area under consolidated farming(ha)	
c. No. of farmers involved in consolidated farming	
d. Total production (metric tons)	

e. Who is managing the consolidated farm?	
3. If consolidated farming will be promoted in your area, are you willing to adopt it?	[1] Yes (If Yes, go to 4) [0] No, state reason: _____
4. If yes, are you willing to adopt any of the ff:	[1] consolidation at production [2] consolidation at the marketing level [3] complete consolidation, from production to marketing
5. Farm area willing to be allocated for consolidated farming (ha)	

F. MARKETING OF PRODUCTS		
	Individual Farm	Consolidated Farm
1. What are the major products being sold? (e.g. corn grains, corn in cobs)		
2. Major market for the products (identify traders/markets where produced are sold)		
3. Distance of farm to market road (in kilometers)		
a. Farm to market road condition	[1] Poor – Totally unpaved [2] Fair – Partially paved [3] Good – Totally paved	[1] Poor – Totally unpaved [2] Fair – Partially paved [3] Good – Totally paved

G. CORN FARM PERFORMANCE										
1. On Scale of 1-10 (10 being the highest) rate the performance in terms of Productivity	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
2. On Scale of 1-10 (10 being the highest) rate the performance in terms of Food Safety	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
3. Existing public-private partnership	[1] Yes [0] No									
4. Certification to standards (eg. GAP, Organic Farm, etc.)										
5. Investment in productivity improving technologies (PhP)										
6. Investment in food safety technologies (PhP)										

H. PROBLEMS ENCOUNTERED		
Risk Factors	Have you encountered these problems?	What are the mitigating measures adopted to address the problems?

A. Production		
1. Chemical contamination (pesticide residue, heavy metals)	[1] Yes [0] No	
2. Drought	[1] Yes [0] No	
3. Pest infestation (eg. fall armyworm)		
a. Extent of infestation	[1] Yes [0] No	
b. Bureau of Plant Industry approach (likely to be the use of buffer farm areas to prevent spread of pest)	[1] Yes [0] No	
c. Biocontrol solution to fall armyworm	[1] Yes [0] No	
4. Earthquake	[1] Yes [0] No	
5. Landslide	[1] Yes [0] No	
6. Typhoon and/or Flood	[1] Yes [0] No	
B. Post-harvest		
7. Physical contamination (glass, metals, sand, stones)	[1] Yes [0] No	
8. Microbial contamination	[1] Yes [0] No	
9. Food Adulteration	[1] Yes [0] No	
10. Milling	[1] Yes [0] No	
C. Marketing		
11. Packaging and Marketing	[1] Yes [0] No	
12. Food Misbranding	[1] Yes [0] No	
13. Others, please specify: _____	[1] Yes [0] No	

I. ASSISTANCE NEEDED	
What are the assistance needed?	Who are the agencies involved: (Government, private, NGO, etc.)
9. Technical assistance	
10. Equipment and machineries	
11. Financial assistance	
12. Market assistance	

13. Others, please specify: _____	

Annex 5.4. Hogs

Production period: October 2019 – September 2020

Interviewer/Enumerator: _____ Date of Survey: _____
Reviewed by: _____

A. RESPONDENT'S LOCATION	
1. Province	
2. City/Municipality	
3. Barangay	
4. GPS Coordinate	Latitude:
	Longitude:

B. PROFILE OF RESPONDENT	
1. Name of Respondent (Last Name, First Name, M.I.)	
2. Contact Number and Email	
3. Sex	[1] Male [2] Female
4. Age as of last birthday	
5. Ethnicity	
6. Number of years in school/Level	
7. Number of years in hog farming	
8. Household Size	
9. Household monthly income (PhP)	
10. Non-farm monthly income (PHP) Source:	
11. Membership to Organization	[1] Yes [0] No (Proceed to No. 13)
12. Type of organization	[1] Farmer's Organization [2] Cooperative [3] Others, specify: _____
13. Farm/Firm Lead's Name (Last Name, First Name, M.I.)	
14. Farm/Firm Lead's Sex	[1] Male [2] Female

15. Farm/Firm Lead's VC Actor Type	[1] Backyard (Smallholder) Producers [2] Commercial (Medium to Large-scale) Producers [3] People in Private Sector Firm [4] People in Civil Society [5] Others, please specify _____	
16. Type of Producer/Firm	[1] Producer-Smallholder (Backyard) (1-20 heads of adult; 1-40 heads of young animals; 1-9 heads of adult & 1-21 heads of young animals) [2] Producer-Commercial [3] Firm-Microenterprise (up to Php3M asset size) [4] Firm-Small and Medium Enterprise (Php3M to Php100M asset) [5] Firm-Large Enterprise or Corporation (Php100M and above asset)	
17. Arrangement	[1] Integrator [2] Contract Grower [3] Not applicable	
18. Adopter Unit	[1] Individual [2] Organization/Firm [3] Not Applicable	
19. Total No. of Houses		
20. Sow level		
21. Number of head per house		
22. Number of cycles from October 2019 – September 2020	During period (With ASF):	Before period (No ASF):
23. Type of breed	[1] Native[2] Non-native or Exotic	
24. Type of operation	[1] Farrow to finish [2] Grower to finish[3] Breeder [4] Others (e.g. piglets)	
Capacity building and support services received:		
25. Have you attended trainings related to productivity improvement?	[1] Yes [0] No If Yes, please identify three (3) trainings 1. _____ 2. _____ 3. _____ If No, state reasons for not being able to attend/participate in related trainings. _____	

26. Have you attended trainings related to food safety?	[1] Yes [0] No If Yes, please identify three (3) trainings 1. _____ 2. _____ 3. _____ If No, state reasons for not being able to attend/participate in related trainings. _____
27. Do you have access to extension services?	[1] Yes [0] No
28. Do you have access to credit?	[1] Yes [0] No (Proceed to No. 30)
29. What are your sources of credit?	[1] Formal [2] Informal [3] Both
30. Do you have access to agricultural insurance?	[1] Yes [0] No If yes, please specify the source: [1] Government programs, please specify: _____ [2] Other source: _____

C. TECHNOLOGY ADOPTION		
1.	Are you aware of the Good Animal Husbandry Practices (GAHP)?	[1] Yes [0] No
2.	If yes, are you practicing GAHP?	[1] Yes [0] No
3.	Is your farm certified under GAHP?	[1] Yes [0] No
4.	After explaining the benefits, are you willing to adopt GAHP?	[1] Yes [0] No

	Awareness/ knowledge of the technology/ practices	Adopting the technology/ practice?	Level of adoption Rating Scale: 1-5 (With remarks on the rating)	Reason for non-adoption	If NOT adopting what are the current farmer's practice	Willing to adopt the technology/ practice?	State your reason
5. Good Animal Husbandry Practices (GAHP)							
5.1. Farm Establishment, Location and Facilities							
5.1.1. Type of animal housing (describe and rate)							
5.1.2. Location (describe and rate)							
5.2. Feeds and Nutrition							
5.2.1. Feeding standard/ technologies	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
c. Use of prebiotics	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
d. Use of probiotics	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.2.2. Food safety assurance system	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
e. Feed quality control	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
	Source of feeds		[1] Commercial feed millers [2] Cooperatives/association [3] Own feed mill; mix own feeds (please proceed to section of raw materials)				
	Swill feeding		[1] Yes [0] No If yes, source of swill feed:				
	Sources of raw materials (if applicable)						

	Awareness/ knowledge of the technology/ practices	Adopting the technology/ practice?	Level of adoption Rating Scale: 1-5 (With remarks on the rating)	Reason for non-adoption	If NOT adopting what are the current farmer's practice	Willing to adopt the technology/ practice?	State your reason
	a. soybean/soybean meal b. fish meal c. corn d. copra meal e. wheat/pollard f. vitamins and minerals g. pre-mixes h. amino acids i. other additives j. other ingredients not mentioned above: _____		[1] Local traders [2] Direct import (Country of origin: _____) [1] Local traders [2] Direct import (Country of origin: _____) [1] Local traders [2] Direct import (Country of origin: _____) [1] Local traders [2] Direct import (Country of origin: _____) [1] Local traders [2] Direct import (Country of origin: _____) [1] Local traders [2] Direct import (Country of origin: _____) [1] Local traders [2] Direct import (Country of origin: _____) [1] Local traders [2] Direct import (Country of origin: _____) [1] Local traders [2] Direct import (Country of origin: _____) [1] Local traders [2] Direct import (Country of origin: _____)				
	Do the farm has its own Animal Nutritionist?		[1] Yes [2] Yes, but on consultant basis [0]None				
f. Food defense systems (threats of sabotage, hazards)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
g. Safe use of antibiotics	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
d. Others, specify:	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.3. Improved production techniques							

	Awareness/ knowledge of the technology/ practices	Adopting the technology/ practice?	Level of adoption Rating Scale: 1-5 (With remarks on the rating)	Reason for non-adoption	If NOT adopting what are the current farmer's practice	Willing to adopt the technology/ practice?	State your reason
5.3.1. *Animal genetics/ breed selection*	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
	a. breed						
	b. Source of genetic material (e.g. semen, barako or gilt)			[1] Registered breeders [2] Own farm [3] LGU [4] Others, pls. specify_____			
	c. Source of piglet			[1] Registered breeders [2] Own farm [3] LGU [4] Others, pls. specify_____			
	d. Issues on the quality of piglets						
	e. SPS issues in bringing piglets to the farm						
	f. How do you address SPS issues?						
5.4. *Water for Pig*							
5.4.1. Water quality monitoring	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.4.2. Waste management (w/ ECC) *Put a remark if with ECC or none	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.5. Farm Management							
5.5.1. Production operation manual	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.5.2. Hygiene and sanitation program (SPS program)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.5.3. Biosecurity measures	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
f. use of vehicle dip	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	

	Awareness/ knowledge of the technology/ practices	Adopting the technology/ practice?	Level of adoption Rating Scale: 1-5 (With remarks on the rating)	Reason for non-adoption	If NOT adopting what are the current farmer's practice	Willing to adopt the technology/ practice?	State your reason
g. foot bath (farm entrance and all buildings)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
h. shower (describe)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
i. downtime	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
j. use of PPE	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
f. Others, specify:	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.5.4. Climate Mitigation	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
c. Use of tunnel ventilation	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
d. Other climate adaptation	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.6. *Recording*							
5.6.1. Production record	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.7. *Animal Health*							
5.7.1. Disease management program	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
d. eg. ASF	[1] Implementing strict measures to ensure BAIs' ASF-free [2] Regular check-up of facilities for infection rate [3] Multi-level bio-security protocols [4] Others: _____ [ ] farm level _____ [ ] barangay _____ [ ] municipality _____ [ ] province _____ [ ] region _____						
e. Vaccination	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	

	Awareness/ knowledge of the technology/ practices	Adopting the technology/ practice?	Level of adoption Rating Scale: 1-5 (With remarks on the rating)	Reason for non-adoption	If NOT adopting what are the current farmer's practice	Willing to adopt the technology/ practice?	State your reason
e. Presence of Veterinarian	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.8. *Animal Welfare*							
5.8.1. Proper handling and restraining of animals	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.8.2. Use of tools to minimize stress and injury to animals	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.9. *Animal Transport*							
5.9.1. Use of BAI accredited transport vehicles	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.9.2. Sanitation of vehicles	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.9.3. Description of animal transport vehicle and practices:							
	a. Ventilation	[1] Sufficient [2] Not sufficient					
	b. Rated capacity	_____ Heads					
	c. Average actual load	_____ Heads					
	d. Average travel time	_____ Hours Leaving the farm at _____ am/pm. Arrive market/slaughterhouse at _____ am/pm					
5.9.4. ASF	[1] Implementing strict measures to ensure BAIs' ASF-free [2] Regular check-up of facilities for infection rate [3] Multi-level bio-security protocols [4] Others: _____ [ ] farm level _____ [ ] barangay _____ [ ] municipality _____ [ ] province _____ [ ] region _____						
5.9.5. Others, specify:	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
6. Postharvest Practices (For Integrator only)							
6.1. Slaughterhouse							

	Awareness/ knowledge of the technology/ practices	Adopting the technology/ practice?	Level of adoption Rating Scale: 1-5 (With remarks on the rating)	Reason for non-adoption	If NOT adopting what are the current farmer's practice	Willing to adopt the technology/ practice?	State your reason
6.1.1. NMIS accreditation	[1] Yes [0] No	If yes, what class? [1] Locally Registered Meat Establishment [2] AA [3] AAA					
6.1.2. Description of slaughterhouse (status of ownership, operator, etc.)	[1] LGU owned and operated [2] Leased from LGU [3] Privately-owned and operated						
6.1.3. Biosecurity measures	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
e. use of vehicle dip	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
f. shower	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
g. use of PPE	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
h. others, specify:	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
6.1.4. Sanitation of facilities	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
6.1.5. Animal holding facilities	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
6.1.6. Operation manual	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
6.1.7. Description of slaughtering operation	Capacity		Heads/Day				
	Line operation?		[1] Yes [0] No				
	Automation		[1] Full [2] Partial [3] None				
6.1.8. Hygiene and sanitation program (SPS program), SSOP, GMP	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
6.1.9. Quality management system, HACCP, ISO, etc.	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	

	Awareness/ knowledge of the technology/ practices	Adopting the technology/ practice?	Level of adoption Rating Scale: 1-5 (With remarks on the rating)	Reason for non-adoption	If NOT adopting what are the current farmer's practice	Willing to adopt the technology/ practice?	State your reason
6.1.10. Pest control	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
6.1.11. Cold storage facilities	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
a. Carcass chiller	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
6.2. Meat cutting facilities	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
	Uses PNS pork cutting standard?		[1] Yes [0] No If No, specify standard used _____				
	Room temperature		_____°C				
6.2.1. Meat packaging system	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
	Type of packaging		[1] Vacuum packed [2] Modified atmosphere [3] Skintight [4] No packaging				
	Packaging system (if applicable)		[1] Automated [2] Manual				
6.2.2. Cold storage facilities	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
a. Carcass chiller	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
b. Blast freezer	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
c. Storage freezer	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
6.2.3. Meat/carcass transport vehicles and conditions	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
	NMIS accredited?		[1] Yes [0] No				
	Refrigerated		[1] Yes [0] No				
	Status of meat		[1] Frozen [2] Chilled [3] Warm				
7. Marketing System							
7.1. Meat Shop Operation	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
7.2. Wet market	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	

D. FARM PRODUCTION VOLUME AND VALUE (Average for all cycles)		
FOR FATTENER		
1. Total No. of Hog Houses		
2. Number of head per house		
3. Sow-level		
4. Number of cycles from October 2019 – September 2020 (per house)		
5. No. of hogs/cycle (heads)		
6. Average live weight of marketable hogs (kg/head)		
7. Farmgate price of hogs (P/kg) (live weight)		
8. Value of Sales (if paid in PHP)		
9. Value of sales (if paid in USD)		
10. Input Cost (in PHP) (Cost per head)		
a. Feeds		
i. Feed conversion ratio		
b. Materials/biologics		
c. Utilities		
d. Labor Cost		
11. Income/hog (PHP)	As reported by farmer:	As computed:
FOR BREEDER		
1. No. of gilt produced		
2. No. of boar produced		
3. No. of services for Artificial Insemination (AI)		
4. Value of gilt sold (P/head)		
5. Value of boar sold (P/head)		
6. Value of services for AI (P/service)		
7. Input Cost (in PHP) (Cost per head)		
a. Feeds		
b. Materials/biologics		
c. Utilities		
d. Labor Cost		

E. HOG FARM PERFORMANCE										
1. On Scale of 1-10 (10 being the highest) rate the performance in terms of Productivity	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
2. On Scale of 1-10 (10 being the highest) rate the performance in terms of Food Safety	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
3. Existing public-private partnership	[1] Yes [0] No									
4. Specify certification to standards (eg. GAHP, HACCP, Animal Welfare, others)										
5. Investment in productivity improving technologies (PhP)										
6. Investment in food safety technologies (PhP)										

F. MARKETING OF PRODUCTS	
1. What are the major products being sold?	[1] Live hogs [2] Pork carcass [3] Pork meat cuts [4] Others, please identify: _____
2. Major market for the products (identify traders/markets where produced are sold)	
3. Distance of Farm to Market	
4. Farm to Market Road Conditions	[1] Poor – Totally unpaved (earthen, gravel) [2] Fair – Partially paved (with earthen, gravel and concrete parts) [3] Good – Totally paved (concrete,asphalt)

G. PROBLEMS ENCOUNTERED		
Risk Factors	Have you encountered these problems?	What are the mitigating measures adopted to address the problems?
1. Feed Adulteration	[1] Yes [0] No	
2. Feed Misbranding/Mislabeling	[1] Yes [0] No	

3. African Swine Fever	[1] Yes [0] No	
4. Other Diseases (Specify)	[1] Yes [0] No	
5. Earthquake	[1] Yes [0] No	
6. Landslide	[1] Yes [0] No	
7. Typhoon and/or Flood	[1] Yes [0] No	
8. Labor Dispute	[1] Yes [0] No	
Others, please specify: _____		

H. ASSISTANCE NEEDED	
Assistance needed:	Agencies involved: (Government, private, NGO, etc.)
1. Technical assistance	
2. Equipment and machineries	
3. Financial assistance	
4. Market assistance	
5. Others, please specify: _____	

Annex 5.5. Milkfish

Production period: October 2019 – September 2020

Interviewer/Enumerator: _____ Date of Survey: _____
Reviewed by: _____

A. RESPONDENT'S LOCATION	
1. Province	
2. City/Municipality	
3. Barangay	
4. GPS Coordinate	Latitude:
	Longitude:

B. PROFILE OF RESPONDENT	
1. Name of Respondent (Last Name, First Name, M.I.)	
2. Contact Number and Email	
3. Sex	[1] Male [2] Female
4. Age as of last birthday	
5. Ethnicity	
6. Number of years in school/Level	
7. Number of years engaged in milkfish farming	
8. Household size	
9. Household monthly income (PhP)	
10. Non-farm monthly income (PhP) Source:	
11. Membership to organization	[1] Yes [0] No (Proceed to No. 13)
12. Type of organization	[1] Farmer's Organization [2] Cooperative [3] Others, specify: _____
13. Farm/Firm Lead's Name (Last Name, First Name, M.I.)	
14. Farm/Firm Lead's Sex	[1] Male [2] Female

15. Farm/Firm Lead's VC Actor Type	[1] Smallholder Producers (Php 180K and below of sales) [2] Non-Smallholder Producers (Php 180K and above of sales) [3] People in Private Sector Firm [4] People in Civil Society [5] Others, please specify: _____				
16. Type of Producer/Firm	[1] Producer-Smallholder (Php 180K and below of sales) [2] Producer-Non-Smallholder (Php 180K and above of sales) [3] Firm-Microenterprise (Php 3M and below asset size) [4] Firm-Small and Medium Enterprise (Php 3M to Php100M asset) [5] Firm-Large Enterprise or Corporation (Php 100M and up asset)				
17. Adopter Unit	[1] Individual [2] Organization/Firm [3] Not Applicable				
18. Type of operation	[1] Fingerling production operation only [2] Grow-Out Brackish pond operation [3] Grow-Out Sea cage culture (material of cage structure used: _____)				
19. Total Area		Fingerling Production Only	Grow-out Brackish pond	Grow-out Sea cage	Grow-Out Offshore
	Nursery Area	___ sq.m	___ sq.m	____sq.m	____sq.m
	Transition Area (if applicable)		___ sq.m	___ sq.m	___ sq.m
	Total Area	___ sq.m	___ sq.m	___ sq.m	___ sq.m
20. Total Production Capacity		Fingerling Production Only	Grow-Out Brackish pond	Grow-Out Sea Cage	
	Nursery Area				
	Transition Pond				
	Rearing				
21. Actual production capacity from September 2019 – October 2020 (%)					
Capacity building and support services received:					

22. Have you attended trainings related to productivity improvement?	[1] Yes [0] No If Yes, please identify three (3) trainings and training service providers 1. _____ 2. _____ 3. _____ If No, state reasons for not being able to attend/participate in related trainings. _____
23. Have you attended trainings related to food safety?	[1] Yes [0] No If Yes, please identify three (3) trainings and training service providers 1. _____ 2. _____ 3. _____ If No, state reasons for not being able to attend/participate in related trainings. _____
24. Food safety standards and practices do you know?	[1] Good Aquacultural Practices (GAqPs) [2] HACCP [3] Others, please specify: _____
25. Do you have access to extension services?	[1] Yes [0] No
26. Do you have access to credit?	[1] Yes [0] No (Proceed to No. 28)
27. What are your sources of credit?	[1] Formal [2] Informal [3] Both
28. Do you have access to agricultural insurance?	[1] Yes [0] No If yes, please specify the source: [1] Government programs, please specify: _____ [2] Other source: _____

C. TECHNOLOGY ADOPTION		
1. What do you know about Good Aquaculture Practices (GAqP)?	[1] Yes	[0] No
2. Are you practicing GAqP?	[1] Yes	[0] No
3. If yes, is your farm certified under GAqP?	[1] Yes	[0] No
4. If you know the benefits of GAqP, are you willing to adopt it?	[1] Yes	[0] No; Explain your answer.

	Awareness /knowledge of the technology/ practices	Adopting the technology/ practice?	Level of adoption Rating Scale: 1-5 (With remarks on rating)	Reason for non-adoption	If NOT adopting what are the current farmer's practice	Willing to adopt the technology/ practice?	State your reason why or why not willing to adopt technology/ practice
I. Good Aquaculture Practices							
a. Fry/Fingerling conditioning and transport							
i. Sources of fries? (Fry is less than 2cm in size)							
i.a.Type of source	[1] Local [2] Imported						
i.b. Origin	[1] Wild [2] Hatchery-bred						
i.c. Frequency of purchase/year							
ii. Sources of fingerlings? (4cm in size)							
ii.a. Type of source	[1] Local [2] Imported						
ii.b. Origin	[1] Own Farm [2] Others, specify _____						
ii.c. Frequency of purchase/year							
iii. Appropriate Packaging/Transport/materials	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
iv. Acclimatization process (temperature/salinity)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
b. Nursery management and operations (stocking and caring for fry)							
b.1. Pond Nursery							
i. Stocking density	[1] Extensive (1500-3000/ha) [2] Semi-extensive (3001-10000/ha) [3] Intensive (10001-20000/ha) [4] Others, specify						
ii. Feed Type	[1] Lablab/Plankton method [2] Use of formulated diets [3] Others, specify _____						
iii. Feeding regime/frequency							
iv. Nursing Period							

v. Average Survival Rate (%)							
b.2. Cage Nursery							
i. Cage net size/No. of Units							
ii. Stocking Density	[1] Intensive (10-20/m^3) [2] Others, specify _____						
iii.Feeding regime/frequency							
iv.Feed Type	[1] Use of formulated diets [2] Others, specify _____						
v.Nursing Period							
vi.Average Survival Rate (%)							
c. Grow out Operations							
c.1.Pond Grow out							
i. Pond preparation (cleaning/drying)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
ii. Tilling/Soil conditioning	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
iii. Liming (Type and quantity/hectare)	[1] Yes [0] No Type and quantity _____						
iv. Pest/Predator Control/Eradication (e.g. tobacco dust, teaseed)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
v. Flushing	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
vi. Fertilization	[1] Organic (chicken manure) [2] Inorganic (specify chemicals used _____)						
vi.a. Quantity/hectare							
vii. Natural food (lablab) production	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
viii. Water Level	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
ix. Water Quality (physicochemical parameters)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
x. Other Inputs (probiotics, rice bran, etc)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
xi. Stocking Density	[1] Extensive (1500-3000/ha) [2] Semi-extensive (3001-10000/ha) [3] Intensive (10001-20000/ha) [4] Others, specify						
xii. Feeding regime/frequency							
xii.a. Feed Type	[1] Lablab/Plankton method [2] Use of formulated diets [3] Others, specify _____						
xii.b. Feeding Method	[1] Hand Feeding [2] Feeding Tray [3] Demand Feeder [4] Automatic Feeder						
xiii. Water management (this pertains to water exchange procedure)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	

xiii.a. Tidal	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
xiii.b. Use of Pumps	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
xiv. Presence of Drainage canals	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
xiv.a. Central canal	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
xiv.b. Peripheral canals	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
xv. Aeration	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
xvi. Effluent Discharge Monitoring/Analysis/Recording	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
xv.a. Physicochemical parameters	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
xv.a.1. Ammonia buildup	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
xv.a.2. Dissolved Oxygen	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
xv.a.3 Temperature	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
xvii. Presence of predators Specify_____	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
xviii. Disease symptoms Specify: _____							
xviii.1. At what stage did the disease mentioned occur?	[1] Fry to fingerling [2] Fingerling stage [3] Grow out stage [4] Others (specify)						
xix. What caused the disease observed?	[1] Genetic materials (e.g. SPS issue) [2] Production and management related [3] Water quality/management [4] Feeds (type/quality) [5] Others, specify _____						
xx. Mortalities (%)							
xx.1. Fry Stage							
xx..2. Fingerling Stage							

xx.3. Grow out Stage							
xxi. Abnormalities (%)							
xxi.1. Stunted growth							
xxi.2. Deformities							
xxi.3. Others (please specify)							
xxii. Survival rate (%)							
xxiii. Average weight/size at harvest							
c.2. Cage/Pen Culture							
i. Cage net size/no. of units							
ii. Stocking Density	[1] Intensive (10-20/m^3)	[2] Others, specify _____					
iii. Feeding regime/frequency							
iii.a. Feed Type	[1] Use of formulated diets	[2] Others, specify _____					
iii.b. Feeding Method	[1] Hand Feeding	[2] Feeding Tray	[3] Demand Feeder			[4] Automatic Feeder	
iv. Net management	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
iv.a. Change net frequency	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
iv.b. Cleaning procedure	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
iv.c. Disinfection procedure	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
iv.d. Drying procedure	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
v. Monitoring	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
v.a. Physicochemical parameters							
v.a.1. Ammonia buildup	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
v.a.2. Dissolved Oxygen	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
v.a.3. Temperature	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
v.b. Check Mooring (frequency)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
v.c. Check cage structure (frequency)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
v.d. Sorting/Size Increase	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	

v.e. Presence of predators	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
v.f. Disease symptoms	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
v.g. Mortalities (%)							
v.g.1. Fry Stage							
v.g.2. Fingerling Stage							
v.g.3. Grow out Stage							
v.h. Abnormalities (%)							
v.h.1. Stunted growth							
v.h.2. Deformities							
v.h.3. Others (please specify)							
v.i. Survival rate (%)							
v.j. Average weight/size at harvest							
v.k. Monitoring of substrates	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
v.k.1. Eutrophication	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
v.k.2. Analysis of bottom substrate	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
v.l. Application of bioremediation procedures	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
d. *Grow out management*							
d.1. Pond Culture							
i. Extensive or straight-run method	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
ii. Modular or progression method	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
iii. Deep water-plankton method	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
iv. Stock manipulation or multi-size group method	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
v. Semi intensive pond culture	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
vi. Polyculture (specify other commodity: crab, shrimp, etc.)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	

vii. Intensive pond culture	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
viii. Fish farm record keeping	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
d.2. Cage Culture							
i. Modular (with stock transfers)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
ii. Straight run	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
iii. Stocking Density	[1] Extensive (1500-3000/ha)	[2] Semi-extensive (3001-10000/ha)			[3] Intensive (10001-20000/ha)		
iv. Fish farm record keeping	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
II.Good Handling Practices							
a. *Harvesting of marketable milkfish*							
a.1. Pond Culture							
i. By freshening ("pasulang")	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
ii. By total drainage	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
iii. By gill net	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
iv. By seining	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
v. By stationary fish corral	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
a.2. Cage Culture							
i. Total or partial harvest per cage net	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
b. Post-harvest handling of marketable milkfish	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
i. Washing with pond water (seawater for cage culture stocks)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
ii. Pre-chilling/icing -On-site (for pond harvest) -Live fish boat (for cage harvest)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
ii.a. Availability of ice plants within the area	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	

iii. Minimizing contact in dirty surfaces	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
iii.a. sorting and grading	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
iv. Preventing physical damage	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
v. Packing in wooden/styro boxes or metal container"bañera"	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
vi. Labelling	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
	[1] Manufacture Date		[2] Expiry Date ("Best Before)				
vii. Use of rigid wooden container if produce is to be shipped through commercial cargo truck/vessel	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
viii. Use of refrigerated transport van	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
c. Processing (if applicable)							
i. Cleaning/Degutting	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
ii. Deboning and marinating	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
	[1] Fresh		[2] Fresh Chilled	[3] Smoked		[4] Frozen	
iii. Smoking (brine/marinated)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
	[1] Drum Type		[2] Traditional Smokehouse	[3] State-of-the-art Smokehouse			
iv. Other Processes Frozen: Whole/Prime cuts (belly/back) Fresh Chilled Canned Sardine style (regular/spicy) Salmon style (regular/spicy) Spanish style Bottled Dried Brined Marinated	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
***d. Packaging and labelling* (if applicable)**	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	

		[1] Can	[2] Bottle	[3] Sachet (Multi-Polyethylene)				
***e. Improvement of processing* (if applicable)**								
i.	Semi and/or full automation system for: -Cleaning/degutting -Cutting/Slicing/Trimming -Washing	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
ii.	Use of automatic timers for critical processes (brining, margination, etc.)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
iii.	Use of conveyors	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
iv.	Strict Quality Check (microbiological tests for contamination)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
v.	***Proper storage facilities (cold storage facilities) (if applicable)***	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
vi.	Others, please specify: _____							
III.Other Food safety aspects related to marketing and transporting of milkfish (if applicable)								
i.	Use of cold storage facility	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
ii.	Use of refrigerated van for transporting milkfish	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
iii.	Upgrading of processing areas/plants (facilities, machinery and appliances, cleaning and sanitation protocols of utilities (including personnel) to ensure delivery of safe and suitable processed milkfish product	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
iv.	Upgrading and employment of modern processing methods adhering to general food safety principles	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	

D. PRODUCTION VOLUME AND VALUE (Average)		
1. Total Area (ha)		
2. Number of compartments		
3. Number of cycles (October 2019-September 2020)		
4. Production		
	Quantity	Price (PHP)
a. Small (250g or below)		
b. Medium (300g to 500g)		
c. Large (501g and above)		
d. Others		
5. Quantity Sold (%)		
a. Small (250g or below)		
b. Medium (300g to 500g)		
c. Large (501g and above)		
d. Others		
6. Quantity Consumed (%)		
7. Quantity Wasted/Loss (%)		
8. Input Cost (in PHP) (Cost per cycle)		
e. Feeds		
f. Materials		
g. Utilities		
h. Labor Cost		
i. Other inputs		

E. FISH FARM PERFORMANCE										
On Scale of 1-10 (10 being the highest) rate the farm performance in terms of Productivity	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
On Scale of 1-10 (10 being the highest) rate the farm performance in terms of Food Safety	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Existing public-private partnership	[1] Yes [0] No									
Certification to standards (eg. GAqP/GMP, HACCP)										

Investment in productivity improving technologies (PhP)	
Investment in food safety technologies (PhP)	

F. MARKETING OF PRODUCT	
1. Major market for the products (identify traders/markets where produced are sold)	
2. Distance of Farm to Market (km)	
3. Farm to Market Road Conditions	[1] Poor – Totally unpaved (earth, gravel) [2] Fair – Partially paved (some parts are earth/gravel, some parts are concrete) [3] Good – Totally paved (concrete, asphalt)

G. PROBLEMS ENCOUNTERED		
Risk Factors	Have you encountered these problems?	What are the mitigating measures adopted to address the problems?
1. Poor brackish water quality/water quality in sea-cages/water quality in off-shore production system	[1] Yes [0] No	
2. Low survival rate of fry/fingerlings	[1] Yes [0] No	
a. Probable cause of mortality		
b. Do you have a disease surveillance and/or laboratory services for diagnosis?	[1] Yes, specify _____ [0] No	
c. Stocking density		
d. What practices in poly-culture in ponds with integration of crustaceans and other finfishes are applied?		
i. Advantages		
ii. Disadvantages		
3. Diseases	[1] Yes [0] No	
a. At what stage did the disease mentioned occur?	[1] Fry to fingerling [2] Fingerling stage [3] Grow out stage [4] Others, specify _____	

b. What caused the disease observed?	[1] Genetic materials (e.g. SPS issue) [2] Production and management related [3] Water quality/management [4] Feeds (type/quality) [5] Others, specify _____		
4. Natural calamities (typhoon, flood, drought)	[1] Yes	[0] No	
5. Predators (snakes, birds, other fishes)	[1] Yes	[0] No	
6. High cost of inputs (e.g., fertilizer, supplemental feeds, fry/fingerling)	[1] Yes	[0] No	
7. Adulteration in fry/fingerlings	[1] Yes	[0] No	
8. Seasonal fluctuation in market price	[1] Yes	[0] No	
9. High labor cost	[1] Yes	[0] No	
10. Fish kill	[1] Yes	[0] No	
11. Others, please identify:			

H. ASSISTANCE NEEDED	
Assistance needed:	Agencies involved: (Government, private, NGO, etc.)
1. Technical assistance	
2. Equipment and machineries	
3. Financial assistance	
4. Market assistance	
5. Others, please specify: _____ _____ _____	

Annex 5.6. Rice

Production period: October 2019 – September 2020

Interviewer/Enumerator: _____ Date of Survey: _____

Reviewed by: _____

A. RESPONDENT'S LOCATION	
1. Province	
2. City/Municipality	
3. Barangay	
4. GPS Coordinate	Latitude:
	Longitude:

B. PROFILE OF RESPONDENT	
1. Name of Respondent (Last, First, M.I.)	
2. Contact number and Email	
3. Sex	[1] Male [2] Female
4. Age as of last birthday	
5. Ethnicity	
6. Number of years in school/Level	
7. Number of years engaged in farming	
8. Household size	
9. Household monthly income (PhP)	
10. Non-farm monthly income (PHP) Source	
11. Membership to Organization	[1] Yes [0] No (Proceed to No. 13)
12. Type of organization	[1] Farmer's Organization [2] Cooperative [3] Others, specify: _____
13. Farm/Firm Lead's Name (Last, First, M.I.)	
14. Farm/Firm Lead's Sex	[1] Male [2] Female
15. Farm/Firm Lead's VC Actor Type	[1] Smallholder Producers (Php 180K and below of sales) [2] Non-Smallholder Producers (Php 180K and above of sales) [3] People in Private Sector Firm [4] People in Civil Society [5] Others, please specify: _____
16. Type of Producer/Firm	[1] Producer-Smallholder (Php 180K and below of sales) [2] Producer-Non-Smallholder (Php 180K and above of sales) [3] Firm-Microenterprise (Php 3M and below asset size) [4] Firm-Small and Medium Enterprise (Php 3M to Php100M asset) [5] Firm-Large Enterprise or Corporation (Php 100M and up asset)

17. Adopter Unit	[1] Individual [2] Organization/Firm [3] Not Applicable
18. Total No. of Hectares Planted	
19. Tenurial status	[1] Farm Owner [2] Lease Holder [3] Tenant
20. Type of farm	[1] Irrigated [2] Rainfed
21. Type of production system	[1] Non-organic/Conventional [2] Organic
Capacity building and support services received:	
22. Have you attended trainings related to productivity improvement?	[1] Yes [0] No If Yes, please identify three (3) trainings 1. _____ 2. _____ 3. _____ If No, state reasons for not being able to attend/participate in related trainings. _____
23. Have you attended trainings related to food safety?	[1] Yes [0] No If Yes, please identify three (3) trainings 1. _____ 2. _____ 3. _____ If No, state reasons for not being able to attend/participate in related trainings: _____
24. Are you adopting voluntary sustainability standards?	[1] GAP [2] Organic [3] Others, please specify: _____
25. Do you have access to extension services?	[1] Yes [0] No
26. Do you have access to credit?	[1] Yes [0] No (Proceed to No. 28)
27. What are your sources of credit?	[1] Formal [2] Informal [3] Both
28. Do you have access to agricultural insurance?	[1] Yes [0] No If yes, please specify the source: [1] Government programs, please specify: _____ [2] Other source: _____

C. TECHNOLOGY ADOPTION	
1. Are you aware of the Good Agricultural Practices (GAP)?	[1] Yes [0] No
2. If yes, are you practicing GAP?	[1] Yes [0] No
3. Is your farm certified under GAP?	[1] Yes [0] No
4. After explaining GAP, are you willing to adopt GAP?	[1] Yes [0] No

	Awareness/ knowledge of the technology/ practices	Adopting the technology/ practice?	Level of adoption Rating Scale: 1-5 (With remarks on rating)	Reason for non-adoption	If NOT adopting, what are the current farmer's practices	Willing to adopt the technology/ practice?	State your reason why or why not willing to adopt technology/practice
5. Good Agricultural Practices (GAP)							
5.1. Farm Location. Assessment of farm for suitability for agricultural land use. The farmer needs to know the history of the land to determine potential hazards such as chemical (heavy metals) and physical (plastic, glass) hazards.							
5.1.1. Conduct of farm location assessment.	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.2. *Farm Environment*. The production, post-harvest, and storage areas shall be kept clean and organized at all times. Field sanitation shall always be practiced.							
5.2.1. Soil and nutrient analysis: c. Use of color chart for fertilization	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
d. Others (Please specify):	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.2.2. Farm sanitation (farm waste mgt and sanitation, cleaning of sprayers, distance of composting and HH wastes from water supply)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.2.3. Agri water management to check for possible contamination	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.3. *Farm Structure and Facility Maintenance*. Farm structures and facilities should be appropriately designed for the intended purpose and constructed separately from one another to minimize contamination.							
5.3.1. Risk assessment of storage/warehouse area (contamination from chemicals and vehicle exhaust; kept dried; proper	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	

	Awareness/ knowledge of the technology/ practices	Adopting the technology/ practice?	Level of adoption Rating Scale: 1-5 (With remarks on rating)	Reason for non-adoption	If NOT adopting, what are the current farmer's practices	Willing to adopt the technology/ practice?	State your reason why or why not willing to adopt technology/practice
lighting – non-breakable lights/with protection)							
5.3.2. Signages for all facilities (e.g. storage areas for chemicals, harvests, tools, etc.)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.3.3. Storage/warehouse safety practices (e.g. available facilities for handwashing, CR, cleaning schedule)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.3.4. Warehouse/storage maintenance	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.3.5. Warehouse/storage hygiene and sanitation; General cleanliness/waste mgt; water quality	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.3.6. Storage of pesticides and fertilizers (designated storage, away from house, preferably non-porous shelves, separate liquid/non-liquid, properly ventilated, secure)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.3.7. Pest control of facility (birds, rodents – use of traps not poison; flying insects, etc.)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.3.8. Equipment cleaning and maintenance (scheduling and recording)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.3.9. Sanitation of sacks and containers (appropriate and clean – free from chemical and microbial contaminants	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	

	Awareness/ knowledge of the technology/ practices	Adopting the technology/ practice?	Level of adoption Rating Scale: 1-5 (With remarks on rating)	Reason for non-adoption	If NOT adopting, what are the current farmer's practices	Willing to adopt the technology/ practice?	State your reason why or why not willing to adopt technology/practice
5.3.10. Transport facility cleaning and maintenance (records)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.4. ***Farming Practices***.							
5.4.1. Land preparation (leveling)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.4.2. Crop Variety/seed selection (source of seeds, type of seeds (hybrid, inbred, farmer)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.4.3. Seedling preparation	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.4.4. Transplanting	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.4.5. Use of pesticides and other agrochemicals							
e. Use of appropriate registered chemicals	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
f. Use of recommended rates	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
g. Use of recommended frequency of application	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
h. Disposal of containers of and expired pesticides and other agrochemicals	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.4.6. Integrated nutrient management							
e. Use of manure	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
f. Use of compost	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	

	Awareness/ knowledge of the technology/ practices	Adopting the technology/ practice?	Level of adoption Rating Scale: 1-5 (With remarks on rating)	Reason for non-adoption	If NOT adopting, what are the current farmer's practices	Willing to adopt the technology/ practice?	State your reason why or why not willing to adopt technology/practice
g. Use of straw	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
h. Others (Please specify):	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.4.7. Natural Resource or Ecosystem Management (e.g. SALT, organic farming, protection of water system, watershed management)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.4.8. Integrated Pest Management (e.g. Cultural mgt, variety, water mgt., attractants, repellants, pest monitoring, chemical, rice-duck system)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.4.9. Weed management (use of herbicide, water management)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.4.10. Water management (Protection of water quality, filtration system)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.4.11. Soil-Related Fertility and Conservation (composting, fallow period, use of crop rotation, use of different/ alternating varieties)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.4.12. Climate Mitigation (burning of straw, alternate wetting and drying, use of chemical fertilizer & pesticide, use of organic fertilizer, weed management)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.4.13. Climate Adaptation (varieties, time of planting, transplanting age, others)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	

	Awareness/ knowledge of the technology/ practices	Adopting the technology/ practice?	Level of adoption Rating Scale: 1-5 (With remarks on rating)	Reason for non-adoption	If NOT adopting, what are the current farmer's practices	Willing to adopt the technology/ practice?	State your reason why or why not willing to adopt technology/practice
5.4.14. Harvesting practices (correct maturity, use of manual and mechanical harvesting)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.4.15. Ratooning	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.4.16. Hauling (farm to dryer, proper worker attire, clean vehicle)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.4.17. Drying practices (solar, mechanical drying, proper moisture content (14%)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.4.18. Hauling (dryer to storage, proper worker attire, clean vehicle, etiquette – smoking, spitting)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.4.19. Piling system (Distance from wall, use of pallets)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.4.20. Labelling (minimum GAP standard; variety, date of harvest)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.5. Worker's health and safety							
5.5.1. Worker's health and safety (e.g. proper training, use of PPE, below 18 y/o, protocols when staff are sick)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.5.2. Personnel training and records	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.6. Farm Management/farm records							
5.6.1. Proper documentation and record keeping. Farm records (all practices are recorded, financial records)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	

	Awareness/ knowledge of the technology/ practices	Adopting the technology/ practice?	Level of adoption Rating Scale: 1-5 (With remarks on rating)	Reason for non-adoption	If NOT adopting, what are the current farmer's practices	Willing to adopt the technology/ practice?	State your reason why or why not willing to adopt technology/practice
5.6.2. Warehouse/storage records (inventory, etc.)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.6.3. Record keeping of use of pesticides	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.6.4. Record keeping of fertilizer usage	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.6.5. Traceability (where harvested, when harvested – lot numbers, etc.)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.6.6. Product recall procedures	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.6.7. Improved Packaging	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	
5.6.8. Stock maintenance and preservation (PNS for warehousing – inventory and sampling)	[1] Yes [0] No	[1] Yes [0] No				[1] Yes [0] No	

D. FARM PRODUCTION VOLUME AND VALUE						
1. Number of production periods from September 2019 to October 2020: _____						
	First Cropping:			Second Cropping:		
Duration Period:						
Area planted (ha)						
Type (irrigated, rainfed)						
2. Quantity Produced (metric tons)						
3. Quantity Sold (metric tons)						
4. Quantity Consumed (metric tons)						
5. Quantity wasted (metric tons)						
6. Price per kg						
7. Value of Sales (if paid in PHP)						
	No. of MD/MAD/MMD	Cost/Unit (P)	Total Cost (P)	No. of MD/MAD/MMD	Cost/Unit (P)	Total Cost (P)
13. Seedbed preparation						
14. Land Preparation						
2.1. Plowing						
2.2. Harrowing						
2.3 Furrowing						
15. Transplanting/ Planting						
16. Fertilization						
17. Pesticide Application						
18. Water Management/ Irrigation						
19. Weeding						
20. Harvesting						
21. Threshing						
22. Hauling						
23. Storage						
24. Drying						
25. Milling						
26. Others:						
27. Pakyaw labor	Arrangement:					
MD – Manday (1 Manday = 8 hrs of work) MAD – Man-Animal Day (with draft animal e.g. carabao) MMD – Man-Machine Day (with rental or use of farm machineries e.g. tractor)						

Material Inputs	Amount (Unit)	Cost/Unit (P)	Total Cost (P)	Amount (Unit)	Cost/Unit (P)	Total Cost (P)
7. Seeds						
d. Genetic material	[1] Hybrid [2] Inbred [3] Farmer Saved Seeds/ Own Harvest [4] Black [5] Others, specify_____			[1] Hybrid [2] Inbred [3] Farmer Saved Seeds/ Own Harvest [4] Black [5] Others, specify_____		
e. Variety, please specify						
f. Source of genetic material						
8. Fertilizers						
9. Chemicals:						
a. Pesticides						
b. Herbicides						
10. Packaging materials: please specify: _____						
11. Others: (Pls. specify) _____						
12. Where do you source your inputs? Please, identify inputs supplier in the locality.						

E. CONSOLIDATED FARMING	
1. Do you practice consolidated farming? (Enumerator to explain consolidated farming)	[1] Yes [0] No (If No, go to 3)
2. If Yes, f. What type of consolidation?	[1] consolidation at production [2] consolidation at the marketing level [3] complete consolidation, from production to marketing
g. Total area under consolidated farming(ha)	
h. No. of farmers involved in consolidated farming	
i. Total production (metric tons)	
j. Who is managing the consolidated farm?	
3. If consolidated farming will be promoted in your area, are you willing to adopt it?	[1] Yes (If Yes, go to 4) [0] No, state reason: _____
4. If yes, are you willing to adopt any of the ff:	[1] consolidation at production [2] consolidation at the marketing level

	[3] complete consolidation, from production to marketing
5. Farm area willing to be allocated for consolidated farming (ha)	

F. MARKETING OF PRODUCTS		
	Individual Farm	Consolidated Farm
1. What are the major products being sold? (e.g. palay)		
2. Major market for the products (identify traders/markets where produced are sold)		
3. Distance of farm to market road (in kilometers)		
a. Farm to market road condition	[1] Poor – Totally unpaved [2] Fair – Partially paved [3] Good – Totally paved	[1] Poor – Totally unpaved [2] Fair – Partially paved [3] Good – Totally paved

G. RICE FARM PERFORMANCE										
1. On Scale of 1-10 (10 being the highest) rate the performance in terms of Productivity	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
2. On Scale of 1-10 (10 being the highest) rate the performance in terms of Food Safety	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
3. Existing public-private partnership	[1] Yes [0] No									
4. Certification to standards (e.g. GAP, Organic Agriculture Certification, etc.)										
5. Investment in productivity improving technologies (PhP)										
6. Investment in food safety technologies (PhP)										

H. PROBLEMS ENCOUNTERED		
Risk Factors	Have you encountered these problems?	What are the mitigating measures adopted to address the problems?
B. Production		
1. Chemical contamination (pesticide residue, heavy metals)	[1] Yes [0] No	
2. Drought	[1] Yes [0] No	
3. Pest infestation (eg. fall armyworm)	[1] Yes [0] No	
a. Extent of infestation		

b. Bureau of Plant Industry approach (likely to be the use of buffer farm areas to prevent spread of pest)		
c. Biocontrol solution to fall armyworm		
d. If no control is being done, would you be willing to adopt a technology intended to control FAW?	[1] Yes [0] No	
4. Earthquake	[1] Yes [0] No	
5. Landslide	[1] Yes [0] No	
6. Typhoon and/or Flood	[1] Yes [0] No	
B. Post-harvest		
7. Physical contamination (glass, metals, sand, stones)	[1] Yes [0] No	
8. Microbial contamination	[1] Yes [0] No	
9. Food Adulteration	[1] Yes [0] No	
10. Milling	[1] Yes [0] No	
C. Marketing	[1] Yes [0] No	
11. Packaging and Marketing	[1] Yes [0] No	
12. Food Misbranding	[1] Yes [0] No	
13. Others, please specify:	[1] Yes [0] No	

I. ASSISTANCE NEEDED	
What are the assistance needed?	Who are the agencies involved: (Government, private, NGO, etc.)
1. Technical assistance	
2. Equipment and machineries	
3. Financial assistance	
4. Market assistance	
5. Others, please specify: _____	

Annex 6. Guide questions for key informant interviews

Annex 6.1. Key Informant Interview Guide Questions for Government

Baseline Study for the Building Safe Agricultural Food Enterprises (B-SAFE) Project in the Philippines

Name of Respondent: _____
Position: _____
Organization: _____
City/Municipality: _____

1. What is your understanding of food safety, especially for rice, corn, chicken, hogs, milkfish and coco sugar?

2. What are the regulatory policies on food safety (e.g. inspection of food establishments like restaurants and canteens; regular inspection of slaughter houses, dressing plants, supermarkets, wet markets, etc.)?

3. What is the regulatory framework being implemented related to food safety?

4. What is the level of implementation of these policies, especially for rice, corn, chicken, hogs, milkfish and coco sugar?

5. What is your agency's role in the implementation of these policies?

6. Who are the key personnel/staff involve in implementing the food safety policies? Describe the qualifications needed to effectively implement the policies and guidelines?

   What are the issues related to human resources in terms of implementing the food safety policies and guidelines (e.g. capacity of the assigned personnel, lack of appropriate personnel, etc.)?

7. What facilities are available in your locality (including the facilities in your agency) for the implementation of food safety policies and guidelines?

Facility	Lead Unit/Agency	Location

8. What are the various programs implemented/funded to advocate for stakeholder awareness, enforcement, adoption of these policies at various stages in the supply chain for rice, corn, chicken, hogs, milkfish and coco sugar?

9. Is monitoring for compliance to food safety standards for these commodities being monitored? Who is monitoring the compliance?

10. Is there certification being done? Is there regular monitoring if standards are being followed?

11. What do you think are the risks in the implementation of the policies?

    How do you manage them?

    Do you have a risk management plan to address these risks? [ ] Yes [ ] No
    Plan Type: [ ] Government [ ] Community

    RMP Phase of Development: [ ] Proposed

    [ ] Adopted

    [ ] Implemented
    [ ] Institutionalized

    What are the risk factors:

    [ ] Food Adulteration [ ] Food Misbranding

    [ ] Non-certification [ ] Non-compliance to standards

    [ ] Drought [ ] Earthquake

    [ ] Landslide [ ] Typhoon and/or Flood

    [ ] Others, please specify _____

    Who conducts the RMP?

    RMP Official Title: _____

12. What are the risks of not implementing the policies?

13. What are the issues associated with the implementation of the policies and programs?

14. Trainings attended on food safety

15. Management practices or technologies applied for food safety policy implementation

16. Partnerships/Collaborations (e.g. DOH, DA, LGUs, Other Government Agencies, Private Sector)

    a. Identify other organized groups/organizations (e.g. cooperatives, NGOs, POs) in the area working in projects/initiatives on food safety?

Agencies	Role/Activities

    b. Identify your existing/current partners?

Current/Existing Partner Agencies	Role and Support Provided

c. Identify your previous partners?

Previous Partner Agencies	Role and Support Provided	Is the organization still supporting in food safety implementation? If not, reason(s) for support termination

d. Among the identified agencies, which can be tapped for trainings and other technical activities?

17. Public investments in food safety
18. Public investments for productivity
19. Rate the agency performance (1-10) in terms of functions related to food safety
20. Problems/issues in implementing the policies/guidelines.
21. Recommendations.

Annex 6.2. Key Informant Interview Guide Questions for Private Sector

Organization: _____
City/Municipality: _____

1. What is your understanding of food safety protocols and standards?

2. What are the food safety protocols being adopted by your firm? (Describe)
    a. [ ] Good Agricultural Practices (GAP)
    b. [ ] Good Manufacturing Practices (GMP)
    c. [ ] Hazard Analysis Critical Control Point (HACCP)
    d. [ ] Sanitary and Phytosanitary Standards (SPS)
    e. [ ] Compliance to FDA requirements
    f. [ ] Other protocols: _____

3. What are the requirements needed to comply to these standards? (e.g. certification)

4. What are the investments in productivity-enhancing technologies and food safety standards? (Identify investments, objectives in investment and estimated cost)

5. Did you receive support from government, private firms, NGOs, etc. in compliance to these standards? Indicate the support provided:
    a. Government (e.g. LGUs, DOH, DA, research institutions, FDA, etc.)
    b. Private Sector
    c. Civil Society/NGOs
    d. Other agencies: _____

6. What are the support needed from the government, private firms, NGOs, etc. to comply with the standards?
    a. Government (e.g. LGUs, DOH, DA, research institutions, FDA, etc.)
    b. Private Sector
    c. Civil Society/NGOs
    d. Other agencies: _____

7. What are the public-private partnerships in implementing/monitoring food safety standards?

8. Is the partnership or support from these various agencies effective in supporting the adoption and compliance to prescribed food safety standards. Please describe.

9. What are the issues and problems in seeking support/partnering with other agencies?

10. What are the necessary conditions for VC actors like the private sector to adopt higher product quality standards?

11. Are you being monitored in terms of compliance to standards?
    a. Describe the procedure in monitoring the compliance
    b. Who are the key players in monitoring?
    c. Issues in monitoring and evaluation
12.
13. What facilities are available in your locality (including the facilities in your agency) for the implementation of food safety policies and guidelines?

Facility	Lead Unit/Agency	Location

14. What are the various programs implemented/funded to advocate for stakeholder awareness, enforcement, adoption of these policies at various stages in the supply chain for rice, corn, chicken, hogs, milkfish and coco sugar?

15. What are the problems/risks encountered in complying to food safety standards?

Risk Factors (Describe)	Mitigating measures adopted?
14. Changes in policies/regulations (e.g. long process, limited staff from monitoring/regulatory body)	
15. Lack of equipment/facilities	
16. Lack of technical skills (e.g. identification of adulteration, misbranding, etc.)	
17. Lack of partners implementing standard	
18. Natural calamities (e.g. earthquake, landslide, typhoon/flood)	
19. Others: _____	

16. Does your organization have a Risk Management Plan? [ ] Yes [ ] No
    Plan Type: [ ] Government [ ] Community
    RMP Phase of Development: [ ] Proposed
    [ ] Adopted
    [ ] Implemented
    Who conducts the RMP?
    RMP Official Title: _____

17. What are the plans in sustaining/expanding the adoption of food safety standards?

18. What can you recommend to improve the food safety standards/protocols being adopted?

Annex 7. Terms of Reference for Baseline Study

PHILIPPINES: BUILDING SAFE AGRICULTURAL FOOD ENTERPRISES (B-SAFE)
REQUEST FOR SUBMISSION OF PROPOSALS

The Building Safe Agricultural Food Enterprises (B-SAFE) Project is a four (4) year program implemented by Winrock International and funded by the Food for Progress Program of the United States Department of Agriculture (USDA).

Winrock International seeks proposals from qualified firms/consultants with experience conducting baseline studies on agricultural and economic growth activities. Qualified firms/consultants are those that have been involved in similar projects in the past, particularly within the last five (5) years.

Interested parties may send their proposals as outlined here within.

REQUEST FOR PROPOSAL – WI-B-SAFE
United States Department of Agriculture Food for Progress
Building Safe Agricultural Food Enterprises (B-SAFE)

BASELINE STUDY

The purpose of this Request for Proposal (RFP) is to solicit proposals from Consultant organizations / firms interested in conducting a Baseline Study for the Building Safe Agricultural Food Enterprises (B-SAFE). The terms of reference outlined herein may be subject to change by Winrock International Institute for Agricultural Development (Winrock) or the U.S. Department of Agriculture (USDA). Any changes to the terms of reference will be communicated to interested applicants and, if deemed necessary by Winrock, the deadline for submission will be extended.

AGRICULTURAL CONTEXT IN THE PHILIPPINES

Agriculture trade is an essential component of the Philippines economy, providing a lifeline to over 12 million farmers and fishermen, representing 40% of the country's labor force, and contributing to over $5.68 billion in export revenues. Integration into the Association of Southeast Asian Nations (ASEAN) —along with the United States (US) and Government of the Philippines (GOP) commitment to strengthen bilateral trade— opens Filipino farmers, businesses, and consumers to expanded market opportunities.

The development and adoption of evidence-based international food safety systems are fundamental building blocks for this to happen, and the Philippines has the strong potentials to realize this. The GOP has committed to improve domestic food safety systems and adhere to international trade protocols which are expected to advance consumer health and strengthen bilateral trade relationships. At the food system level, this is evidenced by the Philippines Food Safety Law of 2013 and subsequent Implementing Rules and Regulations (2015) which are consistent with Codex Alimentarius Commission Guidelines (CODEX), the International Plant Protection Convention (IPPC), and the World Animal Health Organization (OIE). The GOP commitment to adhering to World Trade Organization (WTO) protocols on Sanitary and Phytosanitary (SPS) systems, particularly in relation to evidence-based risk analysis on imports, and efforts to eliminate food safety-related non-tariff barriers have been recognized by its trading partners.

This political will is however threatened by the limited capacity of regulatory agencies involved in implementing food safety systems. Sustained government action on food safety needs to be complemented by private sector investment in upgrading food safety systems. The cost of complying with improved domestic and export market food safety standards is a constraint for farmers and small businesses when the market incentives for upgrading production and processing practices are unclear and relevant business support services (i.e., laboratories and cold chain) are inefficient, insufficient, or inaccessible. Lack of cold chain infrastructure, an essential element to food safety compliance, drives up transaction costs and contributes to food losses of up to 50% from the point of production to distribution to consumers. On the other hand, a burgeoning Filipino middle class is demanding safe food and is willing to pay a premium for it.

In cognizance of these overarching opportunities and challenges, B-SAFE will support the GOP to build its capacity to implement and enforce food safety standards and gain adherence of the private sector.

BUILDING SAFE AGRICULTURAL FOOD ENTERPRISES (B-SAFE) PROJECT DESCRIPTION

B-SAFE Food for Progress Strategic Objectives

Winrock will monetize soybean meal and use the proceeds from the sale to implement B-SAFE project in the Philippines over a period of four years (October 1, 2019 to September 30, 2023).

B-SAFE will be focused on contributing to the following two USDA Food for Progress Strategic Objectives:

- Increase agricultural productivity by improving the Sanitary and Phytosanitary Standards (SPS) in production and management of supply chains.
- Expand trade of agricultural products by improving the GOP's regulatory agencies to manage risk-based systems, promote awareness of biotechnology, enhance regulatory standards and processes, enhance domestic and export market linkages, and build the capacity of the private sector to leverage investment.

B-SAFE's theory of change is: if the GOP and the private sector use risk-based management approaches to guide their use of relevant SPS-related technical assistance that build capacity; and if the GOP and private sector become stronger at capturing information and decision making to meet SPS and regulatory requirements for export and import markets, in market situations that change quickly; and if the GOP and private sector adopt and invest in SPS systems and have adequate facilities and equipment to use; then agricultural products will have increased trade that meet SPS standards for the US, ASEAN, international, and domestic markets.

The approach is built on two distinct, but mutually reinforcing pillars: (1) GOP regulatory agencies' capacity in risk-based SPS systems; and (2) SPS-compliant supply chain linkages.

The B-SAFE project is based in Manila to foster a stronger relationship and facilitate effective coordination with GOP partner agencies. Its capacity development interventions are expected to be implemented in some focused areas of Luzon, Mindanao and Cebu.

(For identification of B-SAFE's expected contributions to FFPr's intermediate results and performance indicators, refer to the *B-SAFE Performance Management Plan.*)

Beneficiary Description

B-SAFE will carry out activities in the Philippines' National Capital Region and in regions that produce a major volume of product in each of the target commodity value chains within the horticulture, livestock, and fisheries sectors (to be determined before the contract is awarded), targeting the following actors:

1. **Pillar I direct beneficiaries:** B-SAFE will target GOP regulatory agencies, particularly Manila-based and targeted frontline regional staff of the Department of Agriculture (DA), Food and Drug Administration (FDA), and Local Government Units (LGUs). These agencies will be prioritized because of their institutional mandate to govern food safety systems, the capacity gaps they face in implementing those systems, and their political will. Within each agency and their subdivisions, B-SAFE will liaise with and empower "champions" who can drive change. B-SAFE will ensure that women staff are equitably included in training and technical assistance activities. The approximate number of direct beneficiaries under Pillar I is 11,500 persons.

2. **Pillar II direct beneficiaries:** B-SAFE will target private sector trade associations and agribusinesses with the incentives and resources to invest in SPS compliant supply chains (both lead firms and SMEs – with a focus on identifying at least 40% women-owned or those employing high numbers of women), training service providers that have the proven capacity and willingness to respond to dynamic market requirements, and business service providers (i.e. refrigerated trucking and packaging companies) that have the ability to invest their resources in testing and scaling smallholder-oriented cold chain services. Trade associations and firms will be selected based on ability to self-invest, commitment to food safety, and aspiration to expand and upgrade. The approximate number of direct beneficiaries under Pillar II is 26,000 persons.

3. **Indirect beneficiaries** will include GOP regulatory agency departments and officials not directly supported by the project but who will benefit from improved policies and procedures; SMEs and producers not directly supported by the project or project-assisted institutions but who will benefit from stronger supply chains and cold chains; domestic retailers who will receive higher quality products; trade associations and alliances not directly

supported by the project but that will benefit from a streamlined policy and regulatory system; and consumers who will have access to safer foods.

In total, B-SAFE plans to work directly with the following populations of beneficiaries:

- About 9 Food Safety and Regulatory Agencies of the DA and FDA including the Bureau of Animal Industry, Bureau of Plant Industry, National Meat Inspection Service, Bureau of Fisheries and Aquatic Resources, Fertilizer and Pesticide Authority, Bureau of Agriculture and Fisheries Standards, Biotech Program Office, Policy Research Service, and the Food and Drug Administration.
- About 10 Local Government Units involved in the enforcement of regulations.
- About 10 trade associations including Cold Chain Association of the Philippines, Biotechnology Coalition of the Philippines, CropLife Philippines, Philippine Association of Meat Processors, Philippines Food Processors and Exporters Organization, and others.
- About 20 Training and Business Service Providers including Freshport, American National Standards Institute, and others
- About 1,000 agribusinesses working through the value/cold chains of targeted crops/products

Beneficiary type	Organizations	Approximate Numbers of Beneficiaries
Food Safety and Regulatory Agencies	9	10,500
Local Government Unit	10	1,000
Trade Associations	10	800
Agribusinesses (producers/producer organizations, transporters, processors, buyers, aggregators/traders, retailers, etc.)	1,000	25,000
Training/Business Service Providers	20	200

B-SAFE Activities

B-SAFE will carry out five activities over a four-year period. For a more comprehensive description of the project components and activities, please see B-SAFE Year 1 Work Plan. Brief descriptions of each project activity are as follows:

Activity 1: Conduct Sanitary & Phytosanitary Gap Assessment and Benchmark Capacity Needs

Winrock has begun conducting a participatory needs assessment that will identify capacity-building priorities and technical assistance (TA) strategies for the Government of the Philippines. This needs assessment started with desk research of past capacity assessments as well as other relevant secondary sources related to SPS capacity, which will be followed by validation of findings with the Food Safety Regulatory Agencies of the Philippines and their participation in a self-assessment activity. Winrock is assessing the capacity of the Philippines Food and Drug Administration (FDA) and the Department of Agriculture (DA), as well as other stakeholders in sanitary and phytosanitary (SPS) systems, including exporters, importers, and the Bureau of Customs. Winrock is assessing the alignment of Filipino SPS regulations with international standards, including Codex, IPPC, and OIE.

Activity 2: Enhance Government of Philippines Capacity in Risk-Based Systems

Winrock will develop a capacity-building programs that supports the adoption of international and risk-based standards to support trade facilitation while being responsive to emerging food borne health risks and pest and disease threats with the Philippines Food and Drug Administration (FDA) and the Department of Agriculture (DA).

Activity 3: Support Biotechnology Decision-Making and Awareness-Building

In order to enhance the importation and use of biotechnology, Winrock will support the development of a streamlined review/approval process through targeted technical assistance to departments involved in permitting and renewal and support inter-departmental coordination and streamlining. Winrock will also provide flexible, demand driven technical assistance on evolving biotechnology issues.

Activity 4: Build Technical Capacity of the Private Sector to Meet International Standards

Winrock will strengthen the capacity of the private sector to develop and manage SPS-compliant supply chains and adhere to the standards set by the Food Safety Law of 2013. Winrock will provide targeted technical assistance to firms to incentivize new, SPS-compliant supply chains to form and investments in supply chain upgrades. Winrock will strengthen training service providers who can provide segmented training services tailored to food safety requirements.

Activity 5: Build Cold Chain Systems

Winrock will provide cold chain capacity building by developing business-decision support tools, grants targeting small infrastructure and new technologies, trainings, and forums to showcase the initiatives. Winrock's activities will build upon past activities and complement other investments in the sector.

SCOPE OF WORK

Objectives

To support B-SAFE's learning agenda and capture results, the Winrock Monitoring, Evaluation and Learning (MEL) team seeks to contract with a third-party consultant or organization to conduct a baseline study. The baseline study will have four principal functions:

- Establishing a baseline as points of comparison to support measurement of program impacts as part of future project evaluation activities;
- Validating proposed targets for performance indicators to ensure realistic target setting;
- Supporting program design through situational analysis relevant to target beneficiaries' knowledge and capacities; access to quality and utilization of proposed inputs and infrastructure; value chain diagrams; and, organizational capacity; and
- Identifying and recommending responses to risks and constraints that may pose challenges to planned project implementation.

Indicator Measurements

A major focus of the analysis of the baseline study are the following twelve (12) FFPr standard indicators and two (2) custom indicators. Of the fourteen outlined indicators, quantitative baseline values are required to be established for three (3) standard indicators, with their respective disaggregates.

No.	Indicator Title	Type	Remarks
SI-22	Number of individuals participating in USDA food security programs	Output	Baseline is zero.
SI-23	Number of individuals benefiting indirectly as a result of USDA assistance	Output	Baseline is zero.
SI-21	Number of individuals who have received short-term agricultural sector productivity or food security training as a result of USDA assistance	Output	Baseline is zero.
SI-4	Number of individuals in the agriculture system who have applied improved management practices or technologies with USDA assistance	Outcome	Baseline values of indicator and disaggregates will be calculated
SI-11	Number of host government or community-derived risk management plans formally proposed, adopted, implemented or institutionalized with USDA assistance	Output	Baseline values of indicator and disaggregates will be calculated
SI-12	Percent of USDA-assisted organizations with improved performance	Outcome	Baseline values of indicator and disaggregates will be calculated
SI-9	Number of technologies, practices, and approaches under various phases of research, development, and uptake as a result of USDA assistance	Output (phases 1-3); Outcome (phase 4)	Baseline is zero.
SI-13	Number of public-private partnerships formed as a result of USDA assistance	Output	Baseline is zero.
SI-17	Number of policies, regulations and/or administrative procedures in each of the following stages of development as a result of USDA assistance	Output (stages 1-2); Outcome (stages 3-5)	Baseline is zero.
SI-18	Value of annual sales of farms and firms receiving USDA	Outcome	Baseline values of indicator and disaggregates will be

No.	Indicator Title	Type	Remarks
	assistance		calculated
SI-19	Volume of commodities sold by farms and firms receiving USDA assistance	Outcome	Baseline values of indicator and disaggregates will be calculated
SI-14	Value of new USG commitments and new public and private sector investment leveraged by USDA to support food security and nutrition	Outcome	Baseline is zero.
CI-1	Number of individuals using improved packaging, equipment, transportation, or cold storage as a result of B-SAFE investment	Outcome	Baseline values of indicator and disaggregates will be calculated
CI-2	Number of farms/firms/ laboratories with GAP, GMP, HACCP, or ISO certification as a result of USDA assistance	Outcome	Baseline values of indicator and disaggregates will be calculated

The consultant should be able to design a statistically sound data collection methodology **to ensure that the quantitative estimates for the indicator values of SI-11, SI-18 and SI-19 and their corresponding disaggregated data sets are produced.** For a complete list of indicator disaggregates, the consultant may refer to USDA's Food Assistance Indicators Definition manual.

Key Evaluation Questions[4]:

The baseline study is expected to address the following key evaluation questions:

B-SAFE Specific Research Questions	Baseline Requirements
1. What models of collaboration among local and international actors, including public institutions, private sector partners, and civil society are effective in supporting improved compliance with standards and regulations?	• Map and describe the private sector various actors and existing models of collaboration at baseline • Identify and describe the well-functioning collaboration mechanisms in order to eliminate them as potential project outcomes. • Identify and describe potential external factors that may affect project outcomes (such as other public or private sector initiatives or donor efforts) and identify strategies to segment attribution.
2. What are the conditions (such as technologies, cold trucking, GAP, GMP, HACCP certification and SPS or private sector government services) necessary for agriculture actors, particularly SMEs and producers, to adopt higher product quality standards for food safety and SPS standards?	• Describe the existing conditions at baseline; identify and describe which conditions are enabling at the time of the baseline in order to eliminate them as potential project outcomes; identify and describe potential external factors that may affect project outcomes (such as other public or private sector initiatives or donor efforts) and identify strategies to segment attribution. • Establish baseline process/procedural costs and duration efficiencies for select commodities and markets (domestic and import/export) for comparison at Final Evaluation. • Identify the commercial supply chain and cold chain pathways at baseline for select commodities for select supermarket chains for comparison at Final Evaluation.

B-SAFE Specific Research Questions	Baseline Requirements
	• Establish baseline organizational and individual capacity for comparison at Final Evaluation; establish baseline process/procedural costs and duration efficiencies for comparison at Final Evaluation.

Situational Analysis

In addition to the prescribed quantification of values for indicators mentioned above, the following situational analysis should be arrived at by the study:

- Map value chains for each targeted commodity and analyze potential for collaboration among chain actors.
- Analyze the risk management capacities of host government agency partners and communities in the targeted project sites by identifying mechanisms in place, including the development and institutionalization of risk management plans. Scope of analysis should cover the types of risks that have shown to be recurrent and/or potential (e.g., typhoons, flooding, etc.) and the stage at which host government partners and/or target communities put in place their respective risk management plans. (The consultant is recommended to take reference from the USDA Food Assistance Indicators and Definitions manual, February 2019 version, particularly on Indicator SI-11, for guidance on this analysis.)
- Establish level of post-harvest loss and sanitary and phytosanitary conditions along value chains of each targeted commodity. Establish the potential partners' capacities and gaps in terms of meeting compliance to GAP, GMP, HACCP, or ISO certification standards.
- For each commodity to be supported by the project, establish the current state of adoption/use of improved management practices or technologies by agricultural producers and other value chain actors in the field of production, climate risk management, marketing and distribution, post-harvest handling and storage, and value-added processing.
- Establish the current organizational performance of targeted beneficiary organizations (e.g., input and equipment providers, financial institutions, infrastructure owners, producers' organizations, water users' associations, women's groups, trade and business associations, and community-based organizations) based on any generally accepted organizational capacity measure (e.g., Organizational Performance Index). Analyze the potential project partners' capacity gaps that may be addressed with support from the project. Collect necessary contact information, including GPS location, for possible follow up.

Key Audience

- B-SAFE Project staff and partners
- Government stakeholders: Manila-based and targeted frontline regional staff of the following agencies with jurisdiction over targeted project sites:
    - Department of Agriculture
    - Food and Drug Administration
    - Local Government Units
- Private Sector stakeholders:
    - Private sector trade associations with the incentives and resources to invest in SPS compliant supply chains

- Agribusinesses with the incentives and resources to invest in SPS compliant supply chains
- Training service providers that have the proven capacity and willingness to respond to dynamic market requirements
- Business service providers that have the ability to invest their resources in testing and scaling smallholder-oriented cold chain services

- USDA officials located in Washington D.C. (must be consulted as key informants

Methodology

This baseline design will be non-experimental and largely dependent upon a sample survey of beneficiary types to establish baseline measurements and provide input to implementation priorities. The baseline will be conducted using the following methodologies:

- **Document Review**: The consultant/organization shall review available project documentation to be provided by Winrock, including the B-SAFE MEL Plan. Additionally, the consultant will review secondary data, including but not limited to the 2019 FSN Philippines SPS assessment and 2019 Food Safety and SPS Planning Workshop Report, relevant for providing contextual background on the operating environment and agriculture sector in the Philippines. This will be both a quantitative and qualitative secondary data source review. To ensure compliance and responsiveness to USDA requirements, the consultant will also review USDA guidance on indicators, monitoring and evaluation, and the relevant solicitation. Additionally, the consultant may access additional materials from credible and validated sources, including government statistics and industry data sets.

- **Key-informant Interviews (KII)**: KIIs will be the principle form of data collection for high-status leaders or under conditions in which a group dynamic may inhibit candid discussion. The interview protocol will include both questions common across respondent types (facilitating analysis of variation in perspectives), as well as customized questions specific to a type or individual who has a unique role or view. Likely respondent types include the USDA-led Steering Committee, SPS and food safety experts, regional and international trade experts, potential direct and indirect beneficiaries in national and local government regulatory agencies and the commercial supply chains and cold chains.

- **Focus Group Discussions (FGD)**: FGDs will consist of groups of four to 10 persons, likely to be separated when appropriate by location, value chain function, and type of B-SAFE involvement. Dividing FGD into these groupings will support disaggregated analysis to identify possible differences in responses according to these key characteristics. Likely types of respondents include consumers, laboratory testing facility staff, DA and FDA personnel, private-sector buyers (domestic, import, and export), farmers/fisherfolk, and SME owners in transport, processing, and other post-production functions.

- **Beneficiary- and Client-Based Surveys (BBS)**: During the baseline evaluation, the consultant will survey *planned* program beneficiaries to gather baseline information on participants to be used to measure progress later in the project. The BBS should be able to provide a single point in time estimate, which can be compared to the future performance evaluations and annual targets. In consultation with B-SAFE, each consultant must define its sample size, selection plan and proposed design. B-SAFE anticipates that the sampling plan will follow USDA recommendations for a household survey approach with two-stage sampling. Only *planned* direct beneficiaries will be included in the pool with the first stage sampling clusters, followed by second stage sampling of direct beneficiaries within the sampled cluster. In order to support data verification, surveys should be conducted in-person, and whenever possible at the respondent's farm, infrastructure facility, or

place of business. Consultant will collect quantitative data for indicators and disaggregates as above specified in section E on Indicator Measurements. Survey sample size should be decided on in consultation with B-SAFE management. The consultant must also include a plan for data entry and cleaning, weighted sample calculations and analysis, if needed.

Whenever possible, data should be verified with written documentation. However, when not feasible either due to poor recordkeeping, dependency on recall or other threats to validity, the Consultant should identify and explain responses to any limitations on data.

As above stipulated, baseline data for some specified indicators should be disaggregated according to USDA mandatory categories identified in the B-SAFE Performance Monitoring Plan (e.g., sex, location, commodity). Consultants and Winrock may recommend additional disaggregates useful for project management. Consultants can use reliable secondary data sets with corresponding citation and rationale for substitution of primary data collection, with the prior approval of Winrock International, and are not to be used to set baseline values for project indicators. Secondary data should be for a period not beyond 3 years prior to the baselining year. However, secondary data will not qualify for indicators requiring baseline values and disaggregates. Consultants are encouraged to suggest creative approaches beyond those mentioned in the RFP and explain how precisely they will enable the project to answer its questions.

The Consultant should include ethical considerations for research with human subjects in its proposed approach. This includes following Do No Harm principles, addressing issues of confidentiality, including data management, training of enumerators, and disclosures to respondents. Enumerators should inform all respondents that their participation will be used to inform programming but does not necessarily commit the project to work with them.

At the Kick-Off Meeting, the B-SAFE management, Winrock headquarters and the consultant will discuss the study design and level off on the baseline requirements. The Consultant shall collaborate with Winrock B-SAFE team to develop appropriate data collection tools, including the formulation of questionnaires, and methodology for conducting the baseline study. The Consultant will then be expected to take the primary lead in providing local expertise in the design phase; data collection, analysis and interpretation; and support in formulating conclusions and recommendations.

Tasks and Deliverables

The selected Consultant will implement the following tasks along the proposed timeline and approximate LOE as summarized in the below table:

Tasks	LOE	Estimated Date
Kick-off meeting with B-SAFE team to discuss the study design and level off on the baseline requirements.	1 day	November 23, 2020
Desk Review of B-SAFE project documentation (Winrock will provide USDA MEL Policy, USDA Food for Progress Indicators and Definitions Handbook, Project-Level Results Framework, Project MEL Plan and PMP, and relevant project-level studies/assessments) and other industry, trade and commodity background resources and data records to inform best approach to establishing baselines and informing aspects of project design.	3 days	November 24 – 26, 2020

Tasks	LOE	Estimated Date
Draft Baseline Design Plan for the data collection and analysis, including: 1. Listing of B-SAFE's baseline data requirements, in consultation with B-SAFE project staff; 2. Methodology for data collection and analysis, including sampling plan with sample size calculations for a representative random sample of producers; surveys of other types of stakeholders may not be random but should specify the sampling method; 3. Recruitment and training requirements for data collectors/enumerators; 4. Field work schedule and timeline for key milestones; 5. Identification of key assumptions and limitations on data; and 6. Baseline data collection tools (e.g., questionnaires, interview guides, secondary data analysis, checklists, interview confidentiality agreements, etc.). 7. Data management and analysis plan. 8. Quality assurance plan	6 days	November 27 – December 7, 2020
Winrock, USDA, B-SAFE feedback on Baseline Design Plan (including data collection tools and surveys) received	n/a	December 8 – 11, 2020
Final Baseline Design Plan submitted	3 days	December 16, 2020
Enumerator training covering B-SAFE project background, confidentiality and Do No Harm considerations, data collection tools, and interviewing skills.	5 days (Saturdays & Sundays included)	December 17 - 20
Field work activities scheduled, conducted and completed.	20 days	December 28, 2020 – January 29, 2021
Data consolidation. Organize all data collected into a database, exportable into Microsoft Excel spreadsheets. Ensure anonymity of data, Do No Harm concerns, and confidentiality.	7 days	February 5, 2021
Draft Baseline Report of baseline measures/values of relevant indicators and disaggregates, with recommendations for project implementation based on needs assessment. The report should include the following sections: • **Cover Page** (with photo, if possible) • **List of Acronyms** • **Table of Contents**, which identifies page numbers for the	10 days	February 19, 2021

Tasks	LOE	Estimated Date
major content areas of the report. • **Executive Summary** (3 to 5 pages): should be a clear and concise stand- alone document that gives readers the essential content of the baseline report. • **Body of Report** (not to exceed 30 pages): o ***Introduction*** (2 page): Briefly describe the B-SAFE project and state the objectives of the baseline assessment. o ***Methodology*** (4 pages): Describe the data collection methods used including schedule of activities, description of any statistical analysis undertaken, and constraints and limitations of the baseline process and rigor. o ***Findings and analysis*** (14- 18 pages) pertaining to qualitative data addressing the baseline learning questions and baseline measures/values for selected indicators and disaggregates, as prescribed o ***Recommendations*** (6-10 pages): Provide actionable recommendations on project design, implementation, approaches to mitigate potential risks to implementation (including COVID-19), validation of indicator targets, and monitoring and data collection methodologies based on lessons learned in the process of collecting the baseline data • ***Annexes***: Attach this Terms of Reference; additional methodology documentation, including data collection tools and field visit schedule; list of stakeholders interviewed with number and type of interactions; table of indicator values; other special documentation as needed. • ***Photographs***: 20-25 high quality photographs (minimum 300 dpi resolution) of data collection activities, i.e., interviews; focus group discussions, current agriculture and trade practices, etc. Photographs should be provided upon submission of the written baseline report on a CD-ROM disc, thumb drive or equivalent external storage device.		
Winrock, USDA, B-SAFE feedback on draft Baseline Report received	n/a	February 26, 2021
Final Baseline Report submitted to Winrock B-SAFE by COB	4 days	March 5, 2021
Available for follow-up guidance per donor requests for clarification on baseline report.	6 days	
Baseline Completion – Total Estimated LOE	**65 days**	

Evaluation Management

Winrock B-SAFE management (COP and MEL Director) and Winrock B-SAFE home office staff (Program Officer, Program Associate, and Agriculture Unit Director) will be responsible for the following tasks to support the baseline assessment:

- Providing background documentation on the B-SAFE project.
- Recommending and providing introductions to key stakeholders for interviews and other forms of data collection
- Reviewing Design Plan, data collection tools, and draft and final Baseline reports.
- Approving Design Plan, data collection tools, and draft and final Baseline reports.

Deliverables under this assignment will include the following:

- Baseline Design Plan (as outlined in above table).
- B-SAFE quantitative and qualitative datasets (descriptive and phenomenal data sets that can be observed but cannot be quantified) and listing of respondents with independent variables (e .g., sex, beneficiary type, location, etc.); quantitative data sets for specified indicators should include prescribed disaggregates.
- Draft of the Baseline Report.
- CD-ROM or other external storage of photographs (each photo clearly titled including GPS coordinates).
- PowerPoint presentation of the Draft Baseline Report to the Winrock B-SAFE office, with electronic version and hard copies of presentation.
- Final Baseline Report with Annexes submitted as electronic Word and PDF files (as outlined in the above table).
- Evaluators shall provide a copy of the final baseline report that is free of personally identifiable information (PII) and proprietary information which is ready for publication and should be accessible to persons with disabilities, known in the US as making the reports Section 508 compliant. USDA will provide a report template for the evaluator to use that helps makes the report document 508 compliant.

As specified in regulations (see 7 CFR Part 1499.13 and 7 CFR Part 1599.13), baseline study will be independent and conducted by a third party. Independence of the evaluation function from program design and management is a core principle of the donor (USDA). Independence helps to ensure both credible and objective evaluation. The project is committed to selecting a proposal that will be conducted by people who are involved in the design and implementation of the project and we will ensure that the process is free from political influence and organizational pressure.

Timeframe

For the purposes of the proposal, the consultant should present a proposed timeline for completion of the aforementioned activities. The consultant should be available to begin work on November 23rd. The entire assignment, including report revisions, presentations and consultations, is expected to require a **Level of Effort not to exceed 65 days**, and completion by March 30, 2021.

SUBMISSION REQUIREMENTS

Proposal Components

Local and international firms and organizations that are registered to work in the Philippines and interested in implementing this assignment are requested to submit a proposal. Each proposal should be typed in 12-point font. The proposal submission should include each of the following sections in the specific order listed below in order to be considered for this consultancy:

- **Technical proposal** (not exceeding 15 pages) The technical proposal should reflect how the applicant would undertake all the tasks in the Scope of Work. The applicant will provide a detailed plan of specific activities and timetable for carrying out the assignment and data collection and analysis activities. Also, it will include a proposal for the statistical approach/method to be used to estimate the optimum sample size and selection of survey participants.
- **Organization** (maximum of 2 pages) The applicant shall provide summary of organizational capacity to conduct monitoring and evaluation in general and baseline studies specifically. This section should also state the organizational legal status in Philippines, type of ownership and management, overview of projects/services, and geographic scope.
- **Team Composition** (maximum of 2 pages) The applicant shall list and briefly describe the name(s), qualifications and responsibilities of the staff proposed to work on the assignment. (CVs of proposed personnel should be included in an annex and not counted toward page limit). The proposed team must include an Evaluation Team Leader who is an Agricultural Economist, Rural Development Specialist, or has related qualifications with expertise in evaluating development projects in the Philippines. Experience with value chain analysis is preferred. Other recommended team members could include: analyst familiar with quantitative and qualitative data analysis; data entry team; and survey enumerators.

  Proposed staff should meet the following requirements at a minimum:

  - Team members with experience in horticultural, livestock and fisheries sectors
  - Team members with experiencing conducting evaluation of USDA and/or USAID projects
  - Team members with experience developing designing surveys and developing sampling plans.
  - Team leader with experience working with multicultural teams
  - Philippine language skills
- **Experience** (maximum of 4 pages) Illustrative listing of contracts, grants, or cooperative agreements involving similar or related assignment within the last three years. Reference information must include the location, a brief description of work performed, value of the project, and contact with current telephone numbers and email addresses. Winrock reserves the right to contact these projects as an organizational reference in the selection process.
- **Assumptions and Risks** (maximum of half page) Describe assumptions which are necessary for the survey to be implemented. Describe any risk/threats which could potentially threaten implementation of the activities and what is or will be done to mitigate these risks.
- **Work Plan (maximum of 2 pages)** Propose the main activities of the assignment, their content and duration, phasing and interrelations, milestones (including interim approvals by the Client), and delivery dates of the reports. The proposed work plan should be consistent with the technical approach and methodology, showing understanding of the SOW and ability to translate them into a feasible working plan. A list of the final documents, including reports, drawings, and tables to be delivered as final output, should be included here. The work plan

should be consistent with the Work schedule. This contract is tied to deliverable based payments.

- **Financial Budget** (length as required to clarify proposed costs) The applicant shall propose a realistic cost estimate for this assignment, including a line-item budget and budget narrative that justifies expenses. The budget shall include only those costs that can be directly attributed to the activities proposed (with explanation of line items). The line item budget should include expenses for enumerator training. In the budget narrative, applicant must show existence of financial and administrative systems to adequately account for funds provided under this assignment.

  Example of **financial budget** is given below:

	Line Item	Cost
I.	Professional Remuneration	
II.	Travel and Per Diem	
III.	Supplies and Equipment	
IV.	General Administrative Costs	
Total Cost including applicable VAT and tax, and others cost as per country law		

N.B. Please add detailed cost breakdown documents for summery of cost. Above line items are mentioned as example for understanding. Please add separate sheet or more Column & Row for detail information, if necessary. For detailed budget please use attached excel sheet.

Assumptions & Constraints

Key assumptions for the baseline bids include that the bidder already has qualified evaluators, data analysts, and enumerators ready to start work without having to go through a lengthy recruitment process; that bidders will provide their own data collection and analysis hardware and software; and that the evaluation team will be ready to start work within 5 days after signing the subcontract. Likely constraints include limited logistical or administrative support the project can provide to the evaluation team, such as transportation and scheduling meetings, due to a smaller project team size at start up and travel related and group size restrictions due to COVID-19.

Terms and Conditions

Each Bidder must conform to the following requirements:

1. Must agree to the general provisions outlined in Attachment A. Any variations must be requested in the bid submission and agreed to before a purchase order is issued.
2. No minimum order requirements may be made by a bidder.
3. Winrock International will not consider advance payment.
4. A Bidder may withdraw or change a bid before the deadline to receive bids if written notice of the withdrawal or change is received by Winrock for submission of bids. Any changes may be made

only by substitution of another bid.

5. Bids received after the time specified in the request for bid will not be considered and shall be returned to the respondent.
6. Final Payment by Winrock will not be made until acceptance of the baseline report by the USDA.
7. Winrock reserves its rights to reject any services and to cancel all or any part of this contract if bidder fails to deliver all or any part of the services described in the request for bid. If bidder ceases to conduct its operations in the ordinary course of business or are unable to meet its obligations, Winrock may cancel this order without liability except for deliveries previously made or for goods covered. The bidder must be able to demonstrate substantial experience in working on similar projects and, in particular, to demonstrate past experience in working with organizations similar to Winrock.
8. The bidder must have excellent communication skills and methods and be able to communicate very clearly at every step of development, both providing information to the Winrock team as well as requesting, understanding and closely following guidance from the Winrock team.

PROPOSAL SELECTION

Technical Evaluation

Submitted Proposals must clearly demonstrate alignment with the SOW outlined above with an adequate level of detail. The following are criteria that all proposals will be judged on:

Proposal Evaluation Committee (PEC) or Procurement Committee (PC) set out by WI, will review the technical as well as financial proposals as per Eligibility/Qualification and Technical criteria mentioned below. Technical proposal will carry 70% weightage; and financial proposal will carry 30% weightage (Technical Pass Mark is 65%). The proposal will be ranked according to combined technical and financial score using the weightage.

Technical evaluation criteria & allocated points are as follows:

No.	Evaluation criteria	Points
1 (1.1+1.2)	Specific experience of the firm related to this assignment	25
1.1 (a+b+c)	Experience of the Firm and its Consultant/s	15
1.1.a	Minimum of 5 years of demonstrated experience in designing and conducting baseline and similar studies in development sector particularly horticulture agriculture and business development fields.	5
1.1.b	Experience in working with US government grants, specifically USDA and/or USAID	5
1.1.c	Knowledge of agriculture sectors, including SPS and GAP, GMP, HACCP, or ISO certification standards	5
1.2 (a+b)	Experience in similar assignments	10
1.2.a	Experience handling multiple datasets from a large survey, and producing high quality analytical reports is what's required.	5

No.	Evaluation criteria	Points
1.2.b	Experience in conducting similar assignments for other donors in the Philippines	5
2(2.1+2.2+2.3)	Implementation and Quality Assurance Plan	35
2.1	Understanding the assignment, comments and suggestions of Consultant/s on the Terms of Reference.	8
2.2 (a+b+c+d)	Roll out plan	19
2.2.a	Team Composition and task assignment	5
2.2.b	Roll out plan and calendar	4
2.2.c	All proposed activities reflected in the work plan with timeline	5
2.2.d	All proposed activities reflecting the assignment properly	5
2.3 (a+b)	Quality Assurance Plan	8
2.3.a	Monitoring tools	4
2.3.b	Monitoring plan	4
3 (3.1+3.2)	Professional qualification and competence for the assignments	10
3.1	Consultant/s educational qualification	5
3.2	List of similar assignment conducted, with names of references for each	5
4 (4.1)	Methodology and Reporting Structure	30
4.1	Details and quality of methodology proposed for the assignment	30
Total Points		**100**

As a part of evaluation process, the firm may be interviewed/asked for presentation on submitted proposal by Proposal Evaluation Committee. Only firms/consultants that obtain more than 65% in the technical proposal will have their financial proposal reviewed.

Financial Evaluation Criteria

A financial proposal shall include Summary of Costs, Breakdown of Staff Remuneration, Travel and DSAs (Daily Subsistence Allowance), miscellaneous, overhead costs (if any). Total cost of the financial proposal (after correctness and confirmation of arithmetical error, if any) will be considered for financial evaluation. Evaluation will be done based on proposed budget amount linked with deliverables. A critical analysis will be done to cross check the proposed amount is appropriate and justified to complete the assignment.

Financial evaluation criteria & allocated points are as follows:

No.	Particulars	Points
1	Presentation of Summary budget	20

No.	Particulars	Points
2	A detail budget with all unit and unit rate (also with details of each unit rate)	40
3	Budget note and justification of each cost	40
	TOTAL	100

Consultant Selection Process

The potential consultants will be evaluated according to the criteria mentioned above. Winrock B-SAFE and headquarters will be following an internal evaluation and selection process.

- Notification of RFP opportunity disseminated on October 22, 2020.
- Deadline for Expression of Interest and request for supporting documents on October 29, 2020.
- Deadline for submission of questions to Winrock on RFP is October 29, 2020.
- Responses on questions disseminated to applicants by November 5, 2020.
- Deadline for submission of proposal is November 12, 2020 by 5:00 pm (Philippine Standard Time).
- Submission should not include any zipped files.
- Winrock International may request additional documentation after the bid deadline.
- Winrock B-SAFE and headquarter staff will review submitted proposals after the closing date
- Winrock B-SAFE and headquarter staff will conduct in-person or remote interviews with candidates under consideration.
- Winrock B-SAFE and headquarter staff reserve the right to consult applicant's provided references of prior clients, included in experience section of proposal.
- Winrock B-SAFE will work with the selected consultant to develop a contract with final Scope of Work, budget and timeline; and
- Awardees will be required to submit deliverables as outlined above.
- Winrock reserves the right to negotiate with the bidders with or without discussion.

SUBMISSION OF PROPOSAL

Instructions to Bidders

- Validity of bid: 60 days starting from the submission date.
- For each item quoted, a detailed description and picture should be included if applicable
- Cost quoted must include unit price and total price in Philippine Peso and USD and inclusive of tax
- Technical and financial proposal must be submitted as separate attachments
- Payment terms and complete banking information
- Winrock reserves right to make changes or cancel this solicitation as required by USDA
- Agreement will be offered as fixed price basis (but detail budget is required for analysis)

Bid Documents to Include

- Legal Business Name
- Authorized contact including address, phone number and email

- Proof of business registration and nationality
- Provide legal establishment / registration, GST, NTN certificates or any other additional supporting documents (if any)
- Proposed Firm must provide information, organizational profile, CVs of key staff/team members and documentary evidences to establish that they have met eligibility criteria for this service.
- Applicant/s must clearly indicate in their profiles for the past evaluation work they have conducted, with names of references for each.
- A list of previous similar contracts completed successfully with the names and contact information of clients.
- A sample of similar assignment done previously.

Submission Procedures

Submissions must be in English and typed single-spaced. All pages must be numbered and include the RFP reference number and name of organization on each and every page. The proposals must be emailed to Winrock B-SAFE Project to the attention of:

MEL Manager: Nielo Tingzon
Email address: Nielo.Tingzon@Winrock.org

Please include the name of the person in your organization who is submitting the application as well as the current telephone and email contacts.

Deadline for submission of proposal is at COB November 12, 2020.

Winrock B-SAFE reserves the right to fund any or none of the applications submitted.

Certification of Independent Price Determination

(a) The offeror certifies that—

(1) The prices in this offer have been arrived at independently, without, for the purpose of restricting competition, any consultation, communication, or agreement with any other offeror, including but not limited to subsidiaries or other entities in which offeror has any ownership or other interests, or any competitor relating to (i) those prices, (ii) the intention to submit an offer, or (iii) the methods or factors used to calculate the prices offered;

(2) The prices in this offer have not been and will not be knowingly disclosed by the offeror, directly or indirectly, to any other offeror, including but not limited to subsidiaries or other entities in which offeror has any ownership or other interests, or any competitor before bid opening (in the case of a sealed bid solicitation) or contract award (in the case of a negotiated or competitive solicitation) unless otherwise required by law; and

(3) No attempt has been made or will be made by the offeror to induce any other concern or individual to submit or not to submit an offer for the purpose of restricting competition or influencing the competitive environment.

(b) Each signature on the offer is considered to be a certification by the signatory that the signatory—

(1) Is the person in the offerors organization responsible for determining the prices being offered in this bid

or proposal, and that the signatory has not participated and will not participate in any action contrary to subparagraphs (a)(1) through (a)(3) above; or

(2) (i) Has been authorized, in writing, to act as agent for the principals of the offeror in certifying that those principals have not participated, and will not participate in any action contrary to subparagraphs (a)(1) through (a)(3) above; (ii) As an authorized agent, does certify that the principals of the offeror have not participated, and will not participate, in any action contrary to subparagraphs (a)(1) through (a)(3) above; and (iii) As an agent, has not personally participated, and will not participate, in any action contrary to subparagraphs (a)(1) through (a)(3) above.

(c) Offeror understands and agrees that –

(1) violation of this certification will result in immediate disqualification from this solicitation without recourse and may result in disqualification from future solicitations; and

(2) Discovery of any violation after award to the offeror will result in the termination of the award for default.

Attachment A: General Provisions

1. **Independent Organization**. Vendor shall be an independent organization and shall not claim to be an agent, officer, or employee of Winrock International and shall not have authority to make any commitments on behalf of Winrock International, except to the extent that such authority shall be expressly conferred by Winrock International in writing.

2. **Insurance.** Vendor shall maintain comprehensive general liability and automobile liability insurance coverage to cover itself for all activities undertaken under this Purchase Order.

3. **Publicity**. No advertising or publicity having or containing any reference to Winrock International, or in which the name of Winrock International is mentioned, shall be used by Vendor without the written approval of Winrock International. Vendor shall not use Winrock International's logo or title block on any correspondence or written matter without the written approval of Winrock International.

4. **Communication with the Funding Agency**. All contact, communication and dealings with the Funding Agency and its agent and representatives by Vendor and any of its personnel, consultants, or Vendors, on matters subject to this Purchase Order shall be through or approved by Winrock International.

5. **Terms of Payment**. Subject to any superseding terms on the face hereof, Vendor shall invoice Winrock International at address and contact listed on Purchase Order and be paid upon completion/acceptance of the required supplies/services. Vendor shall be paid no later than thirty (30) days unless otherwise negotiated in terms and conditions of the Purchase Order after Winrock's receipt of an acceptable invoice or Winrock's receipt of the completed products/services, together with any required documents. Drafts will not be honored.

6. **Compliance with Law**. Vendor's performance of work hereunder and all products to be delivered hereunder shall be in accordance with any and all applicable executive orders, Federal, State, municipal, and local laws and ordinances, and rules, orders, requirements and regulations. Such Federal laws shall include, but not be limited to, the Fair Labor Standards Act of 1938 as amended. Unless otherwise agreed, governing law shall be that of the State of Arkansas.

7. **Assignment Prohibited**. Vendor may not assign or Subcontract any part of the activities described in the Purchase Order without the prior written consent of Winrock International. Where such prior written consent is given, it shall not relieve the Vendor of any of its responsibilities under this Purchase Order.

8. **Indemnification**. Vendor hereby agrees to indemnify, hold harmless, and defend each and every Winrock Indemnified Party from and against any and all Claims arising out of, relating to, or in connection with (i) any injuries (including death) to persons and for damage or loss to property caused by, arising out of, or relating to Vendor performing the Contract Work or otherwise providing of any goods and/or services covered by this Agreement in whatever manner and by whomever the same may be caused; (ii) any wrongful act, omission,

misconduct, or violation of Laws by Vendor or by any agent, servant, or employee of Vendor or any Vendor and any party retained by any Vendor; (iii) any negligent, wanton, willful, or intentional act or omission of or by Vendor, any Vendor, anyone directly or indirectly employed or retained by any of them, or anyone for whose acts any one of them may be liable under any Law; (iv) any breach of Warranty; and (v) any breach or violation by Vendor of, or default by Vendor with respect to, any other terms and conditions of this Agreement or Vendor's duties, obligations, and responsibilities under this Agreement. The indemnity provided in this Section is intended for the benefit of Winrock and each Winrock Indemnified Party. Vendor's indemnification obligations will in no way be limited by the limitation on amount or type of damages or by any compensation or benefits payable by or for Vendor or any Vendors, under any worker's compensation act, employer liability act, disability act, or other employee benefit act. The indemnification provided in this Section will survive the expiration or termination of this Agreement.

9. **Title and Risk of Loss**. Title to and risk of loss of, each product and/or service to be delivered/provided hereunder shall, unless otherwise provided herein, pass from Vendor to Winrock upon acceptance of such product/service by Winrock.

10. **Stop Work Order**. Winrock International's contracting authority may at any time before acceptance of the order by the Vendor, by written order to the Vendor require the Vendor to stop all, or any part, of the work called for by this purchase order for a period of 90 days after the order is delivered to the Vendor, and for any further period to which the parties may agree. The order shall be specifically identified as a stop-work order issued under this clause. Upon receipt of the order, the Vendor shall immediately comply with its terms and take all reasonable steps to minimize the incurrence of costs allocable to the work covered by the order during the period of work stoppage. Within a period of 90 days after a stop work order is delivered to the Vendor, or within any extension of that period to which the parties shall have agreed, the Winrock International contracting authority shall follow the guidelines as described in FAR 52.242-15.

11. **Debarment and Suspension**. In accepting this Agreement, the Vendor certifies that neither it nor its principals are presently debarred, suspended, proposed for debarment, declared ineligible or voluntarily excluded from participation in this transaction by any US Federal department or agency. Any change in the debarred or suspended status of the Vendor during the life to this Agreement must be reported immediately to Winrock. The Vendor agrees to incorporate the Debarment and Suspension certification into any lower-tier award that they may enter into as part of this Agreement.

12. **Termination**. Winrock International shall have the option to terminate this Purchase Order in the event of termination of the Prime Agreement by the Funding Agency for whatever reasons. In the event of such termination, Vendor shall be entitled to receive all supporting funds as described herein for those expenditures justifiably incurred to the time of termination of this Purchase Order, including commitments which cannot be reversed or mitigated, to the extent that said funds are available to Winrock International under its Prime Agreement. Either party shall have the option to terminate this Purchase Order if either party fails to perform its obligations under this Purchase Order and fails to cure any such default in performance within thirty (30) days unless otherwise noted in Purchase Order Terms & Conditions after written notification by the other party thereof. In the event termination is due to fault of Vendor, Winrock International may hold it liable of reimbursement for expenses incurred due to said fault and of any penalties, damages or interest which are incurred by Winrock International as a result of said fault; provided that Winrock International delivers adequate documentation to Vendor evidencing the expenses, penalties, damages, or interest which have been incurred. Any such expenses may be deducted from any sums due to Vendor, and Vendor shall promptly pay any deficiencies upon demand of Winrock International. In the event of termination of this Purchase Order, Vendor shall, upon receipt of notification of termination, immediately take all steps required to minimize additional costs incurred during the termination of performance hereunder.

13. **Applicable Law**. This purchase order shall be enforced in accordance with the body of law applicable to procurement of goods and services by the Federal Government. To the extent that Federal law does not exist, the laws of Arkansas shall apply. By accepting this agreement Vendor agrees to waive any rights to invoke the jurisdiction of the local national courts where this contract is performed.

14. **Drug Trafficking**. Winrock reserve the right to terminate this purchase order to demand a refund or take other

appropriate measures if the Vendor is found to have been convicted of a narcotics offense or to have been engaged in drug trafficking as defined in 22 CFR Part 140.

15. **Disputes.** Any disputes arising out of this Purchase Order or from a breach thereof shall be submitted to arbitration in Little Rock, Arkansas, and the judgment upon the award rendered by the arbitrators may be entered in any court having jurisdiction thereof. The arbitration shall be held under the standard form of the Rules of the American Arbitration Association.

16. **Liens**. Vendor agrees to deliver/provide the products/services which are the subject-matter of this order to Winrock free and clear of all liens, claims, and encumbrances.

17. **Access to Accounting Records**. Vendor agrees that Winrock International, the Funding Agency, or any of their duly authorized representatives, shall have access to any books, documents, papers and records of the Vendor which are directly pertinent to the services provided hereunder, for the purpose of making audits, examinations, excerpts and transcriptions upon prior written request and during normal business hours.

18. **Confidential Information**. The Vendor may become privy to confidential information either provided by to the Vendor by Winrock International or discovered by the Vendor without the knowledge of Winrock International. The Vendor agrees to treat such information as confidential and to use such information only for the purposes of carrying out the scope of work under this agreement. The Vendor further agrees that such information will not be disclosed to any third party without the prior written consent of Winrock International and return to Winrock International all original and copies of such information upon completion of this agreement or whenever requested by Winrock International, whichever occurs first. No news release, public announcement, denial or confirmation of any part of the subject matter of this agreement shall be made without the prior written consent of Winrock International. The restrictions of this article shall continue in effect upon completion or the parties may mutually agree upon termination of this Agreement for such period of time as in writing. In the absence of a written established period, no disclosure is authorized.

19. **Intellectual Property**. Unless otherwise provided for in the Primary Contract, if Vendor first conceives of, actually puts into practice, discovers, invents, or produces any intellectual property subject to patent or copyright exclusively in connection with Vendor's performance pursuant to the Purchase Order (the "Intellectual Property"), it shall report that finding to Winrock International. Vendor shall also assist Winrock International in obtaining governmental protection for rights in the intellectual property. Winrock International shall retain ownership of all patents and copyrights for intellectual properties created as the result of this Vendor Agreement, either in part or in whole. In the case of copyrighted materials created as a result of this Vendor Agreement, Winrock International shall grant to Vendor a nonexclusive, royalty-free right to use, publish, reproduce or distribute those materials for educational purposes.

20. **Work Product Presumptive Property**. All writings, books, articles, computer programs, databases, source and object codes, and other material of any nature whatsoever, including trademarks, trade names, and logos, that is subject to copyright protection and reduced to tangible form in whole or in part by Vendor in the course of Vendor's service to Winrock shall be considered a work made for hire, or otherwise Winrock property. During this agreement and thereafter, Vendor agrees to take all actions and execute any documents that Winrock may consider necessary to obtain or maintain copyrights, whether during the application for copyright or during the conduct of an interference, infringement, litigation, or other matter (Winrock shall pay all related expenses). Vendor shall identify all materials in which Vendor intends to exempt from this provision prior to the use or development of such materials.

21. **Affirmative Action**. Unless this Purchase Order is exempted by rules, regulations or orders of the Secretary of Labor, Vendor agrees to comply with the provisions of paragraph 91) through (7) of Part 202 of Executive Order 11246, as amended; the affirmative action for handicapped workers clause set forth in 41 CFR 60-741.5; and the affirmative action for disabled veterans and veterans of the Vietnam era clause set forth in 41 CFR 60-250.4, which are by reference incorporated herein.

22. **Force Majeure**. Vendor's failure to perform the terms and conditions of this Purchase Order, in whole or in part, shall not be deemed to be a breach or a default hereunder or give rights to any liability to Winrock International if such failure is attributable to any act of God, riot, public enemy, fire, explosion, flood, drought,

war, sabotage, an action by governmental authorities or any other condition beyond the reasonable control.

23. **Rights in Data**. The Vendor understands and agrees that Winrock may itself and permit others, including government agencies of the United States and other foreign governments, to reproduce any provided publications and materials through but not limited to the publication, broadcast, translation, creation of other versions, quotations there from, and otherwise utilize this work and material based on this work. During the agreement and thereafter, Vendor agrees to take all actions and execute any documents that Winrock may consider necessary to obtain or maintain copyrights, whether during the application for copyright or during the conduct of an interference, infringement, litigation, or other matter (all related expenses to be borne by Winrock). The Vendor shall identify all materials it intends to exempt from this provision prior to the use or development of such materials. The Vendor shall defend, indemnify, and hold harmless Winrock against all claims, suits, costs, damages, and expenses that Winrock may sustain by reason of any scandalous, libelous, or unlawful matter contained or alleged to be contained in the work, or any infringement or violation by the work of any copyright or property right; and until such claim or suit has been settled or withdrawn, Winrock may withhold any sums due the Vendor under this agreement.

24. **United States Executive Order 13224** – Anti Terrorism. The Vendor is reminded that U.S. Executive Orders and U.S. Law prohibit transactions with, and the provision of resources and support to, individuals and organizations associated with terrorism. It is the legal responsibility of the Vendor to ensure compliance with these Executive Orders and laws. This provision must be included in all lower-tier awards and will flow down into task orders issued under this IQC. A list of individuals and organizational names that are the subject of this Executive Order can be found at the web site of the Office of Foreign Assets Control (OFAC) within the U.S. Department of Treasury. The address of this web site is http://treasury.gov/ofac.

25. **Computer Software Licenses**. Vendor agrees to specifically identify to Winrock International any and all computer software licenses ("including shrink-wrap") as may convey to the Winrock International. The Vendor agrees that any and all computer software developed in the performance of this order using Winrock International monies shall, unless otherwise agreed, become and remain the property of Winrock International.

26. **Anti-trafficking in Persons Directive**. Vendor acknowledges that WI International is opposed to human trafficking, prostitution, and related activities, which are inherently harmful and dehumanizing, and contribute to the phenomenon of trafficking in persons. None of the funds made available under this Agreement may be used to engage in trafficking in persons or to promote, support, or advocate the legalization or practice of prostitution. Nothing in the preceding sentence shall be construed to preclude assistance designed to ameliorate the suffering of, or health risks to, victims while they are being trafficked or after they are out of the situation that resulted from such victims being trafficked.

27. **Conflict of Interest**. Vendor must establish safeguards to prevent employees, consultants, or members of governing bodies from using their positions for purposes that are, or give the appearance of being, motivated by a desire for private financial gain for themselves or others such as those with whom they have family, business, or other ties. Each Subcontracting institution receiving funds must have written policy guidelines on conflict of interest and avoidance thereof. These guidelines should reflect country and local laws and must cover conflict of interest situations regarding financial interests, gifts, gratuities and favors, nepotism, and other areas such as political participation and bribery. Winrock International must be informed of any conflict of interest or appearance of conflict of interest by the recipient. If organizational or management systems cannot be structured to neutralize such conflict, Winrock International may choose to terminate the relationship with the Vendor.

28. **No Improper Payments**: Vendor agrees and represents that, in connection with its performance hereunder, it has not and will not make any payments or gifts or any offers or promises of payment or gifts of any kind, directly or indirectly, to any official of any government, government agent, government instrumentality or to any political candidate. This agreement will become null and void if the recipient organization makes any such offer, promise, payment or gift in connection with performance of this agreement.

29. **Insurance & Work on Winrock's or Winrock's Client Premises**. When Vendor performs work on Winrock's premises during the performance of this order, the Vendor agrees to maintain General Liability Insurance in the

amount of at least $500,000 per claim/occurrence unless otherwise noted in the Purchase Order Terms & Conditions and such other insurance as may be required in writing by the Winrock Client. Vendor, however, shall maintain adequate insurance coverage against claims arising from injuries sustained by Vendor on Winrock's facilities and agrees to be liable for all damages & claims arising against Winrock for which the Vendor is responsible.

30. **U.S. Export Control Laws**. Vendor shall at all times comply fully with all United States export control laws and regulations as they apply to any goods, software, or information, or the direct product of such information, provided under this Agreement. Vendor shall not at any time sell, deliver, or divert any goods other than in strict compliance with all applicable U.S. export control laws and regulations.

31. **Liquidated Damages**. If the Vendor fails to deliver the supplies or perform the services within the time specified in this agreement, Winrock may require that Vendor pay, in place of actual damages, liquidated damages in the amount of one percent (1%) unless noted in the Purchase Order Terms & Conditions of the agreement value for each day of delay. If Winrock terminates this agreement in whole or in part for default, as provided under section 11 above, Vendor is liable for liquidated damages accruing until such time that Winrock reasonably obtains delivery or performance from another Vendor. These liquidated damages shall be in addition to any excess costs for re-purchase. Vendor will not be charged with liquidated damages when delay of delivery or performance is beyond the control and without the fault or negligence of the Vendor.

32. **Entire Purchase Order**. The Purchase Order document and all attachments incorporated therein represents and constitutes the entire Purchase Order between parties and shall not be explained, modified, or contradicted by any prior or contemporaneous negotiations, representations, or agreements, either written or oral. Only a written instrument signed by each party may amend this Purchase Order.

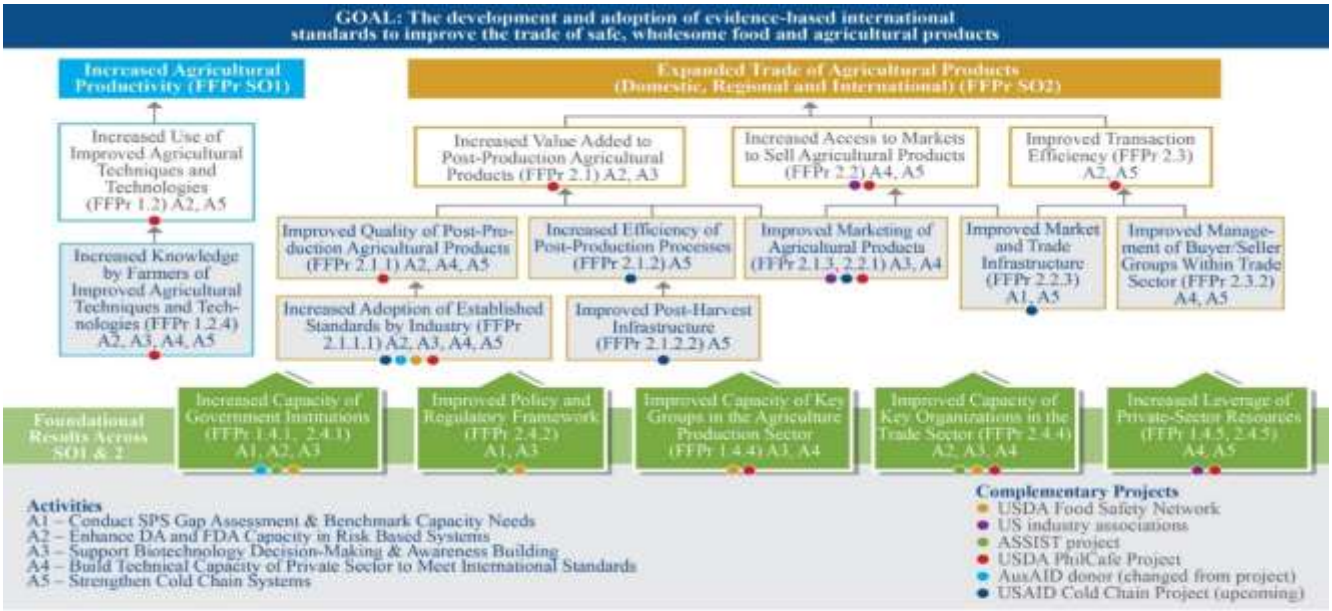
33. **Waiver**. A waiver of a breach of any provision of this Agreement shall not constitute a waiver of any subsequent breach of that provision or a breach of any other provision of this Agreement. The failure of Winrock to enforce at any time or from time to time any provision of this Agreement shall not be construed as a waiver of any of Winrock's rights or the Vendor's duties.

34. **Severability**. If any provision or any portion of a provision of this Agreement shall be finally determined to be superseded, invalid, illegal, or otherwise unenforceable pursuant to any applicable legal requirements or court order, such determination shall not impair or otherwise affect the validity, legality, or enforceability of the remaining provision or portion of the provision hereunder, which shall remain in full force and effect as if the unenforceable provision or portion were deleted.

35. **Clauses Incorporated By Reference**. Work performed under this Agreement is pursuant to a contract or grant from the U.S. Government, or other funding sources, and all relevant flow-down clauses from the contract or grant shall be deemed to be incorporated in this Agreement: (a) in such manner as to make the Vendor subject to those clauses, as applicable; and (b) to the extent necessary to enable Winrock International to perform its obligations under the contract or grant and to enable the funding source to enforce its rights hereunder. This agreement incorporates the following FAR, and agency regulations (AIDAR) as applicable. To the fullest extent that these clauses flow-down or apply to the Vendor, they are incorporated herein by reference with the same force and effect as if they were given in full text. Where appropriate and applicable under these clauses, reference to the "Government" shall be interpreted to mean "Winrock International" and "Vendor" to mean "Vendor."

36. **Laws and regulations within the General Provisions apply to all purchase orders**. Special provisions that apply to a specific purchase order activity can be found in the Terms and Conditions section of this agreement. It is the responsibility of the vendor to read and accept the terms and conditions included in the purchase order.

Attachment B: Results Framework



B-SAFE Critical Assumptions

1. The current public sector commitment to harmonize the regulatory framework and strengthen and invest in enforcement mechanisms will remain strong.
2. Expanded domestic and import/export market opportunities are sufficient (and perceived to be sufficient) to incentivize the private sector to invest in food safety and SPS compliance.
3. The GOP can establish itself as an honest broker to deliver evidence-based information campaigns on the safety of biotechnology.
4. A significant outbreak of food borne disease can be competently managed and contained by GOP regulatory agencies, maintaining public and international buyer confidence in food safety systems.
5. Philippine's major trading partners don't impose unjustified export bans on key traded commodities.
6. Trade relations with the US, Europe and ASEAN countries remain stable.
7. Applicable international standards remain consistent during the life of the project.

Assumptions 1-4 are considered *"killer assumptions."* B-SAFE focus on improved coordination and communication is intended to support these assumptions.

Annex 8. Conflict of Interest Statement

ASIAN SOCIAL PROJECT SERVICES, INC.
www.asiansocial.org | aspsi@asiansocial.org | aspsiglobal@gmail.com | +63 49 536 3448
3rd Floor MG Building 10001 Mt. Halcon St., Los Baños Subd., Batong Malake, Los Baños, Laguna, Philippines 4030

Conflict of Interest Form

On behalf of Asian Social Projects Services, Inc. (ASPSI), I certify, to the best of my knowledge and belief as of the date indicated below, that any of us in ASPSI either

1) have no actual or potential conflict of interest, personal or organizational, that could diminish our capacity to perform an impartial and objective evaluation, or that might otherwise result in an unfair advantage or personal gain, or

2) have fully disclosed all such conflicts to the Winrock International and will comply fully with any instructions to mitigate, avoid, or neutralize conflicts(s). We understand that we will also be under a continuing obligation to disclose, and act as instructed concerning, such conflicts discovered at any time prior to the completion of the evaluation.

Name: DR. BEATRIZ P. DEL ROSARIO	Signature:
Title: Chairperson and President	Date: December 10, 2020

List of Appendices

Rice Appendices

Rice Appendix 1. Overview of the Rice Industry

Rice is the most important crop in the Philippines, with a per capita consumption of about 111.62 kg/year. In 2020, the industry contributed the largest, at 18.1 percent, to the agriculture, forestry and fishery GVA. It employed 2.1 million farmers, 110,000 and 320,000 workers for post-farm and ancillary activities, respectively.

The country was the 8th largest rice producer of the world with 11.73 million metric tons in 2018/2019. More than three-fourths (77 %) of the country's palay output were harvested from irrigated areas and the rest from rainfed farms. Luzon accounted for the bulk of the country's palay output (60.7 %), of which almost one-third came from Central Luzon. Cagayan Valley was also a major rice producing region, accounting for 14.1 percent of the country's total output. The three regions in Visayas had 17 percent of total output, bulk of which (11 percent) was from Western Visayas region. Mindanao accounted for about one-fifth of total, with the SOCCKSARGEN region as the top producer having a share of 6.3 percent, followed by Northern Mindanao which had 4 percent of the country's total palay output.

The average volume of imported rice from 2017 to 2019 was 2 million metric tons. Import volume was only 0.9 million metric tons in 2017. However, this amount increased considerably to 2 million metric tons in the following year and further jumped to 3 million in 2019. During the same period per capita consumption increased from 119 kg/year in 2017 to 128 kg/year in 2019. Rice self-sufficiency consequently declined from 95 percent in 2017 to 79.8 percent in 2019. The increasing dependence on imports is attributed to import liberalization under the 2019 Rice Tariffication Law.

The government enacted the RTL in 2019 to comply with its quarter-of-a-century obligation under the WTO Agreement on Agriculture to convert the rice import monopoly of the National Food Authority into ordinary import rice tariff. In 2018, rice prices increased by 20 percent, pushing the country's inflation by about two percentage points.

The import monopoly of the NFA had pushed rice prices up and eroded the competitiveness of the country's rice farmers vis-à-vis the Thai and Vietnamese farmers. The total cost of a kilogram of local rice is PhP 12.41, which is almost twice as high as that of Vietnam and 41 percent higher than that of Thailand. The high cost is due mainly to the labor cost, which on average is PhP3.66/kg as against less than PhP1/kg in Vietnam and Thailand. The costs of animal labor, as well as fuel and oil for farm machinery are likewise higher in the Philippines. Accordingly, the farmgate price of palay is high, which understandably translates to higher wholesale and retail prices of the commodity in the country.

Besides production cost, rice marketing in the Philippines is likewise more costly than in Thailand and Vietnam. Marketing a kilogram of rice entails a cost of PhP 4.63, significantly higher than the corresponding figures of PhP 2.73 in Thailand and PhP 3.78 in Vietnam. This cost disadvantage is traced to relatively inefficiencies in transporting, milling and packaging rice locally. Relative to Vietnam and Thailand, the Philippines has a natural comparative disadvantage in rice production since former have larger flat plains, fewer typhoons and better access to water, the Mekong River system. This river provides a rich source of soil nutrients thus, the higher paddy yields achieved in these countries. Liberalizing rice imports is therefore considered advantageous to the country so that consumers can enjoy lower rice prices.

To enhance the competitiveness of rice farmers, the government has implemented various competitiveness-enhancing programs, funded with the Rice Competitiveness Enhancement Fund (RCEF) with at least 10 billion pesos per year for a period of six years. RCEF is funded from the in-quota customs duties of rice imports, which can

accumulate to at least 60 billion pesos in the next six years following the enactment of the RTL. Besides RCEF, the DA is implementing its Rice Roadmap.

Rice Industry in Bukidnon

Bukidnon has a total land area of 1,049,859 hectares. Of this, 669,529 hectares are classified as timberland and the remaining as alienable and disposable of which, 92% is utilized for agricultural production. In terms of area harvested, corn and rice are the two largest crops grown in the province. Other important crops are sugarcane and pineapple. From the latest census of agriculture in 2012, 38,333 households of the province are engaged in corn production and 8,333 households in rice. There are over a thousand small or medium firms in the province engaged in rice and corn milling (Provincial Profile, 2019).

About 95 percent of rice producers in Bukidnon cultivate less than 5 hectares (average is 1.75 hectares) and are therefore classified as smallholders using the Food for Progress (FFPr) classification. Majority (56%) of the farmers are male, almost all (98%) of whom are more than 30 years of age and trace their ethnic origin either as “Higaonon”, “Kapampangan” and “Cebuano”. Three fourths of these farmers have at most ten years of formal education, and the rest have 11 to 14 years. Fifty- seven percent of households have at least five members. The large majority (75%) have monthly household income of at most PhP 11,000 and may therefore be classified as poor, while 15 percent have monthly household income of more than PhP11,000 to lower than PhP21,000. Almost all (96%) have non-farm income sources, albeit small or less than PhP10,000 monthly. Six (6) percent of the farmers are members of cooperatives, while 66 percent are members of farmers associations (**Rice Appendix Tables 3 and 4**).

Rice Appendix 2. Rice Probit Models

Probit models are used to explore the factors affecting significantly the decision of producers to adopt a given improved technology or management practice. The model is formulated and estimated using the data from the survey conducted in this baseline study. The general form of the model is $Y_i = A + \propto^t \boldsymbol{X}_i + \in_i$ where Y_i is a binary variable with values of 0 and 1, representing the adoption decision of producer *i*. $\boldsymbol{X}_i$ is a vector of explanatory variables attributable to producer *I*, while $\propto$ is a vector of same dimension representing the coefficients of each of the explanatory variable in $\boldsymbol{X}$. A and $\in_i$ are respectively the constant and error terms, respectively of the probit model.

For the rice producers, the model specified in this study is the following:

$$Y_{ij} = A_j + \sum_{\forall\, k\ in\ SEDC} \alpha_k SEDC_{ki} + \sum_{\forall\, k\ in\ FARM} \beta_k FARM_{ki} +$$

$$\sum_{\forall\, k\ in\ M} \mu_k M_{ki} + \sum_{\forall\, k\ in\ INS} \delta_k INS_{ki} + \sum_{\forall\, k\ in\ INF} \gamma_k INF_{ki} + \varepsilon_{ii}$$

Y_{ij} is 1 if respondent I adopts technology/practice j,
J=1 is pest management (especially control of fall army worm); j=2 is general pest management (recommended pesticide application); j=3 is soil fertility management; j=4 is nutrient management; j=5 is water management; j=6 is post-harvest management; j=7 is consolidated farming; j=8 is GAP certification; j=9 is organic farming.

$\boldsymbol{SEDC_{ki}}$ is the vector of socio-economic demographic cultural variables attributable to producer i and used to explain the adoption decision j of producer I, where k=1 is education; k=2 is age; k=3 is ethnicity, k=4 is gender, k=5 is household income, k=6 is non-farm income; and k=7 is household size.

$\boldsymbol{FARM_{ki}}$ is the vector of farm characteristics attributable to producer i and used to explain the adoption decision j of producer i, where k=1 is irrigated/rainfed farm; k=2 is farm size; and k=3 is distance from market; k=4 is accessibility; and k=5 is fall army worm infestation.

$\boldsymbol{M_{ki}}$ is the vector of market-related variables attributable to producer I and used to explain the adoption decision j of producer I, where k=1 is premium price for quality; k=2 is major market (e.g. trader, consolidator, processor); k=3 is source of market information.

$\boldsymbol{INS_{ki}}$ is the vector of institutional variables attributable to producer i and used to explain the adoption decision j of producer I, where k=1 is membership in organization; k=2 is access to extension service; k=3 is availability of technology in the area; k=4 is contractual arrangements; k=5 is access to credit; k=6 is access to crop insurance; k=7 is beneficiary of government program; and k=8 is financial inclusion.

$\boldsymbol{INF_{ki}}$ is the vector of infrastructural variables attributable to producer i and used to explain the adoption decision j of producer I, where k=1 is access to farm to market roads; k=2 is road condition; and k=3 is access to the internet.

A_j, ε_{ii} are respectively the constant and error terms of the model.

$\alpha_k, \beta_{k,} \mu_k, \delta_k$ and γ_k are the vectors of coefficients for each of the variable k in vectors SEDC, FARM, M, INS, and INF respectively.

Rice Appendix Table 1. Reason for non-adoption of GAP practices on area assessment, rice farms in Bukidnon

Reason	Number Reporting	%
Farm location assessment		
Not enough knowledge on farm location assessment	110	58.2
Difficult to apply/assess	10	5.3
No time	11	5.8
No need to assess the farm	9	4.8
No one conducted the farm assessment	35	18.5
others	7	3.7
Soil nutrient analysis using color chart		
Lack of knowledge/awareness	48	25.8
Lack of facility/accessible analysis center	87	46.8
Lack of time	15	8.1
No budget/expensive	8	4.3
Not practiced	6	3.2
Others	16	8.6
Farm sanitation		
Lack of knowledge/awareness	7	33.3
Labor intensive	3	14.3
Others	4	19.0
Agri water management		
Lack of knowledge/awareness	97	65.1
Lack of facility/equipment	19	12.8
Lack of time	17	11.4
Others	9	6.0

Rice Appendix Table 2. Results of Probit analysis on adoption of GAP practices among rice farmers

Adoption of GAP	Coef.	Std. Err.	Z	P>z
YrsInSchool	-.021	.0272	.596	.440
Sex	-.401**	.1775	5.105	.024
HHIncome	.000	.0000	1.999	.157
HHSize	.022	.0326	.463	.496
FarmSize	-.002	.0168	.011	.917
FarmOwn	.012	.1825	.004	.949
DistFarmtoMarket	-.038**	.0148	6.429	.011
FAW	-.113	.1782	.399	.527
IPM	-.172	.1966	.763	.382
MajorMarket	.207	.1780	1.346	.246
MemOrg	-.255	.1959	1.696	.193
AccExt	.082	.1920	.183	.668
AccCredit	.033	.1902	.030	.862
AccAgriIns	.061	.1955	.096	.757
FarmMarketRoad	.212	.1353	2.462	.117
cons	-.622	.4025	2.388	.122

**Significant at 5% level; *Significant at 10% level

Corn Appendices

Corn Appendix 1. Overview of the Corn Industry

Corn is the second most important crop in the Philippines after rice. It is not only used as food for human consumption but also for animal feed and industrial uses. Two types of corn are grown in the country, yellow and white corn. Yellow corn is used mostly for animal feeds, while white corn is mostly for human consumption, and partly for industrial uses. The per capita consumption of corn in 2019 was 20.54 kg/year. In 2020, corn was the 6th biggest contributor to GVA of agriculture, fishing and forestry, and 3rd in the crops sector after rice and coconuts. In addition, an estimated 600,000 households depend on corn farming as a primary source of income, most of whom are small farmers with an average farm size of merely 1.14 hectares.

Yellow corn production, area harvested and yield during the last decade are shown in **Corn Appendix Figure 1**. Area harvested is steadily increasing during the period. Consequently, total volume of production was generally on an uptrend, albeit the trend is not as smooth as that of area harvested expectedly due to the interplay of agro-climatic and agronomic conditions, which may vary over time and which determine to a large extent the annual volume of output. It is interesting to note the rapid growth of yellow corn production in just a decade. The 50-percent expansion is attributed more to yield growth than to area expansion. Yield expansion from 2.5 MT/ha in 2010 to 6 MT/ha in 2020 may be attributed primarily to the use of genetically modified corn technology.

In contrast to yellow corn, the country's white corn output plateaued over the last ten years at about 2.2 million metric tons per year (**Corn Appendix Figure 2**).

Cagayan Valley is the country's largest yellow corn producing region, producing hardly anything of white corn, but comes after BARMM in terms of combined output of both types of corn. Northern Mindanao is the third largest yellow corn producing region, but harvests most of the country's white corn. Other major corn producing regions in the Philippines are SOCCSKSARGEN and the Ilocos regions.

The country's corn supply and utilization accounts from 2017 to 2019 are shown in **Corn Appendix Table 2.** The annual average domestic output was about 7.9 million metric tons. Together with an annual average import of 650 thousand metric tons, the average annual gross supply of the country was about 9.2 million metric tons.

The bulk of the annual supply (about 5.1 million metric tons) were used as animal feeds, while about 1 million metric ton were used as raw material by the various processing industries. The net food disposable, i.e. for consumption, was about 2.16 million metric tons per year.

The production of yellow corn in the country remains profitable with a net profit to cost ratio of 0.4 in 2011 (**Corn Appendix Table 3**). This even improved the following years reaching as high as 0.77 in 2014. The net profit to cost ratio was slightly lower at 0.67 in 2019.

Seeds, fertilizer and pesticide constitute the largest cash expense items in yellow corn production amounting to almost PhP7,000 per hectare in 2019. This represents about 44 percent of the total cash cost. However, hired labor is the single highest expense item amounting to almost PhP5,600 per hectare. The cost of seeds and hired labor were increasing over the years, albeit very slightly. Together with the cost of pesticides, these are the cost items that have to be managed if not significantly reduced to sustain the financial viability of producing yellow corn in the country.

Producing white corn is much less profitable than yellow corn. The net profit to cost ratio of producing white corn, which was 0.38 in 2011 approximates that of yellow corn, but the profitability difference between the two widened over the years in favor of yellow corn. In 2019, the net profit to cost ratio of producing white corn was only 0.23, which is a far cry from the 0.67 reported for yellow corn.

Corn Appendix 2. Corn Probit Models

Probit models are used to explore the factors affecting significantly the decision of producers to adopt a given improved technology or management practice. The model is formulated and estimated using the data from the survey conducted in this baseline study. The general form of the model is $Y_i = A + \propto^t \boldsymbol{X}_i + \in_i$ where Y_i is a binary variable with values of 0 and 1, representing the adoption decision of producer *i*. $\boldsymbol{X}_i$ is a vector of explanatory variables attributable to producer *I*, while $\propto$ is a vector of same dimension representing the coefficients of each of the explanatory variable in $\boldsymbol{X}$. A and $\in_i$ are respectively the constant and error terms, respectively of the probit model.

For the **corn producers**, the model specified in this study is the following:

$$Y_{ij} = A_j + \sum_{\forall\, k\ in\ SEDC} \alpha_k SEDC_{ki} + \sum_{\forall\, k\ in\ FARM} \beta_k FARM_{ki} +$$

$$\sum_{\forall\, k\ in\ M} \mu_k M_{ki} + \sum_{\forall\, k\ in\ INS} \delta_k INS_{ki} + \sum_{\forall\, k\ in\ INF} \gamma_k INF_{ki} + \varepsilon_{ii}$$

Y_{ij} is 1 if respondent I adopts technology/practice j,
J=1 is pest management (especially control of fall army worm); j=2 is general pest management (recommended pesticide application); j=3 is use of Bt corn; j=4 is nutrient management; j=5 is consolidated farm management; j=6 is GAP certification; and j=7 is organic farming.

$\boldsymbol{SEDC_{ki}}$ is the vector of socio-economic demographic cultural variables attributable to producer i and used to explain the adoption decision j of producer I, where k=1 is education; k=2 is age; k=3 is ethnicity, k=4 is gender, k=5 is household income, k=6 is non-farm income; and k=7 is household size.

$\boldsymbol{FARM_{ki}}$ is the vector of farm characteristics attributable to producer i and used to explain the adoption decision j of producer i, where k=1 is irrigated/rainfed farm; k=2 is farm size; and k=3 is distance from market; k=4 is accessibility; and k=5 is fall army worm infestation.

$\boldsymbol{M_{ki}}$ is the vector of market-related variables attributable to producer I and used to explain the adoption decision j of producer I, where k=1 is premium price for quality; k=2 is major market (e.g. trader, consolidator, processor); k=3 is source of market information.

$\boldsymbol{INS_{ki}}$ is the vector of institutional variables attributable to producer i and used to explain the adoption decision j of producer I, where k=1 is membership in organization; k=2 is access to extension service; k=3 is availability of technology in the area; k=4 is contractual arrangements; k=5 is access to credit; k=6 is access to crop insurance; k=7 is beneficiary of government program; and k=8 is financial inclusion.

$\boldsymbol{INF_{ki}}$ is the vector of infrastructural variables attributable to producer i and used to explain the adoption decision j of producer I, where k=1 is access to farm to market roads; k=2 is road condition; and k=3 is access to the internet.

A_j, ε_{ii} are respectively the constant and error terms of the model.

$\alpha_k, \beta_{k,} \mu_k, \delta_k$ and γ_k are the vectors of coefficients for each of the variable k in vectors SEDC, FARM, M, INS, and INF respectively.

Corn Appendix Table 1. Corn Grits Classification, PNS/BAFPS 15:2004, Philippines

Grade factors (% by weight maximum)	Grades				
	Premium	Grade No. 1	Grade No. 2	Grade No. 3	Grade No. 4
Moisture Content	14	14	14	14	14
Aflatoxin	20ppb	20ppb	20ppb	20ppb	20ppb
Filth	0.1	0.1	0.1	0.1	0.1
Discolored Grits	Trace	0.5	1.0	2.0	3.0
Foreign Matter	Trace	0,5	0.8	1.0	2.0
Grits of other colors	Trace	0.5	1.5	3.0	5.0
Grits of other sizes	1.0	4.0	7.0	10.0	13.0

Corn Appendix Table 2. Supply and utilization accounts, corn, 2017-2019

		SUPPLY					UTILIZATION					
									Net Food Disposable			
Year	Beginning Stock	Production	Imports	Gross Supply	Exports	Seeds	Feeds & Waste	Processing	Total	Per Capita Kilogram /Year	Per Capita Gram/Day	Ending Stock
Level (in '000 metric tons)												
2017	382	7,915	475	8,772	a/	51	5,145	1,056	1,569	15.06	41.27	952
2018	952	7,772	1,017	9,740	a/	50	5,052	1,037	2,925	27.66	75.79	676
2019	676	7,979	458	9,113	a/	50	5,186	1,064	2,000	18.65	51.08	812
Average	670	7,889	650	9,209	a/	51	5,128	1,052	2,165	20.46	56.05	813
Growth Rate (in percent)												
17-18	149.03	-1.81	113.94	11.03		-1.61	-1.81	-1.81	86.44	83.64	83.64	-28.95
18-19	-28.95	2.66	-54.91	-6.44		0.21	2.66	2.66	-31.62	-32.59	-32.59	20.09
Average	60.04	0.43	29.51	2.30		-0.70	0.43	0.43	27.41	25.52	25.52	-4.43

Corn Appendix Table 2. Results of Probit analysis on willingness of corn farmers to adopt GAP practices

Willingness to adopt GAP	Coef.	Std. Err.	Z	P>z
YrsInSchool	-.021	.0272	.596	.440
Sex	-.401**	.1775	5.105	.024
HHIncome	.000	.0000	1.999	.157
HHSize	.022	.0326	.463	.496
FarmSize	-.002	.0168	.011	.917
FarmOwn	.012	.1825	.004	.949
DistFarmtoMarket	-.038**	.0148	6.429	.011
FAW	-.113	.1782	.399	.527
IPM	-.172	.1966	.763	.382
MajorMarket	.207	.1780	1.346	.246
MemOrg	-.255	.1959	1.696	.193
AccExt	.082	.1920	.183	.668
AccCredit	.033	.1902	.030	.862
AccAgriIns	.061	.1955	.096	.757
FarmMarketRoad	.212	.1353	2.462	.117
cons	-.622	.4025	2.388	.122

**Significant at 5% level; *Significant at 10% level

Hogs Appendices

Hogs Appendix 1. Overview of the Hog Industry

Until the outbreak of the African Swine Fever (ASF) in the third quarter of 2019, the country's swine industry had increasing pig herd. The industry had been one of the most important contributors to agriculture sectoral performance, contributing more than PhP 200 billion or 15.2% to total agricultural output in 2019.

Backyard and commercial farms make up the industry. Backyard farms are mostly found in rural areas with one sow and at most ten heads. Commercial farms vary a lot in size from the smallest commercial farms with two sows and from 11 to 20 heads to the large farms, some of which are known to have 5,000 heads. The largest commercial farms are typically integrated, with some farms going into contract growing.

Backyard farms dominate the industry, accounting for 62% of total inventory (**Hogs Appendix Fig. 1**). However, about 75% of the swine herds in Central Luzon and CALABARZON are raised in commercial farms (**Hogs Appendix Fig. 2**).

ASF Outbreak

The country's swine population had consistently grown from 12.7 million heads in 2016 to 13.01 in 2019 (**Hogs Appendix Table 8**). Central Luzon had the largest inventory, accounting for 18% in 2016 to 17% in 2019 of total herd. CALABARZON and Western and Central Visayas followed, having respectively 12% and 11% share of country's pig inventory. Following the ASF outbreak, hog population declined by 13% from 13 m heads in 2019 to 11.269 M in 2020. Hardest hit region was Central Luzon, which suffered a 51-percent decline of its herd.

CALABARZON's swine population likewise declined due to the ASF outbreak by 13.8%. Other regions also experienced a slight decline in swine inventory in 2020. However, major producing regions namely Central Visayas, Western Visayas and Northern Mindanao continued to expand their respective herds in 2020 despite the outbreak. By the third quarter of 2020, CALABARZON had the largest swine inventory in the country, followed by Western Visayas and Central Visayas.

Twenty-five provinces were affected by the disease causing the continuous decrease in hog production (DA Strategic Communications, 2020). From July to September 2020, the total hog produced was estimated at 508.91 thousand MT, live weight, which was 7.7% lower from the previous year quarter's output of 551.62 thousand MT, live weight. By December 2020, the DA reported that almost 350,000 hogs have been culled to prevent the spread of the virus and a total of P56 billion has been lost to the hogs' industry. Currently, prevention and control of the disease, quarantine procedures, monitoring of movements, inspection, education campaign and other eradication programs are carried out by the authorities and stakeholders to addressing the problem.

Pork production was also increasing from 2.23 million MT in 2016 to 2.29 million MT in 2019, but fell to 2.1 m MT in 2020 (**Hogs Appendix Table 9**), a year-to-year decrease of 4.5%. Central Luzon and CALABARZON were hardest hit, their pork outputs cut by 23% and 12%, respectively. Visayas and Despite the ASF outbreak, Mindanao sustained the growth of its pork output.

Following the decline in production, the farmgate prices of live hogs in 2020 showed a sharp increase from P100/kg liveweight in January to P162/kg live weight in December (**Hogs Appendix Fig. 3**). This is in contrast to the trend in the previous year, where prices in started at P120 in January and ended at below P100 in December.

In the last quarter of 2020, prices of pork across the country increased resulting to price cap regulations by the government in the early 2021. Shipments from Mindanao started in February 2021 to buffer the supply in Luzon and stabilize prices, coupled with the plan to increase the minimum access volume and lowering of tariffs of imported pork. In addition, the DA allocated P280 million for the establishment of cold storage warehouses with meat cutting

facilities to lessen the trading of live animals in the country, and P400 million budget to assist and help the hog raisers recover from the disease outbreak (Simeon, 2020).

Meat Facilities

There are 117 slaughterhouses accredited as AA by the NMIS, 27 of which are found in CALABARZON, 19 in Central Luzon and 16 in the National Capital Region (**Hogs Appendix Table 10**). There are only 8 AAA-slaughterhouses, and 3 of them are found in CALABARZON.

Of the 76 AA-accredited meat cutting plants, 39 are found in NCR, 13 in Central Luzon, and 10 in CALABARZON. For the AAA meat cutting plants, 6 out of 8 are found in CALABAZON.

The 22 AA-accredited meat distribution centers are mostly found in Luzon. Thus, while these facilities are fairly evenly spread throughout the country, nonetheless three regions have the largest concentration of these facilities, namely CALABARZON with 46 facilities, NCR with 39 and Central Luzon with 36 units.

Situation in Batangas

At the provincial level, Batangas has the largest hogs' inventory in CALABARZON, contributing up to 45% of the region's herd. (**Hogs Appendix Table 11**). With chicken, hogs' industry is a major contributor to the economy of the province. More than 75% of the hogs are in commercial farms. In February 2019, the first case of ASF was reported and confirmed in the province by the Office of the Provincial Veterinarian (OPV) (Macaraig, 2020), although officially the outbreak was reported sometime in August 2019. The province, along with the different national government agencies, had coordinated in controlling the spread of the ASF virus. In August 2020, the DA provided P272.5 million worth of assistance to ramp up the agricultural sector of the province (DA Communications Group, 2020).

As of November 2020, 934,166 hogs have been affected (Elarmo, 2020). Vigorous efforts were conducted by the OPV to control the spread of the ASF in the province. Aside from culling and information and education campaigns, 18 disinfection sites were also established, and the movement of the commodity was strictly monitored, "Cash for Work" programs for the affected hog farmers were provided, and repopulation efforts were made to allow farmers to recover from ASF losses.

The DA and Tanauan City Government established the first government-owned slaughterhouse in the City, the Triple A "AAA", to boost the hog industry. The facility is located in a 1.9 ha area, which is composed of a cold chain network, meat laboratory, wastewater treatment area, and modernized system that can process 500 head per 8-hour shift (DA Communications Group, 2020). The facility, targeted to start operating in April 2021, is expected to help ensure food safety, sustain livelihoods, and the economy of the country recover from the disease outbreak.

Hogs Appendix 2. Hogs Probit Models

Probit models are used to explore the factors affecting significantly the decision of producers to adopt a given improved technology or management practice. The model is formulated and estimated using the data from the survey conducted in this baseline study. The general form of the model is $Y_i = A + \propto^{t} \boldsymbol{X}_i + \in_i$ where Y_i is a binary variable with values of 0 and 1, representing the adoption decision of producer *i*. $\boldsymbol{X}_i$ is a vector of explanatory variables attributable to producer *I*, while $\propto$ is a vector of same dimension representing the coefficients of each of the explanatory variable in $\boldsymbol{X}$. A and $\in_i$ are respectively the constant and error terms, respectively of the probit model.

For the **hog producers**, the model specified in this study is the following:

$$Y_{ij} = A_j + \sum_{\forall\, k\ in\ SEDC} \alpha_k SEDC_{ki} + \sum_{\forall\, k\ in\ FARM} \beta_k FARM_{ki} +$$

$$\sum_{\forall\, k\ in\ M} \mu_k M_{ki} + \sum_{\forall\, k\ in\ INS} \delta_k INS_{ki} + \sum_{\forall\, k\ in\ INF} \gamma_k INF_{ki} + \varepsilon_{ii}$$

Y_{ij} is 1 if respondent i adopts technology/practice j,
J=1 is ASF Management; j=2 is Biosecurity; j=3 is GHP Certification, j=4 is Cold Chain, j=5 is Slaughterhouse, j=6 is Cutting Plant, j=7 is ISO Certification, j=8 is HACCP Certification

$\boldsymbol{SEDC_{ki}}$ is the vector of socio-economic demographic cultural variables attributable to producer i and used to explain the adoption decision j of producer I, where k=1 is education; k=2 is age; k=3 is ethnicity, k=4 is gender, k=5 is household income, k=6 is non-farm income; and k=7 is household size.

$\boldsymbol{FARM_{ki}}$ is the vector of farm characteristics attributable to producer i and used to explain the adoption decision j of producer i, where k=1 is Sow level; k=2 is Inventory level for weaning to finish; k=3 is Farm ownership (e.g. sole proprietorship, partnership, etc.); k=4 is Integrator; k=5 is number of years in business; k=6 is distance from main market; k=7 is Breed type (e.g. native or commercial breed)

$\boldsymbol{M_{ki}}$ is the vector of market-related variables attributable to producer I and used to explain the adoption decision j of producer I, where k=1 is premium price for quality; k=2 is major market (e.g. trader, consolidator, processor); k=3 is source of market information.

$\boldsymbol{INS_{ki}}$ is the vector of institutional variables attributable to producer i and used to explain the adoption decision j of producer I, where k=1 is membership in organization; k=2 is access to extension service; k=3 is availability of technology in the area; k=4 is contractual arrangements; k=5 is access to credit; k=6 is access to livestock insurance; k=7 is beneficiary of government program; and k=8 is financial inclusion.

$\boldsymbol{INF_{ki}}$ is the vector of infrastructural variables attributable to producer i and used to explain the adoption decision j of producer i, where k=1 is access to farm to market roads; k=2 is road condition; k=3 is access to the internet; .k=4 is trucking services; k=5 is access to slaughterhouse; and k=6 is access to cutting plant.
A_j, ε_{ii} are respectively the constant and error terms of the model.

$\alpha_k, \beta_{k,} \mu_k, \delta_k$ and γ_k are the vectors of coefficients for each of the variable k in vectors SEDC, FARM, M, INS, and INF respectively.

Hogs Appendix Table 1. Trading by Hog Producers

Volume traded by producers: 118,707 MT

Product form		Sold to		Selling method		Mode of Payment	
Live hogs	94%	Traders	83%	Pick up	97%	Cash	93%
				Delivered	2%	Check	2%
		Direct selling	17%			Consignment	1%
				Both	1%		
						Combination	4%
Carcass	5%	Traders	65%	Pick up	100%	Cash	94%
		Direct selling	35%			Consignment	6%
Meat cuts	1%	Traders	67%	Pick up	100%	Cash	100%
		Direct selling	33%				

Hogs Appendix Table 2. Trading by Hog Traders

Volume traded by traders: 306,695.43 MT

Product form	Sold to		Mode of Delivery		Mode of Payment			Price setter
Live hogs (11%)	Traders	50%	Delivered	50%	Cash	75%	100%	Trader
	Markets (public markets/groceries)	50%	Pick up	50%	Cash and consignment	25%		
Carcass (28%)	Traders	40%	Delivered	30%	Cash	100%	10%	Grower
			Pick up	50%				
	Markets (public markets/groceries)	60%					90%	Trader
			Both	20%				
Meat cuts (75%)	Markets (public markets/groceries)	100%	Delivered	29.63%	Cash	92.59%	3.70%	Grower
			Pick up	59.26%			88.89 %	Trader
					Cash and consignment	7.41%		
			Both	11.11%			7.41%	Both
Processed (2.7%)	Markets (public markets/groceries)	100%	Pick up	100%	Cash	100%	100%	Trader

Hogs Appendix Table 3. Awareness and Adoption of Specific GAHP Requirements by Hog Farmers in Batangas, in percent

Specific GHAP Requirement	Aware	Currently Adopting	Willingness to adopt (for those not adopting)
Feed and Nutrition			
Feeding standard/ technologies	86	87	63
Use of prebiotics	86	85	70
Use of probiotics	64	86	53
Food safety assurance system	94	98	13
Feed quality control	96	95	14
Food defense systems	95	97	14
Use of antibiotics	97	95	47
Others (vitamins)	57	57	0
Improved Production Technologies			
Animal genetics/breed selection	87	54	51
Water for Pigs			
Water quality monitoring	87	86	22
Waste management	96	96	13
with ECC permit	3	3	0
Recording			
Production record	96	78	45
Animal Health			
Disease management program	95	95	28
Vaccination	96	97	40
Presence of veterinarian	92	85	27
Farm Management			
Production Operation Manual	79	45	45
Hygiene and sanitation program	99	99	75
Biosecurity measures	96	93	48
Use of vehicle dip	61	6	15
Foot bath (farm entrance & all buildings)	80	33	44
Shower	76	21	36
Downtime	86	85	30
Use of PPE	93	85	25
Climate mitigation	91	92	0
Use of tunnel vent	58	7	16
Other climate adaptation	72	71	1
Animal Welfare			
Proper animal handling and restraining of animals	96	97	40
Use of tools to minimize stress and injury to animals	92	85	27
Animal Transport			
Use of BAI accredited transport vehicles	1	0	1
Sanitation of vehicles	1	2	0

Hogs Appendix Table 4. Awareness and Adoption of Specific GAHP Requirements by Hog Traders in Batangas

Specific GHAP Requirement	Aware	Currently Adopting	Willingness to adopt (for those not adopting)
Recording by traders (n=36)	94	58	25
Proper handling and restraining of animals (n=27)	100	100	
use of tools to minimize stress of animals (n=26)	100	92	
Use of BAI accredited transport (n=28)	50	43	21
Sanitation of vehicles (n=28)	96	93	

Hogs Appendix Table 5. Probit Model for African Swine Fever Management

ASF Management	Coefficient	Std. Error	z	P>z
Sex	-0.381	0.271	-1.41	0.160
Age	-0.003	0.011	-0.25	0.806
No. of Years in School	-0.062	0.044	-1.39	0.163
Household Monthly Income	.000	0.000	0.82	0.412
Household Size	-0.091*	0.047	-1.93	0.054
Type of Breed	0.923**	0.442	2.09	0.037
Good FMR condition	-0.490*	0.279	-1.76	0.079
Contractual arrangement	0.799*	0.474	1.69	0.092
Major Market	-0.693	0.444	-1.56	0.118
Source market info	-0.709	0.580	-1.22	0.222
cons	2.923	1.217	2.40	0.016

**Significant at 5% level; *Significant at 10% level

Hogs Appendix Table 6. Probit Model for Biosecurity Measures

Biosecurity Measures	Coefficient	Std. Error	z	P>z
Sex	-0.158	0.239	-0.66	0.509
Age	0.029**	0.012	2.43	0.015
No. of Years in School	-0.066*	0.041	-1.61	0.107
Household Monthly Income	0.000	0.000	1.41	0.159
Household Size	-0.096**	0.045	-2.12	0.034
Sow level	0.033	0.031	1.07	0.283
No. of years in hog industry	-0.032**	0.012	-2.74	0.006
Type of breed	0.827*	0.439	1.88	0.060
Membership to Organization	-0.380	0.249	-1.53	0.127
Access to extension services	0.250	0.254	0.99	0.324
constant	0.601	0.905	0.66	0.507

**Significant at 5% level; *Significant at 10% level

Hogs Appendix Table 7. Probit Model for GAHP Certification

GAHP Certification	Coefficient	Std. Error	z	P>z
Sex	1.764**	0.850	2.08	0.038
Age	-0.022	0.019	-1.14	0.253
No. of Years in School	0.045	0.066	0.68	0.496
Household Monthly Income	0.000	0.000	-0.98	0.327
Household Size	-0.104	0.119	-0.87	0.385
Sow level	-0.101**	0.038	-2.66	0.008

Inventory level for Weanling to Finish	0.207*	0.115	1.79	0.073
Distance of Farm to Market	0.012**	0.004	3.38	0.001
Membership to Organization	0.638	0.404	1.58	0.114
Access to agricultural insurance	1.456**	0.504	2.89	0.004
constant	-2.878	1.464	-1.97	0.049

**Significant at 5% level; *Significant at 10% level

Hogs Appendix Table 8. Swine Inventory by Region, 2016-2020

	Oct 2016	Oct. 2017	Oct. 2018	Oct. 2019	Oct. 2020
PHILIPPINES	12,787,340	13,013,912	13,127,670	13,010,644	11,269,387
CAR	209,218	225,979	251,067	278,174	261,986
Ilocos Region	569,839	587,952	605,174	618,680	465,342
Cagayan Valley	433,839	464,713	471,079	446,607	314,931
Central Luzon	2,304,152	2,285,420	2,296,872	2,206,809	1,082,137
CALABARZON	1,584,517	1,606,244	1,593,545	1,574,047	1,356,854
MIMAROPA	595,219	598,822	565,042	524,348	517,857
Bicol Region	942,223	1,022,670	1,014,967	964,393	880,798
Western Visayas	1,290,996	1,274,439	1,303,060	1,271,228	1,260,108
Central Visayas	1,022,472	1,085,929	1,068,669	1,112,957	1,204,227
Eastern Visayas	370,305	329,131	323,170	302,044	278,168
Zamboanga Peninsula	573,798	576,320	588,108	618,897	634,201
Northern Mindanao	974,344	1,022,269	1,030,361	1,058,769	1,049,098
Davao Region	879,444	893,778	930,592	934,370	898,650
SOCCSKSARGEN	766,754	774,227	808,304	812,742	782,203
Caraga	228,355	223,631	232,711	238,298	225,894
ARMM	41,865	42,388	44,949	48,281	56,933

Source: PSA, 2021

Hogs Appendix Table 9. Volume of Hogs' Production by Region, 2016-2020 (MT)

REGION	2016	2017	2018	2019	2020
PHILIPPINES	2,231,660	2,265,015	2,319,764	2,296,651	2,142,646
CAR	26,361	25,833	26,655	26,647	25,781
Ilocos Region	86,553	90,065	94,684	94,568	92,223
Cagayan Valley	71,356	72,869	71,805	72,488	68,921
Central Luzon	462,430	447,517	472,552	417,748	322,409
CALABARZON	365,056	371,713	381,590	395,545	348,511
MIMAROPA Region	79,585	83,047	80,840	79,381	79,794
Bicol Region	121,543	126,603	130,063	133,246	119,880
Western Visayas	188,758	186,600	187,105	191,899	195,297
Central Visayas	175,105	192,199	194,472	192,758	192,871
Eastern Visayas	76,390	76,448	77,972	77,522	81,954
Zamboanga Peninsula	80,051	82,199	82,084	82,135	82,950
Northern Mindanao	177,672	188,448	196,623	200,965	210,031
Davao Region	149,157	151,599	154,784	155,894	150,190

SOCCSKSARGEN	119,047	117,741	117,291	124,594	122,808
Caraga	42,388	42,188	40,689	40,495	38,491
ARMM	10,208	9,946	10,555	10,767	10,527

Source: PSA, 2021

Hogs Appendix Table 10. Number of National Meat Inspection Services Accredited Meat Establishments by Classification and Region

Region	**No. of accredited slaughterhouses**		**No. of accredited meat cutting plant**		**No. of accredited meat distribution centers**
	AA	AAA	AA	AAA	AA
NCR	16	1	39	0	2
CAR	3	0	0	0	1
Ilocos Region	11	0	0	0	7
Cagayan Valley	3	0	0	0	5
Central Luzon	19	0	13	1	2
CALABARZON	27	3	10	6	0
MIMAROPA	2	0	2	0	0
Bicol	4	0	1	0	3
Western Visayas	4	0	2	0	0
Central Visayas	5	1	2	0	0
Eastern Visayas	1	0	1	0	1
Zamboanga	1	0	0	0	0
Northern Mindanao	5	0	3	0	1
Davao	7	2	1	1	0
SOCCSAKSARGEN	5	1	0	0	0
Caraga	4	0	2	0	0
TOTAL	117	8	76	8	22

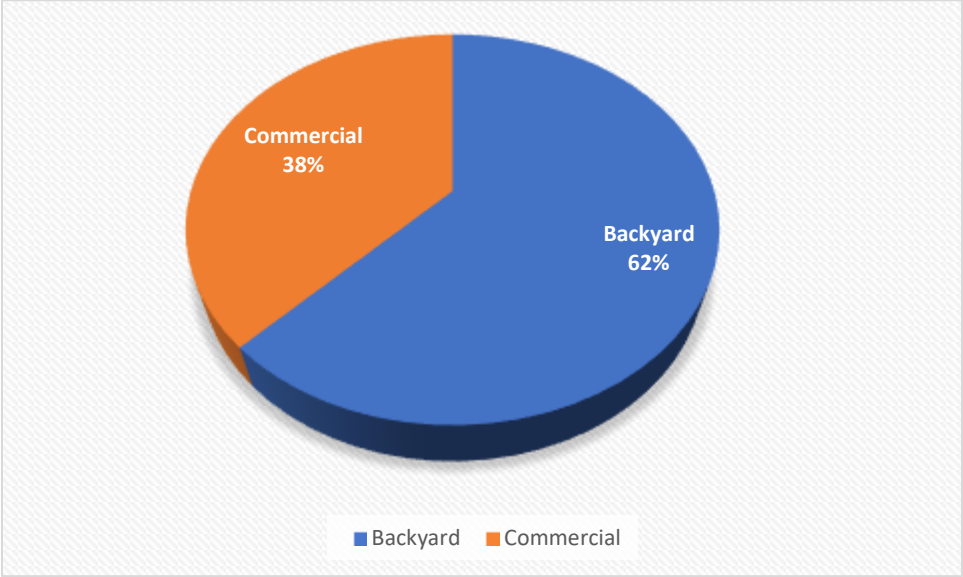
Source: NMIS, 2021.

Hogs Appendix Table 11. Hogs Inventory in CALABARZON

Region	**2016**	**2017**	**2018**	**2019**	**2020**
CALABARZON	1,584,517	1,606,244	1,593,545	1,574,047	1,356,854
Batangas	749,021	751,053	743,403	742,507	618,993
Cavite	137,526	141,319	139,161	146,401	161,592
Laguna	169,865	173,413	158,927	179,499	98,712
Quezon	234,021	235,128	237,554	244,371	226,179
Rizal	294,084	305,331	314,500	261,269	251,378

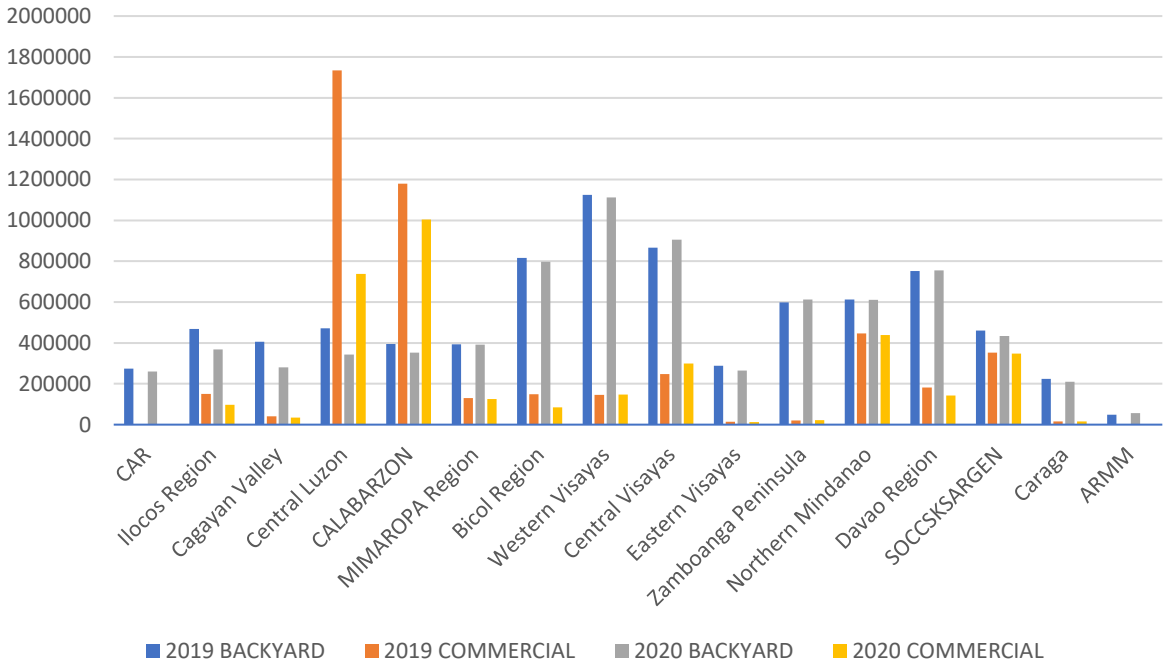
Source: PSA 2021

Hogs Appendix Figure 1. Hog Inventory by Farm Type, 2020



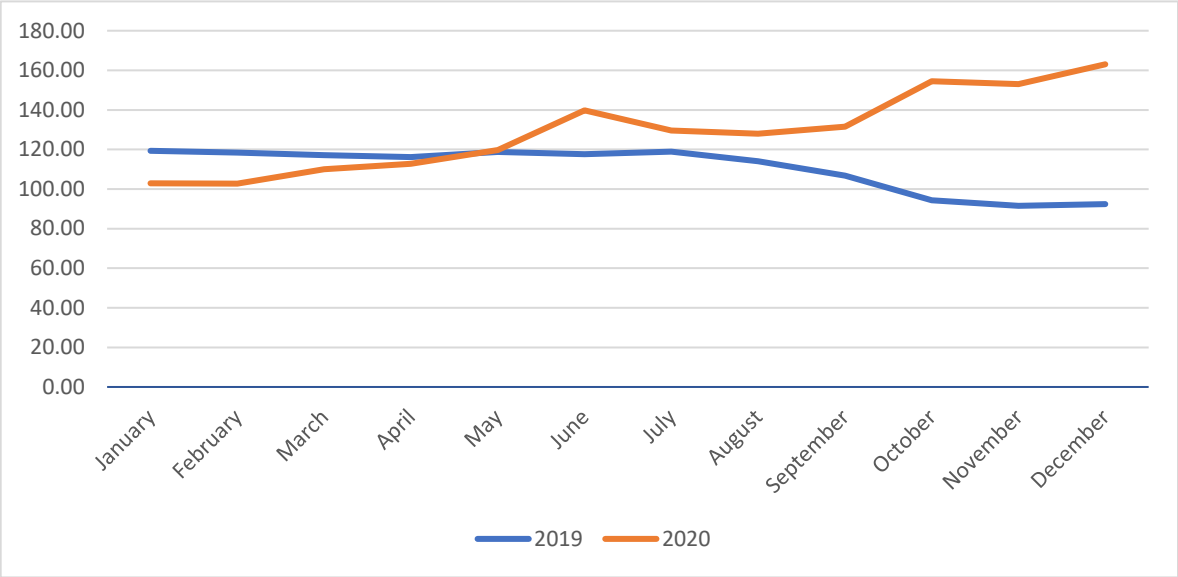
Source of basic data: PSA, 2021.

Hogs Appendix Figure 2. Hog Inventory by Type of Farm, by Region



Source of basic data: PSA, 2021.

Hogs Appendix Figure 3. Farm Gate Price of Hogs, 2019 and 2020 (P/kg liveweight)



Source of basic data: PSA, 2021.

Chicken Appendices

Chicken Appendix 1. Overview of the Chicken Industry

The chicken industry has been a consistent leader of the country's agriculture sector. Chicken inventory has steadily increased from 175 million birds in 2016 to 186 million in 2020 (**Chicken Appendix Table 11**). About half of the industry is in the five largest producing regions, namely Central Luzon (15%), CALABARZON (13%), Northern Mindanao (12%), Western Visayas (10%), and Central Visayas (11%). The industry raises three types of chickens, the dominant being the native and improved variety making up 45% of total inventory, followed by broilers (33%), and layers (22%) (**Chicken Appendix Figure 1).**

By major producing regions, Central Luzon and Northern Mindanao raise mostly chicken for meat. Respectively, their broilers are 49% and 42% of their poultry. CALABARZON, in contrast, grow layers, which is 62% of its poultry inventory (**Chicken Appendix Figure 2**). Improved native chicken varieties are mostly found in Western Visayas and Central Visayas, respectively making up 62% and 48% of their poultry production. The volume of chicken production has also steadily increased, from 1.67 million MT in 2016 to 1.81 million in MT in 2020 (**Chicken Appendix Table 12**). Top in the list is Central Luzon which contributed 35% to total output in 2020, followed by CALABARZON with nearly 18% in 2020. Northern Mindanao and Western and Central Visayas came with output shares of 9% and 6%, respectively.

There are 147 poultry dressing plants that are accredited by NMIS, as of December 2021 (**Chicken Appendix Table 13**). Majority are classified as AA, while the rest are certified as AAA plants. Most of these facilities are found in Luzon, 27 plants in Central Luzon and 18 in CALABARZON. In Mindanao, majority of the facilities are in Northern Mindanao (16) and Davao (12), while Western and Central Visayas host 14 and 12 facilities, respectively. Farmgate prices of broilers had been relatively volatile (**Chicken Annex Figure 3**). Prices in 2018 exceeded those in 2019 and 2020, particularly in the months of January through August, but were lowest in December. The highest observed farmgate price was PhP98/kg live weight in October. Farmgate prices in 2020 fluctuated, reaching their bottom at PhP61/kg live weight in October, and spiking to reach their highest of PhP93/kg in December. Retail prices exhibited hardly any trend, their level stuck in the band from PhP122 to PhP138/kg, with monthly variation not exceeding P10/kg.

Batangas Provincial Profile

Batangas holds more than half of the chicken inventory in CALABARZON from 2016-2020 (**Chicken Appendix Table 14**). Although the region's inventory had generally fluctuated in this period, a positive growth of provincial chicken output was observed. In 2020, the province holds 14.3M birds, 11 M of which are layers (**Chicken Appendix Table 15**). Broilers were only 23% of the provincial chicken inventory.

Batangas is a first-class province. With its total area of 316,581 hectares, the province has the second largest international seaport of the country in Batangas City. Its capital has been classified as a Regional Growth Center and Regional Agro-Industrial Center for Special Economic Zone (City Government of Batangas, n.d).

Thirty-four municipalities and 1,078 barangays make up the province. Based on the 2015 census, the population was 2,694,335 individuals, growing per year at the rate of 2.41% from 2010 to 2015. In 2020, the population was projected to increase to 2,981,736, its growth significantly attributed to the migration into the province from the rest of the country.

Batangas can be a poster province for economic growth. As of May 2015, it hosted 18 operating economic zones and industrial parks and 849 business enterprises. The livestock industry, largely poultry and hogs, has marked imprint on the provincial economy. Sixty-five (65) of businesses are feed mills, four (4) are slaughterhouses, and four (4) poultry dressing plants, all accredited by NMIS. The industry complements other vibrant sectors of the

economy like manufacturing and tourism. The province offers 34 famous tourism sites and boasts of 3,696,343 arrivals of local and foreign visitors in 2015.

Crops, livestock, poultry, and fisheries play a significant role in the province's agriculture. Major crops include rice, coconut, sugarcane, fruit, corn, vegetables, root crops, and coffee. Sugarcane tops agricultural output at 1.07 million MT, but comes only second to … in terms of the harvested land area (24,290 ha) (**Chicken Appendix Table 16**).

Aside from producing various crops, Batangas is a suitable location for backyard and commercial type of animal farms. The PSA (2021) recorded six major farm animals raised in the province, namely chicken, swine, cattle, goat, duck and carabao (**Chicken Appendix Table 17**). As of July 2020, chicken tops its commercial animal herd with 15 million heads, followed by swine, cattle and goat.

The fishery sector in the province is classified as commercial, municipal and aquaculture in nature. Among these, aquaculture has the highest contribution in terms of volume (54,354 MT) and value (PhP7.20 million) (**Chicken Appendix Table 18**). Sales from acquaculture make up at least 80% of the province's total fishery production

The province has a high literacy rate of 96.5%, considered among the highest in the country. Scholarships and improvement of school facilities are part of the program for education. Increasing job opportunities, allocating funds for the cooperatives and livelihood, construction of food terminal, and other activities were set to improve the livelihood sector of the province. Ensuring safety and security of the people, properties and its environment is pursued by the government through the program.

Chicken Appendix 2. Chicken Broiler Probit Models

Probit models are used to explore the factors affecting significantly the decision of producers to adopt a given improved technology or management practice. The model is formulated and estimated using the data from the survey conducted in this baseline study. The general form of the model is $Y_i = A + \propto^t \boldsymbol{X}_i + \in_i$ where Y_i is a binary variable with values of 0 and 1, representing the adoption decision of producer *i*. $\boldsymbol{X}_i$ is a vector of explanatory variables attributable to producer *I*, while $\propto$ is a vector of same dimension representing the coefficients of each of the explanatory variable in $\boldsymbol{X}$. A and $\in_i$ are respectively the constant and error terms, respectively of the probit model.

For the **chicken broiler producers**, the model specified in this study is the following:

$$Y_{ij} = A_j + \sum_{\forall\, k\ in\ SEDC} \alpha_k SEDC_{ki} + \sum_{\forall\, k\ in\ FARM} \beta_k FARM_{ki} +$$

$$\sum_{\forall\, k\ in\ M} \mu_k M_{ki} + \sum_{\forall\, k\ in\ INS} \delta_k INS_{ki} + \sum_{\forall\, k\ in\ INF} \gamma_k INF_{ki} + \varepsilon_{ii}$$

Y_{ij} is 1 if respondent i adopts technology/practice j,
J=1 is Avian Influenza Management; j=2 is Biosecurity; j=3 is GHP Certification, j=4 is Cold Chain, j=5 is Dressing plant; j=6 is Cutting Plant, j=7 is ISO Certification, j=8 is HACCP Certification

$\boldsymbol{SEDC_{ki}}$ is the vector of socio-economic demographic cultural variables attributable to producer i and used to explain the adoption decision j of producer I, where k=1 is education; k=2 is age; k=3 is ethnicity, k=4 is gender, k=5 is household income, k=6 is non-farm income; and k=7 is household size.

$\boldsymbol{FARM_{ki}}$ is the vector of farm characteristics attributable to producer i and used to explain the adoption decision j of producer i, where k=1 is flock level; k=2 is farm ownership (e.g. sole proprietorship, partnership, etc.) ; k=3 is Integrator; k=4 is number of years in business; k=5 is distance from main market; k=6 is Breed type (e.g. native or commercial breed)

$\boldsymbol{M_{ki}}$ is the vector of market-related variables attributable to producer I and used to explain the adoption decision j of producer I, where k=1 is premium price for quality; k=2 is major market (e.g. trader, consolidator, processor); k=3 is source of market information.

$\boldsymbol{INS_{ki}}$ is the vector of institutional variables attributable to producer i and used to explain the adoption decision j of producer I, where k=1 is membership in organization; k=2 is access to extension service; k=3 is availability of technology in the area; k=4 is contractual arrangements; k=5 is access to credit; k=6 is access to livestock insurance; k=7 is beneficiary of government program; and k=8 is financial inclusion.

$\boldsymbol{INF_{ki}}$ is the vector of infrastructural variables attributable to producer i and used to explain the adoption decision j of producer i, where k=1 is access to farm to market roads; k=2 is road condition; k=3 is access to the internet; .k=4 is trucking services; k=5 is access to slaughterhouse; and k=6 is access to dressing plant.

A_j, ε_{ii} are respectively the constant and error terms of the model.

$\alpha_k, \beta_{k,} \mu_k, \delta_k$ and γ_k are the vectors of coefficients for each of the variable k in vectors SEDC, FARM, M, INS, and INF respectively.

Chicken Appendix Table 1. Details of Animal Genetics of Broiler Raisers in Batangas

Details	%	Details	%	Details	%
Breed/strain of day-old chick used		**Source of day-old chick**		**Issues on quality of day-old chicks**	
45 days (cobbs)	88.54%	Registered Hatchery	82.81%	*Small*	33.61%
30 to 35 days	3.13%	Own Farm/Hatchery	3.13%	*Crippled*	19.33%
Class A	2.08%	Other sources	14.06%	*Lame*	14.29%
Contract Growers	6.25%			*Cough/other disease*	10.08%
		Other sources		Mortality	6.72%
		Poultry/vet supply shop	50.00%	Lightweight	5.88%
		Agent/viajero	30.77%	*Not uniform in size*	3.36%
		Integrator	19.23%	*Diarrhea*	2.52%
				With physical deformities	5.00%

Chicken Appendix Table 2. Trading by Broiler Producers

Volume traded by producers: 105,946 MT

Product Form		**Sold to**		**Mode of Delivery**		**Mode of Payment**	
Live Chicken	83.8%	Direct Consumers Processors Contract grower Public Markets Traders/haulers	33.33% 24.59% 20.77% 12.57% 8.74%	Delivery Pick-up Both	17.14% 50.71% 32.15%	Cash Check Consignment Installment Credit	97.14% 3.57% 2.14% 4.29% 5%
Dressed Chicken	16.2%	Public Markets Traders	85.19% 14.81%	Delivery Pick-up Both	37% 25.92% 37.04%	Cash Installment	96.3% 3.7%

Chicken Appendix Table 3. Trading by Broiler Traders

Volume traded by traders: 542,104 MT

Product Form		**Sold to**		**Mode of Delivery**		**Mode of Payment**		**Who determines the price**	
Live Chicken	17.07%	Processors Public markets	66.67% 33.33%	Delivered Pick-up Both	14.29% 57.14% 28.57%	Cash	100%	Trader Grower Both	76.47% 14.71% 8.82%
Dressed Chicken	82.93%	Traders Public markets	5.88% 94.12%	Delivered Pick-up Both	26.47% 67.65% 5.88%	Cash Credit	91.89% 8.11%	Trader Grower Both	14.29% 42.86% 42.86%

Chicken Appendix Table 4. SPS Issues in Bringing Day-Old Chicks into the Farm and Corresponding Solutions

SPS Issues	**Percent**	**Solution**	**Percent**
Crippled	39.13	Throw away/cull	47.8
Mortality	26.09	Antibiotics	26.1
Diarrhea	17.39	Isolate	15.2

Sick	13.04	Cleaning/showering	10.9
Stunted growth	4.35		

Chicken Appendix Table 5. Risk Factors in Broiler Production

Risk factors	No. reporting (n=192)	Percent
Feed Adulteration	24	12.57%
Avian Flu	33	17.19%
Others:		
Cough/Colds	57	67.86%
Wheezing	7	8.33%
Heat Stroke	6	7.14%
Chronic Respiratory Disease	3	3.57%
Diarrhea	3	3.57%
Lame	2	2.38%
Small eyes	2	2.38%
New Cancer Disease	1	1.19%
Bacterial Infection	1	1.19%
Stunted growth	1	1.19%
High Blood	1	1.19%
Earthquake	19	9.90%
Landslide	1	0.52%
Typhoon/Flood	58	30.21%
Labor Dispute	1	0.52%
Others:		
Taal Volcano eruption	2	40.00%
Increase in the price of production inputs (chick)	1	20.00%
Lack of support from the government	1	20.00%
Price instability	1	20.00%

Chicken Appendix Table 6. Awareness and Adoption of Specific GAHP Requirements by Broiler Farmers in Batangas, in percent

Specific GAHP Requirement	Aware	Currently Adopting	Willingness to adopt (for those not adopting)
Feed and Nutrition			
Feeding standard/ technologies	81.25	73.44	92.16
Use of prebiotics	53.65	45.83	82.69
Use of probiotics	53.13	46.88	80.39
Food safety assurance system	88.54	85.42	100.00
Feed quality control	86.46	84.90	100.00
Food defense systems	77.60	76.04	93.75
Use of antibiotics	92.19	82.29	80.00
Others (vitamins at)	1.04	1.04	0.00
Improved Production Technologies			
Animal genetics/breed selection	67.71	45.31	74.29
Water for Broiler			
Water quality monitoring	87.50	84.90	93.10
Waste management	79.17	70.31	77.97
with ECC permit	18	18	-
Recording			

Specific GAHP Requirement	Aware	Currently Adopting	Willingness to adopt (for those not adopting)
Production record	86.46	75.00	81.25
Animal Health			
Disease management program	76.69	72.40	96.23
Avian influenza management	60.42	38.54	88.98
Vaccination	74.48	48.44	72.73
Presence of veterinarian	71.35	49.48	59.79
Farm Management			
Production Operation Manual	58.85	32.29	77.69
Hygiene and sanitation program	82.29	77.60	83.72
Biosecurity measures	82.81	79.69	92.31
Use of vehicle dip	51.04	25.00	43.75
Foot bath (farm entrance & all buildings)			
Shower	51.56	32.29	46.92
Downtime	56.77	28.13	55.40
Use of PPE	67.71	39.58	46.55
Climate mitigation	84.90	81.25	86.11
Use of tunnel vent	47.40	20.31	50.32
Other climate adaptation	100.00	100.00	100.00
Animal Welfare			
Animal Transport			
Sanitation of vehicles	19.61	4.58	41.78

Chicken Appendix Table 7. Awareness and Adoption of Specific GAHP Requirements by Broiler Traders in Batangas

Specific GAHP Requirement	Aware	Currently adopting	Willingness to adopt (for those not adopting)
Recording by traders (n=16)	100.00	68.75	80.00
Animal welfare (n=16)	75.00	62.5	100.00
Use of animal crates (n=16)	87.5	68.75	60.00
Use of BAI accredited transport (n=16)	43.75	18.75	76.92
Sanitation of vehicles (n=15)	100.00	85.71	100.00

Chicken Appendix Table 8. Probit Model for Avian Influenza Management

Avian Flu Management	Coefficient	Std. Error	z	P>z
Sex	0.191	0.228	0.840	0.402
Age	-0.006	0.010	-0.570	0.570
No. of years in school	-0.002	0.045	-0.040	0.969
Household monthly income	0.000	0.000	1.570	0.117
Household size	-0.009	0.058	-0.160	0.873
Distance of farm to market	0.039**	0.017	2.370	0.018
Major market	1.142**	0.247	4.630	0.000
Access to extension services	0.794**	0.275	2.890	0.004
Access to credit	0.386*	0.226	1.710	0.087
Access to agricultural insurance	1.022**	0.470	2.170	0.030
cons	-1.271	0.811	-1.570	0.117

**Significant at 5% level; *Significant at 10% level

Chicken Appendix Table 9. Probit Model for Biosecurity Measures

Biosecurity measures	Coefficient	Std. Error	z	P>z
Sex	-0.036	0.248	-0.140	0.886
Age	-0.010	0.011	-0.900	0.369
No. of years in school	0.089*	0.050	1.780	0.076
Household monthly income	0.000**	0.000	2.400	0.016
Household size	0.002	0.065	0.030	0.973
Contractual arrangement	-0.897*	0.460	-1.950	0.051
Access to credit	0.740**	0.285	2.590	0.009
Access to extension services	0.501	0.338	1.480	0.139
Distance of farm to market	0.013	0.020	0.670	0.504
FMR condition	-0.238	0.265	-0.900	0.370
cons	0.481	0.893	0.540	0.590

**Significant at 5% level; *Significant at 10% level

Chicken Appendix Table 10. Probit Model for GAHP Certification

GAHP Certification	Coefficient	Std. Error	z	P>z
Sex	0.041	0.387	0.110	0.916
Age	-0.018	0.014	-1.330	0.183
No. of years in school	0.008	0.056	0.140	0.889
Household monthly income	0.000	0.000	-1.490	0.136
Household size	-0.012	0.086	-0.130	0.893
Ethnicity	-1.462**	0.516	-2.840	0.005
Years in chicken industry	0.050**	0.023	2.150	0.031
Access to credit	-0.797**	0.393	-2.030	0.043
Access to agricultural insurance	1.562**	0.394	3.970	0.000
FMR condition	-0.522*	0.324	-1.610	0.108
cons	0.910	1.186	0.770	0.443

**Significant at 5% level; *Significant at 10% level

Chicken Appendix Table 11. Chicken Inventory by Region, 2016-2020

REGION	2016	2017	2018	2019	2020
PHILIPPINES	175,358,349	181,792,452	194,688,840	192,802,612	186,331,913
CAR	1,497,279	1,627,326	1,709,387	1,749,289	1,759,904
Ilocos Region	8,449,085	9,532,432	9,816,192	10,141,227	10,898,138
Cagayan Valley	6,590,500	6,693,675	7,140,813	6,742,849	6,819,278
Central Luzon	28,927,347	28,150,343	38,086,964	35,399,462	28,203,395
CALABARZON	26,951,303	27,887,178	26,583,650	27,241,118	24,186,253
MIMAROPA Region	4,358,163	4,479,362	4,661,519	4,429,348	4,230,521
Bicol Region	10,159,151	10,618,500	10,021,510	9,441,799	9,378,232
Western Visayas	19,840,890	20,066,771	19,780,328	18,886,094	19,857,117
Central Visayas	14,444,654	14,586,503	16,334,785	19,421,310	20,967,843
Eastern Visayas	2,938,827	3,365,703	3,268,844	2,960,007	3,186,046
Zamboanga Peninsula	6,466,543	6,465,559	8,288,883	7,413,435	8,327,214
Northern Mindanao	20,972,791	22,340,271	22,927,439	23,528,236	23,512,591
Davao Region	11,654,729	12,086,104	11,608,307	11,157,281	10,522,579

REGION	2016	2017	2018	2019	2020
SOCCSKSARGEN	8,207,139	10,086,040	10,296,172	9,962,673	10,328,183
Caraga	2,164,051	2,094,397	2,460,845	2,410,687	2,361,794
ARMM	1,735,897	1,712,288	1,703,202	1,917,797	1,792,825

Source: PSA, 2021

Chicken Appendix Table 12. Volume of Chicken Production, by Region 2016-2020 (MT)

REGION	2016	2017	2018	2019	2020
PHILIPPINES	1,674,504.59	1,745,888.43	1,836,663.60	1,927,413.97	1,809,852.55
CAR	7,601.70	7,924.37	7,277.52	6,621.97	6,136.17
Ilocos Region	78,759.99	78,079.38	84,932.89	84,230.56	84,534.68
Cagayan Valley	60,644.04	58,777.35	57,893.71	55,371.63	53,692.64
Central Luzon	590,992.50	624,686.33	658,909.35	699,655.40	635,384.37
CALABARZON	328,429.85	328,645.74	330,940.14	343,264.69	317,186.18
MIMAROPA Region	10,300.72	10,154.41	10,867.74	11,173.62	10,905.00
Bicol Region	42,240.73	43,967.27	47,177.55	54,884.12	46,287.59
Western Visayas	95,834.77	103,817.82	110,011.54	117,438.62	117,019.37
Central Visayas	99,742.96	104,845.20	115,114.18	118,627.83	108,704.57
Eastern Visayas	36,293.82	49,319.44	55,000.24	62,321.68	56,587.80
Zamboanga Peninsula	30,203.51	31,986.25	34,236.37	36,476.01	35,847.67
Northern Mindanao	152,801.50	159,085.55	164,672.34	170,020.52	170,931.62
Davao Region	72,007.20	71,758.06	76,341.31	81,089.70	74,380.04
SOCCSKSARGEN	49,843.88	53,402.53	61,915.98	65,563.46	71,208.93
Caraga	13,864.19	14,590.80	16,276.63	15,513.40	15,411.55
ARMM	4,943.22	4,847.93	5,096.13	5,160.77	5,634.38

Source: PSA, 2020

Chicken Appendix Table 13. Number of National Meat Inspection Services Accredited Poultry Dressing Plants, by Region

REGION	AA	AAA
CAR	1	-
Ilocos Region	12	2
Cagayan Valley	5	1
Central Luzon	22	15
CALABARZON	7	11
MIMAROPA Region	2	-
Bicol Region	7	1
Western Visayas	14	-
Central Visayas	14	2
Eastern Visayas	7	2
Zamboanga Peninsula	6	-
Northern Mindanao	13	3
Davao Region	8	4
SOCCSKSARGEN	5	-
Caraga	2	-
ARMM	1	-
Total	126	41

Source: NMIS

Chicken Appendix Table 14. Chicken Inventory in CALABARZON

	2016	2017	2018	2019	2020
CALABARZON	26,951,303	27,887,178	26,583,650	27,241,118	24,186,253
Batangas	13,183,781	13,151,796	13,618,916	14,091,114	14,315,306
Cavite	2,248,070	2,050,302	2,061,526	1,909,791	1,799,613
Laguna	2,597,362	3,323,847	2,393,087	3,042,974	1,346,135
Quezon	4,849,381	5,029,906	4,830,374	4,841,494	3,808,393
Rizal	4,072,709	4,331,327	3,679,747	3,355,745	2,916,806

Source: PSA, 2021

Chicken Appendix Table 15. Chicken Inventory by Type of Farm, CALABARZON, 2020

	TOTAL	Broiler	Layer	Native/Improved
CALABARZON	24,186,253	6,970,236	14,746,753	2,469,264
Batangas	14,315,306	1,690,550	11,847,500	777,256
Cavite	1,799,613	1,174,432	500,357	124,824
Laguna	1,346,135	1,015,536	290,118	40,481
Quezon	3,808,393	1,935,412	378,778	1,494,203
Rizal	2,916,806	1,154,306	1,730,000	32,500

Source: PSA, 2021

Chicken Appendix Table 16. Major Crops, by Area and Production, Batangas, 2019

Commodity	Area (ha)	Production (MT)
Coconut	36,305	100,709
Sugarcane	24,290	1,075,726
Mango	10,820	36,463
Rice	8,627	33,001
Banana	5,530	40,919
Coffee	3,752	489
Vegetables	3,623	31,349
Corn	3,273	10,456
Rootcrops	1,064	16,335

Note: Data used for rice and corn were from year 2020

Source: PSA, 2021

Chicken Appendix Table 17. Animal Inventory by Type of Farm in Batangas, July 2020

Animal	Type of Farm	Number of head
Carabao	TOTAL	46,980
	Backyard	46,980
	Commercial	-
Cattle	TOTAL	125,825
	Backyard	125,825
	Commercial	3,198
Goat	TOTAL	122,700
	Backyard	122,358
	Commercial	342

Swine	TOTAL	749,658
	Backyard	160,890
	Commercial	588,768
Chicken	TOTAL	15,069,529
	Broiler	2,085,232
	Layer	11,706,797
	Native/Improved	1,277,500
Ducks	TOTAL	13,000
	Backyard	13,000
	Commercial	-

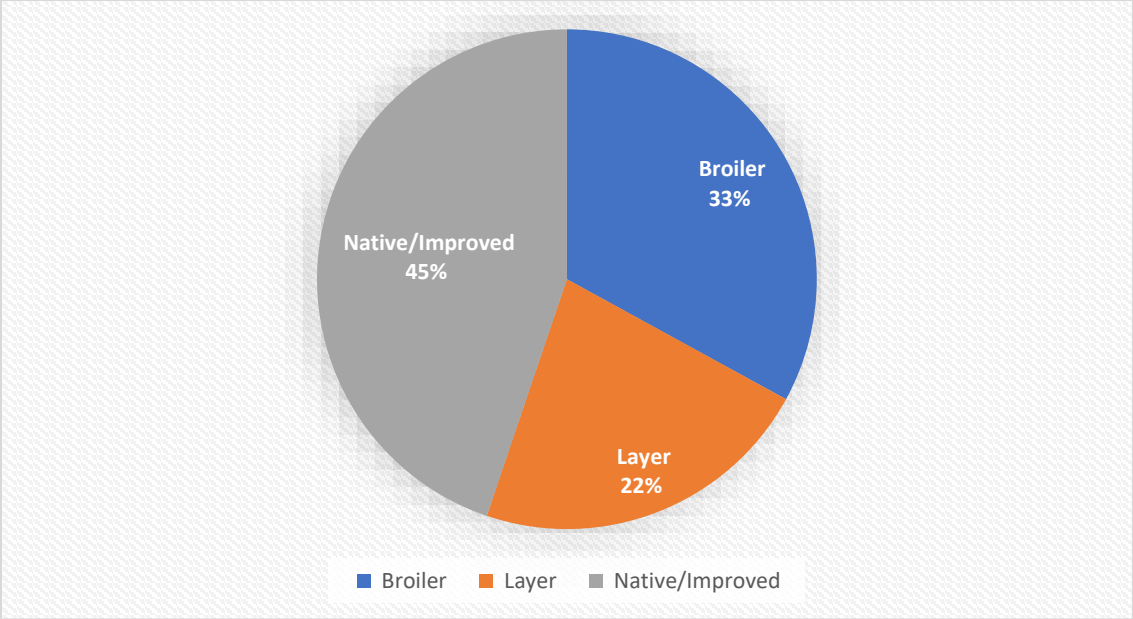
Source: PSA, 2021

Chicken Appendix Table 18. Volume and Value of Fisheries in Batangas, by type, 2020

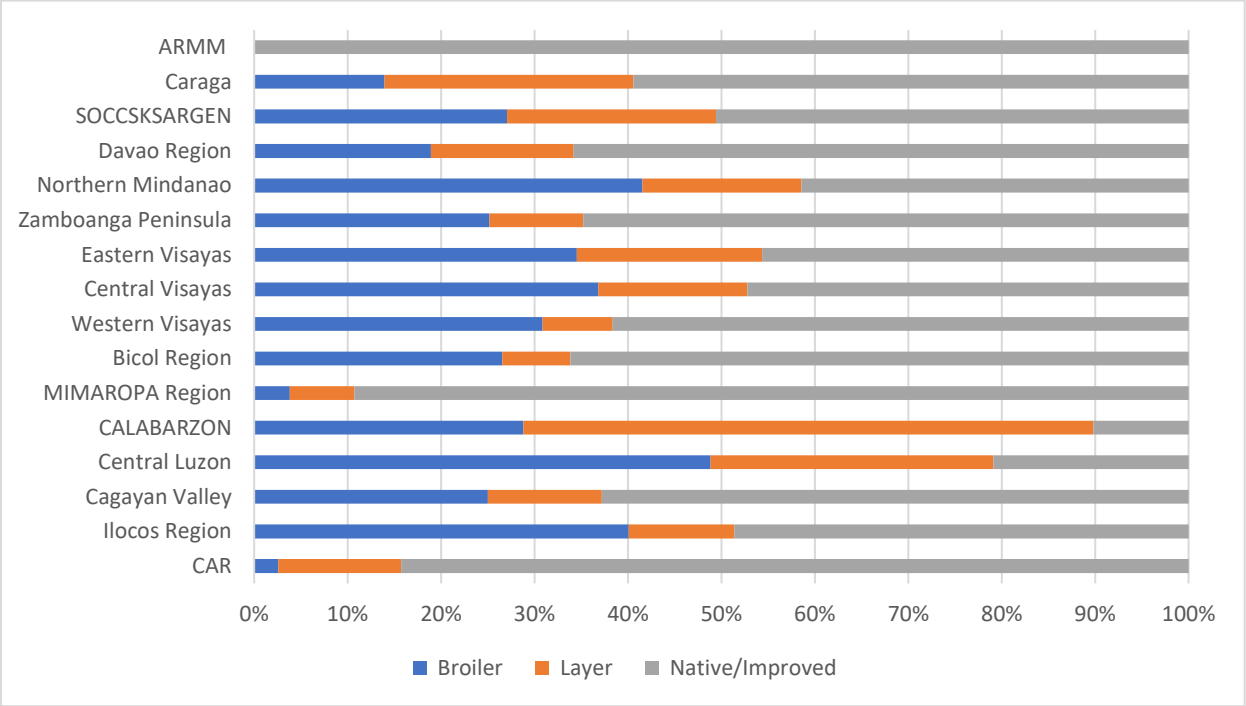
Type	Volume (MT)	Value (PhP)
Commercial Fisheries	3,741	445,942
Municipal Fisheries	7,762	815,325
Aquaculture	54,354	5,948,377
TOTAL	65,857	7,209,646

Source: PSA, 2021

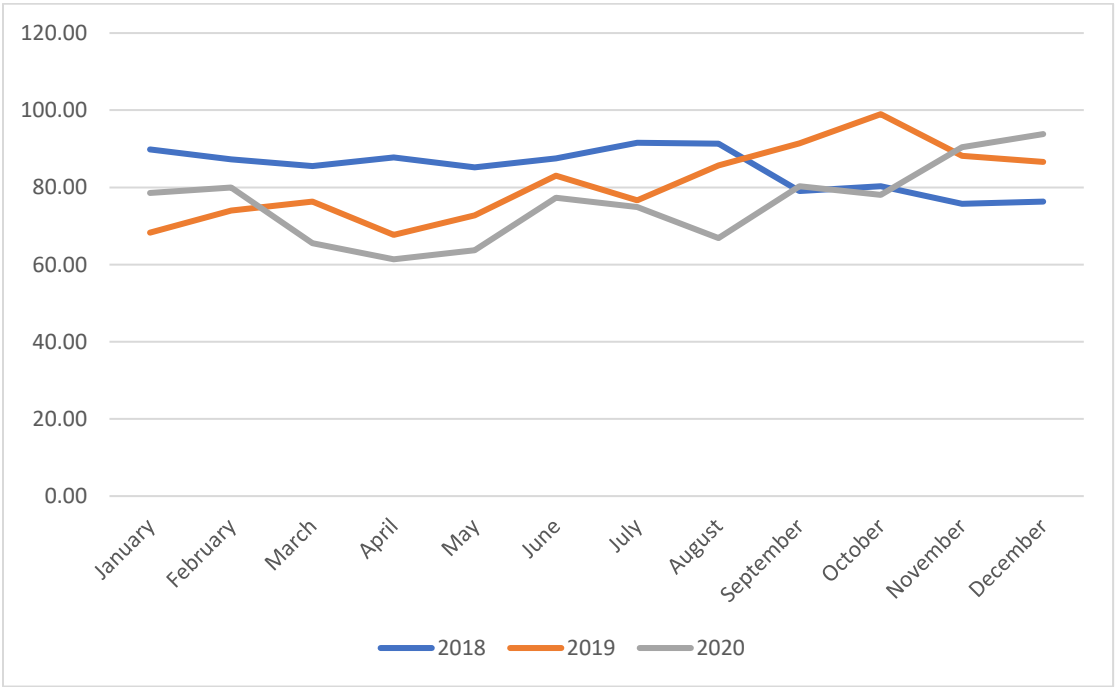
Chicken Appendix Figure 1. Chicken Inventory by type of farm, Philippines



Chicken Appendix Figure 2. Chicken Inventory by type of farm by region, 2020



Chicken Appendix Figure 3. Farmgate price of broilers, P/kg, 2018-2020



Source of basic data: PSA 2021

Milkfish Appendices

Milkfish Appendix 1. Overview of the Milkfish Industry

The Philippines is one the world's top commercial producers of Milkfish (Francisco, 2020). Together with Indonesia, it accounts for about 95% of the world's supply of the commodity

The top producing regions and provinces are Ilocos Regions (Pangasinan), Western Visayas (Capiz and Negros Occidental), Central Luzon (Bulacan and Pampanga), and CALABARZON (Laguna). On the average, Ilocos Region contributed nearly 27% to total yearly output from 2011 to 2019; Western Visayas, 21%; Central Luzon, 16%; and CALARZON, 14% (**Milkfish Appendix Figure 1**). Annual quantity and value of production in the last ten years are presented in **Milkfish Appendix Table 13.**

Pangasinan is the country's top milkfish producer. Agriculture-based production is the major source of income of majority of its 2.96 million population, with aquaculture being the major income source for households near the coastal and places with brackish water source. Favored species being cultured are milkfish, Malaga and prawns. Recent available data indicates that the province produced 105,700 mt of milkfish in 2019. Its capital city, Dagupan, is known as the "Bangus Capital of the World" being the central of business hub for milkfish in fresh and various processed forms.

The province has a total of 11,200 ha of brackish water fish ponds. About 90-95% of fishpond operators are milkfish growers (i.e, fingerlings to marketable size) while 5-10 % are into culture of milkfish fry to fingerlings. Of its 44 municipalities/cities, 17 have milkfish ponds and 6 have fish cages. BFAR maintains a registry of all milkfish farms both fishponds and fish cages.

Milkfish Processors and Product Lines

There are two huge processing plants in Pangasinan: (1) Korea-Philippines Seafood Processing Complex in Dagupan; and (2) Anjo Farms in San Fabian. Both plants are accredited under the Hazard Analysis Critical Control Point (HACCP) as well as by the European Union for the sanitary standards set on imported food products. HACCP is a systematic preventive approach to food safety, which is a requirement of every importing country.

ANJO FARMS, INC.
Anjo Farms Incorporated primarily deals with seafood processing, shrimp paste production, and milkfish processing. It exports sme of its products to foreign markets in Europe, Asia and the Middle East.

It claims to be the first and only Kosher-certified Bangus processing plant in the Philippines. It is a HALAL certified company. All of its fish products come from Bonuanbangus grown in Pangasinan

Milkfish Product Lines
Bangus (MilkFish) Sisig
Bangus Prime Belly (Barbecue)
Bangus Prime Belly (Teriaki)
Bangus Prime Belly (adobo)
Bangus Prime Belly (Curry)

Product Description
-Fresh Frozen Minced Prime **B**elly Cuts (400g net)
-Convenient and Ready to Eat (Microwaveable)
-NO Transfat; NO Preservatives; NO msg
-E.U. Accredited
-HACCP Certified
-HALAL Certified
-KOSHER Certified

KPSPC-Korea Philippines Seafood Processing Complex
The complex was built on a 1,500-square meter lot owned by the city government in Barangay BonuanBinloc through a USD 2.2M grant from the Korean International Cooperation Agency (KOICA)

Then Director of the BFAR-NIFTDC, Dr. Westly Rosario, said that this state-of-the-art triple-A standard processing facility completes the major facilities needed to ensure the expanding but sustainable *bangus* industry in Dagupan and Pangasinan.

Main product is deboned milkfish. Daily target production is 3000 pcs or 1.2 tons. Manpower requirement for fulltime operation is 80 (recently reduced to 40 due to the pandemic situation)

One of the small-scale processing plants later established in the region was the BinmaleyFisherfolk Association-operated plant from Binmaley (the first recipient of the provincial government's fish processing livelihood project).

The BinmaleyRural Improvement Club (BRIC) was a recipient of the Department of Trade and Industry's Shared Service Facilities (SSF) Program for MSMEs: PHP 1 million worth of equipment (Food-grade stainless steel smoking chamber, stainless tables, double-chamber vacuum packaging machine, chest freezer, industrial pressure cooker, tools)
Monthly average capacity was 3,000 to 10,000 kg (later increased to 18,000 kg) of fresh milkfish.

Milkfish Appendix 2. Milkfish Probit Models

Probit models are used to explore the factors affecting significantly the decision of producers to adopt a given improved technology or management practice. The model is formulated and estimated using the data from the survey conducted in this baseline study. The general form of the model is $Y_i = A + \propto^t \boldsymbol{X}_i + \in_i$ where Y_i is a binary variable with values of 0 and 1, representing the adoption decision of producer *i*. $\boldsymbol{X}_i$ is a vector of explanatory variables attributable to producer *I*, while $\propto$ is a vector of same dimension representing the coefficients of each of the explanatory variable in $\boldsymbol{X}$. A and $\in_i$ are respectively the constant and error terms, respectively of the probit model.

For the **milkfish producers**, the model specified in this study is the following:

$$Y_{ij} = A_j + \sum_{\forall\, k\ in\ SEDC} \alpha_k SEDC_{ki} + \sum_{\forall\, k\ in\ FARM} \beta_k FARM_{ki} +$$

$$\sum_{\forall\, k\ in\ M} \mu_k M_{ki} + \sum_{\forall\, k\ in\ INS} \delta_k INS_{ki} + \sum_{\forall\, k\ in\ INF} \gamma_k INF_{ki} + \varepsilon_{ii}$$

Y_{ij} is 1 if respondent i adopts technology/practice j,
j=1 is management of fish diseases; j=2 is bio-security; j=3 is good aquaculture practices certification; j=4 is cold chain; j=5 is deboning plant; j=6 is harvest and postharvest technology; j=7 ISO Certification;j=8 HACCP Certification; and J=9 is Improved Fingerling/Nursery Mgt.

$\boldsymbol{FARM_{ki}}$ is the vector of farm characteristics attributable to producer i and used to explain the adoption decision j of producer i, where k=1 is farm size/stocking level; k=2 is farm ownership (e.g. sole proprietorship, partnership, etc.) ; k=3 is Integrator; k=4 is number of years in business; k=5 is distance from main market; k=6 is Breed type (e.g. native or commercial breed)

$\boldsymbol{FARM_{ki}}$ is the vector of farm characteristics attributable to producer i and used to explain the adoption decision j of producer i, where k=1 is Farm size/stocking level;k=2 is Farm ownership (e.g. sole proprietorship, partnership, etc); k=3 is Integrator; k=4 is number of years in business; k=5 is distance from main market; k=6 is Farm type (e.g. hatchery/nursery, grow-out); k=7 is culture type (e.g. intensive, extensive); stocking density

$\boldsymbol{M_{ki}}$ is the vector of market-related variables attributable to producer I and used to explain the adoption decision j of producer I, where k=1 is premium price for quality; k=2 is major market (e.g. trader, consolidator, processor); k=3 is source of market information.

$\boldsymbol{INS_{ki}}$ is the vector of institutional variables attributable to producer i and used to explain the adoption decision j of producer I, where k=1 is membership in organization; k=2 is access to extension service; k=3 is availability of technology in the area; k=4 is contractual arrangements; k=5 is access to credit; k=6 is access to livestock insurance; k=7 is beneficiary of government program; and k=8 is financial inclusion.

$\boldsymbol{INF_{ki}}$ is the vector of infrastructural variables attributable to producer i and used to explain the adoption decision j of producer i, where k=1 is access to farm to market roads; k=2 is road condition; k=3 is access to the internet; .k=4 is trucking services; k=5 is access to ice plant; and k=6 is access to cold chain facility.

A_j, ε_{ii} are respectively the constant and error terms of the model.

$\alpha_k, \beta_{k,}\mu_k, \delta_k$ and γ_k are the vectors of coefficients for each of the variable k in vectors SEDC, FARM, M, INS, and INF respectively.

Milkfish Appendix Table 1. Fry source

	Number	Percent
Source of Fry (n = 233)		
Imported		42
Local		190
Both		1
Origin of Fry (n = 233)		
Hatchery		152
Wild/fry gatherer		81

Note: 67 are using fingerlings instead of fry

Milkfish Appendix Table 2. Access to support services

	Number	Percent
Attended training on productivity improvement		
Yes	36	12
No	264	88
Type of training		
Fishpond management	12	
Pond preparation	2	
Fish processing	2	
Fishpond facilities	1	
Fingerling management	5	
Feed management	11	
Milkfish production	3	
Training on food safety		
Yes	12	4
No	288	96
Type of training		
Deboning	1	
Feed nutrient	2	
Pond management	1	
Food safety	7	
About HACCP	1	
Access to extension services		
Yes	94	31
No	206	69
Access to credit		
Yes	71	24
No	229	76
Sources of credit		
Formal	13	
Informal	50	
Both	8	

Milkfish Appendix Table 3. Current Acclimatization Practice and Adoption of Improve Technology

	Number	**Percent**

Current Practice (n=300)		
Partially Adjusting Fry to the Water in pond to adapt	69	23.0
Manual Observation And Checking	62	20.7
Estimate water salinity and temperature	32	10.7
Manual Monitoring/inspection	46	15.3
Manual Checking Of Temperatures	23	7.7
Get water sample to test/ taste	18	6.0
Partially submerging fry to the pond water	15	5.0
Monitored by BFAR	12	4.0
Cultural Method	11	3.7
Proper Application of Salinity Test	11	3.7
Partially Adjusting Fry to the Water in pond to adapt	9	3.0
Monitor using Refractometer	1	0.3
Willing to adopt		
Yes	257	85.7
No	43	14.3
Reasons for adopting (n=257)		
For Better Production	93	36.2
For high survival rate	85	33.1
Used to Old Ways	29	11.3
improve production	21	8.2
To Expand Knowledge/improve practice	20	7.8
To monitor the water parameters	11	4.3
Convenience	9	3.5
For high survival of fry/fingerlings	5	1.9
To know the water situation	4	1.6

Milkfish Appendix Table 4. Survival Rate of Fry to Fingerling, by source

	Hatchery		**Wild**	
Survival rate	**Imported**	**Local**		**All Sources**
	n = 41	n = 94	n=50	n = 185
20-30	2.4	9.6	6	7.0
40-50	48.8	52.1	14	41.1
60-70	12.2	19.1	32	21.1
80-90	31.7		52	21.1
> 90			2	0.5
Average	63	67	69	67.0

Milkfish Appendix Table 5. Adoption of Good Aquaculture Practices

Item	Aware of the Practice	Rate of Adoption among those who are aware
	Percent Reporting	
Pond preparation	96.0	82.0
Tilling and soil conditioning	74.0	72.0
Liming	52.3	100.0
Fertilization	64.5	100.0
Natural food production	72.0	79.0
Pest/Predator control/Eradication	70.0	91.9
Flushing	51.7	77.4
Water level	68.7	70.9
Water quality	37.3	73.2
Use of other inputs (probiotics. Rice bran)	30.3	48.4
Water management		
Tidal	48.7	77.4
Use of pumps	57.3	80.8
Presence of drainage canal		
Central canal	36.7	60.0
Peripheral canal	36.0	73.1
Aeration	20.0	38.3
Effluent discharge		
Physicochemical parameter		
Ammonia buildup	11.7	11.4
Dissolved oxygen	30.3	39.6
Temperature	23.7	57.7
Presence of predators	64.7	61.3
Disease symptoms	36.7	69.1
Harvesting Flushing	100.0	36.0
Total drainage	100.0	23.0
Gill net	100.0	35.0
Fish corral	100.0	6.0
Post harvest handling	14.0	42.9

Milkfish Appendix Table 6. Problems on water quality and low fry survival rate

	Number	Percent
Poor brackish water quality		
Yes	186	62
No	114	38
Mitigating measure		
Drain and change pond water by flushing	59	34.1
Use Proper Water Management And Sanitation	28	16.2
Use water pump	19	11.0
Proper Water Management	17	9.8
Check the dikes and screen to ensure entry of good quality water	16	9.2
By Letting It Flow	14	8.1
Wait for rainfall	5	2.9
Pre-Harvest	4	2.3
Nothing	4	2.3
Monitor/Observe the water quality by tasting and smelling	7	4.1
Low survival rate of fry		
Yes	185	61.7
No	115	38.3
Mitigating Measure		
Monitor and Observe the cause of low Survival Rate	64	34.6
Change the stock/buy new stock	54	29.2
Proper handling management	45	24.3
Use 0f Nets to Catch Bird Eating Fish/predators	16	8.6
Letting it go	12	6.5
Used of chemicals to eradicate birds Eating Fish	5	2.7
Use of Chemicals to Eradicate Bird Eating Fish	3	1.6
Changing Water	2	1.1
Lessening the Use of Chemicals	1	0.5
Additional Compartments	1	0.5
minimize stress/handling fish	1	0.5
Put Aerator/aeration	1	0.5
Put Malaga rabbit dish	1	0.5
Separation of small and big fish	1	0.5

Milkfish Appendix Table 7. Disease of milkfish

				Percent Reporting
Disease symptom (97) please, specify:				
Bruises In Gills/Body scales removed				26.3
Malnourish/thin/no appetite				20.6
Gasping due to lack of oxygen oxygen lack				15.0
has ticks, white spots				13.1
Loss of Oxygen, Finrot, Fungus, ulcer, lice				6.9
Discolored patches on the skin/dark skin /Finrot/ Lack of Oxygen				3.1
Ulcers/ Open wounds				3.1
Lice,Fungus,Loss of oxgyen/Gill flukes				1.9
Loss of Oxygen, Finrot, Fungus,Red Skin				1.9
Yellowing of Liver/damage gall bladder				1.9
No Appetite, Blindness, Wounds				1.3
Red Eyes				1.3
Small Tail				1.3
Unbalance their swim/ red eye				1.3
Blackened Tail				0.6
Red Gills				0.6
Stage when disease mentioned occured (197) (Fry to fingerling; Fingerling stage; Grow out stage; Others)				
Grow out stage				33.7
Fry to fingerling				33.7
Fingerling stage				29.5
Fingerlings and Growout stage				3.1
Cause of the disease observed (Genetic materials; Production and management related; Water quality/management; Feeds; Others)				
Water Quality/ Management				72.6
Production and Management related				15.2
Genetic Material (e.g, SPS Issue)				5.6
Bird attack				5.1
Temperature				1.0
Predators				0.5

Milkfish Appendix Table 8. Probable cause of mortality

	Percent Reporting n =300
Water Quality	27.3
Climate Change	23.0
Presence of Birds	18.0
Temperature and Weather	14.3
Poor Water Quality	12.3
Lack of oxygen, stressed	12.0
Predators	10.0
Birds Eating Fish	4.7
Water Management/Water Contamination	3.3
Physio-chemical parameters	1.7
Fish kill/Red tide	1.3
Feeding management/inadequate feed	1.3
Water Pollution	1.3
Salinity, rainfall	1.0
Heat from The Sun	1.0
Over Crowding	1.0
Poor Management	0.7
Genetics	0.7
High Tide and Low Tide	0.3

Milkfish Appendix Table 9. Probit Results on GAP Certification

GAqPCert	Coef.	Std. Err.	z	P>z	[95% Conf. Interval]	
Ethnicity	1.0458**	.2046928	5.11	0.000	.6446092	1.44699
HHSize	.0709072*	.0407704	1.74	0.082	-.0090014	.1508157
TotalProdArea	5.45e-06*	2.79e-06	1.95	0.051	-2.39e-08	.0000109
MembershipToOrg	.5687858**	.2782354	2.04	0.041	.0234545	1.114117
AccessToExtn	.7718919**	.3390524	2.28	0.023	.1073614	1.436422
AccessToCrdt	.3861189*	.2397157	1.61	0.107	-.0837152	.855953
AccessToInsrnce	1.646446**	.4478729	3.68	0.000	.7686312	2.524261
ColdStorage	1.872881**	.4192919	4.47	0.000	1.051084	2.694678
_cons	-1.142001	.2632342	-4.34	0.000	-1.65793	-.626071

**Significant at 5% level; *Significant at 10% level

Milkfish Appendix Table 10. Probit results on disease management

DiseaseMgt	Coef.	Std. Err.	z	P>z
No.ofYrsInSchool	.097**	.031	3.11	0.002
Age	.017**	.007	2.55	0.011
TotalProdArea	.000**	.000	2.76	0.006
FngrlingProdOperation	1.019**	.272	3.74	0.000
Grow-out Brackish Oprtn	.744**	.328	2.27	0.023
GrwOutSeaCageOprtn	.707*	.403	1.76	0.079
Fry Origin	1.238**	.221	5.61	0.000
cons	-3.496	.650	-5.38	0.000

**Significant at 5% level; *Significant at 10% level

Milkfish Appendix Table 11. Production by farm type

Cost of production per cycle						
	Grow-out Pond per ha	Cage Per Cage	Nursery per ha			
Total Cost	83,095.00	29,955.00	95,630.00			
Percent of total						
Fry/Fingerling	36	2	29			
Feeds	47	70	52			
Materials	10	10	12			
Utilities	3	6	5			
Labor Cost	4	12	2			
	100	100	100			
Milkfish production per cycle						
		Total Production		Sold		Consumed/
	Average Area	Quantity (kg)	Value (Pesos)	Quantity (kg)	Value (Pesos)	Waste (kg)
Grow-out Pond						
Per ha	1.92 ha	2,005.63	169,691.44	1,836.69	156,190.82	168.94
Cage Culture		1,154.06	98,439.49	1,014.80	86,353.97	139.26
Nursery		pieces	Value	pieces	Value	
per ha	4.91 ha	70,752.00	318,384.00	70,752.00	318,384.00	
Cost and return per cycle						
			Amount (Pesos)			
Grow out pond (per ha)						
	Value		169,691.44			
	Cost		83,095.00			
	Net Return		86,596.44			
Grow out cage						
	Value		98,439.49			
	Cost		29,955.00			
	Net Return		68,484.49			
Nursery						
	Value		318,384.00			
	Cost		95,630.00			
	Net Return		222,754.00			

Milkfish Appendix Table 12. Probit results on cold storage facilities

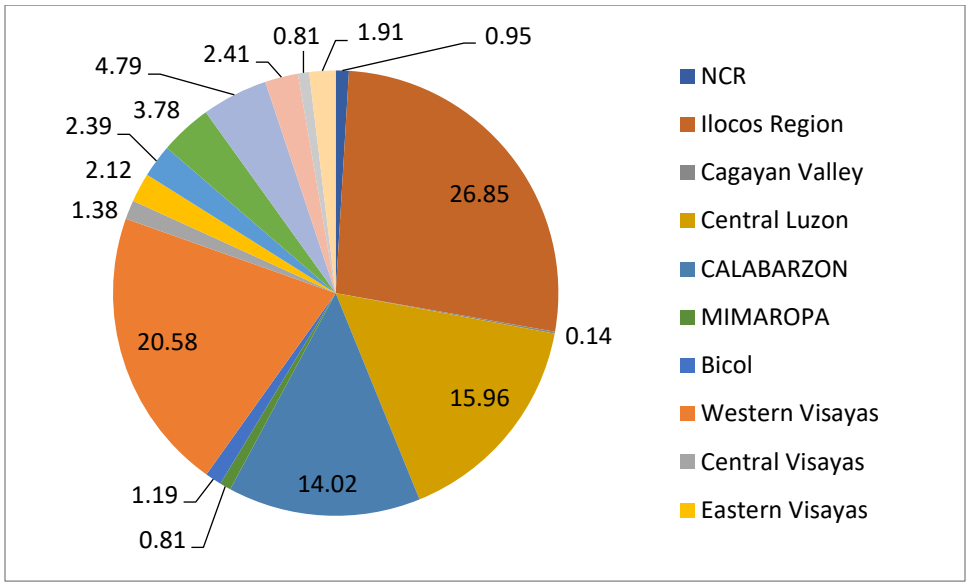
Cold Storage	Coef.	Std. Err.	z	P>z	[95% Conf. Interval]	
Age	-.0236618*	.014134	-1.67	0.094	-.051364	.0040404
Ethnicity	1.497182	.9982793	1.50	0.134	-.4594094	3.453773
HHSize	-.2014562**	.098193	-2.05	0.040	-.393911	-.0090014
Grow-out Brackish Oprtn	.6182307	.6760817	0.91	0.360	-.7068651	1.943326
GrwOutSeaCageOprtn	4.451495**	.7890941	5.64	0.000	2.904899	5.998091
Fry Origin	1.016559*	.590722	1.72	0.085	-.1412345	2.174353
AccessToInsrnce	-1.247404**	.5939913	-2.10	0.036	-2.411605	-.0832022
_cons	-2.577655	1.422072	-1.81	0.070	-5.364866	.2095545

**Significant at 5% level; *Significant at 10% level

Milkfish Appendix Table 13. Technology adoption by traders

		Adopting	Percent
Number of traders	33		
Washing with pond water/sea water		20	61
Pre Chilling		21	64
Icing		15	45
Using refrigerated van		19	58
Utilizing the available ice plant in the area		33	100
Minimize contact in dirty surface		33	100
Sorting and grading		33	100
Preventing physical damage		33	100
Packing in wooden/styro boxes or metal container "bañera"		33	100
Labeling		23	70
Cleaning/degutting		21	64
Using rigid wooden container for shipment in commercial cargo		23	70
Deboning		33	100
Marinating		33	100
Frozing Whole/Prime cuts (belly/back		33	100
Freezing fresh milkfish in cold storage		33	100

Milkfish Appendix Figure 1. Regional Percentage Contribution to Milkfish Production



(Source of Basic Data: PSA)

Coco Sugar Appendices

Coco Sugar Appendix 1. Overview of the Coco Sugar Industry

The coconut sap sugar, being a natural sweetener, targets the health-conscious market. The increasing number of diabetic people in the world hit 346 million in 2011 according to the World Health Organization with 23.6 million in the US and 8 million in the Philippines. This implied the need for a healthier sweetener like coco sugar. The projected requirement for alternative sweetener in 2016 according to the World Health Organization is almost 30,000 metric tons based on the assumption of 5 percent target diabetics. Hence, consumers all over the world are now shifting to organic and natural products like coconut sap sugar which has a low glycemic index of 35, rich in phytochemicals, key vitamins and minerals.

Philippines ranks first among the top most exporting countries in the world contributing 52% of the total export volume, followed by Indonesia with 24 % and Thailand with 13% **(Coco Sugar Appendix Figure 1)**. Top ranking producers in the country are Northern Mindanao (sharing 32%), XI (19%), and XII (21%) with Region IV-A picking up in terms of production capacity. There is an increasing demand for coconut sap sugar or coco sugar due to its nutritional value as healthy product hence the competitive advantage of the Philippines in the global market in terms of quality has to be protected by setting quality standards and pursuing clinical researches to promote this high-value product. Moreover, this product is seen to emancipate the coconut farmer from poverty, mainstreaming the coconut tappers and the village processors in the supply-value chain of the industry.

Mindanao is the largest producer of coco sugar and where several established local brands of coco sugar can be found. The provinces of Misamis Oriental and Davao del Sur are major producers in the island. Both are among the top ten coconut producing provinces in the Philippines with Misamis Oriental ranking 7th and Davao del Sur, 10th.

Data from the Philippine Coconut Authority – Market Development Department (PCA-MDD) revealed that from 10,000 kilograms of the country's coco sugar export volume in 2009, it has already increased to around 40,000 kilograms in the following year and still continues to increase up to the present. Coco sugar in the Philippines is being exported to Japan, US, Middle East, Hong Kong, South Korea, Norway, France, Canada, Switzerland, Australia, and New Zealand. The monthly export performance is shown in **Coco Sugar Appendix Figure 2.**

Contamination in coco sugar may happen in all phases of production from tapping of coco sap to processing and packaging. Cleanliness and sanitation should therefore be observed in all phases to avoid wastage and losses. Hence, a quality control officer is assigned to ensure the quality of the product. Targeting the export market requires compliance to food safety laws of the importing country to ensure the safety and traceability of the exporter's coconut sugar. One particular requirement is to have a HACCP system in place which guarantees the food safety of the product. The exporter must test for contamination such elements as plastic residues, metal and dirt, cleaning agents, pesticides, heavy metals and food-borne micro-organisms. Two out of seven PCA-registered coco sugar processors in Northern Mindanao and all manufacturer-exporters in the Davao Region have HACCP and other certifications like Kosher, HALAL, JAS, ISO and others

Coco Sugar Appendix 2. Coco Sugar Probit Models

Probit models are used to explore the factors affecting significantly the decision of producers to adopt a given improved technology or management practice. The model is formulated and estimated using the data from the survey conducted in this baseline study. The general form of the model is $Y_i = A + \propto^t \boldsymbol{X}_i + \in_i$ where Y_i is a binary variable with values of 0 and 1, representing the adoption decision of producer *i*. $\boldsymbol{X}_i$ is a vector of explanatory variables attributable to producer *I*, while $\propto$ is a vector of same dimension representing the coefficients of each of the explanatory variable in $\boldsymbol{X}$. A and $\in_i$ are respectively the constant and error terms, respectively of the probit model.

For the coco sugar producers, the model specified in this study is the following:

$$Y_{ij} = A_j + \sum_{\forall\, k\ in\ SEDC} \alpha_k SEDC_{ki} + \sum_{\forall\, k\ in\ FARM} \beta_k FARM_{ki} +$$

$$\sum_{\forall\, k\ in\ M} \mu_k M_{ki} + \sum_{\forall\, k\ in\ INS} \delta_k INS_{ki} + \sum_{\forall\, k\ in\ INF} \gamma_k INF_{ki} + \varepsilon_{ii}$$

Y_{ij} is 1 if respondent I adopts technology/practice j,
J=1 is General Cultural Mgt; J=2 Nutrient Mgt Sap Mgt; J=3 Postharvest Mgt; J=4 Consolidated Farming; J=5 GAP Certification; J=6 Organic farming Sap use (e.g. solely for coco-sugar or for other products).

$\boldsymbol{SEDC_{ki}}$ is the vector of socio-economic demographic cultural variables attributable to producer i and used to explain the adoption decision j of producer I, where k=1 is education; k=2 is age; k=3 is ethnicity, k=4 is gender, k=5 is household income, k=6 is non-farm income; and k=7 is household size.

$\boldsymbol{FARM_{ki}}$ is the vector of farm characteristics attributable to producer i and used to explain the adoption decision j of producer i, where k=1 is farm size; and k=2 is distance from market; k=3 is accessibility; k=4 is CSI infestation. and k=6 is volume of sap collection.

$\boldsymbol{M_{ki}}$ is the vector of market-related variables attributable to producer I and used to explain the adoption decision j of producer I, where k=1 is premium price for quality; k=2 is major market (e.g. trader, consolidator, processor); k=3 is source of market information.

$\boldsymbol{INS_{ki}}$ is the vector of institutional variables attributable to producer i and used to explain the adoption decision j of producer I, where k=1 is membership in organization; k=2 is access to extension service; k=3 is availability of technology in the area; k=4 is contractual arrangements; k=5 is access to credit; k=6 is access to crop insurance; k=7 is beneficiary of government program; and k=8 is financial inclusion.

$\boldsymbol{INF_{ki}}$ is the vector of infrastructural variables attributable to producer i and used to explain the adoption decision j of producer I, where k=1 is access to farm to market roads; k=2 is road condition; and k=3 is access to the internet.

A_j, ε_{ii} are respectively the constant and error terms of the model.

$\alpha_k, \beta_{k,} \mu_k, \delta_k$ and γ_k are the vectors of coefficients for each of the variable k in vectors SEDC, FARM, M, INS, and INm respectively.

Coco Sugar Appendix Table 1. Probit results on adoption of PNS

pnscert	Coef.	Std. Err.	z	P>z	95% Conf. Interval	
Sex	-1.004263*	.5292331	-1.90	0.058	-2.041541	.0330149
HHIncome	6.76e-06	7.44e-06	0.91	0.364	-7.83e-06	.0000213
FrmtoMrkt	-.0842702*	.0445478	-1.89	0.059	-.1715823	.003042
Sap	1.077541**	.3213068	3.35	0.001	.4477914	1.707291
Syrup	1.000534**	.3130267	3.20	0.001	.3870128	1.614055
MjrMrkt	-.6001066**	.2288467	-2.62	0.009	-1.048638	-.1515753
AccExtn	.9653239**	.2161902	4.47	0.000	.5415989	1.389049
AccCrdt	.4981938**	.2446146	2.04	0.042	.018758	.9776296
BnfcryGovt	.4824654	.4293938	1.12	0.261	-.359131	1.324062
AccInsrnce	.858233**	.398996	2.15	0.031	.0762153	1.640251
_cons	-1.209705	.6113288	-1.98	0.048	-2.407887	-.0115226

**Significant at 5% level; *Significant at 10% level

Coco Sugar Appendix Table 2. Marketing of coco sugar and by-products

Variable	No. Reporting (n=259)	Percent
Perform Grading and Classification		
No	259	100.00%
Compliance to product packaging and labelling requirement of buyer		
No	80	66.12%
Yes	41	33.88%
Usual packaging material used		
Paper	2	0.95%
Bottle	1	0.47%
Plastic	208	98.58%
Carton	-	
Sachet	-	
Compliance to Philippine National Standards		
No	180	69.50%
Yes	76	29.34%
Partially observed	3	1.16%
Issues on product development, branding and labeling		
None		
Percent of production rejection encountered		
<5	254	98.07%
5 to 10	3	1.16%
>10	2	0.77%
Causes of product rejection		

Overcooked	5	33.33%
Fermentation	5	33.33%
Over supply	3	20.00%
Contamination	2	13.33%
Selling/marketing methods		
Direct selling	259	100.00%
Online marketing	-	
Others, identify:	-	
Mode of delivery		
Delivered	243	93.82%
Pick-up	16	6.18%
Both	-	
Mode of payment		
Cash	164	59.64%
Weekly Payment	39	14.18%
Consignment	33	12.00%
Check	24	8.73%
Credit	15	5.45%
Average distance of farm to market (km)	8.96	
Farm to market road condition		
Fair	188	72.59%
Good	60	23.17%
Poor	11	4.25%

Coco Sugar Appendix Table 3. Problems encountered in coco sugar production

Risk Factors	No. Reporting (n=259)	Percent
Low yield of sap from existing coconut varieties in the area		
No	84	32.43%
Yes	175	67.57%
Limited number of dwarf coconut trees in the area		
No	201	77.61%
Yes	58	22.39%
Limited skilled manpower in collecting sap		
No	254	98.07%
Yes	5	1.93%
High risk in collecting sap due to tall trees		
No	179	69.11%
Yes	80	30.89%

High labor cost		
No	256	98.84%
Yes	3	1.16%
Fermentation problem due to delays in collection and contamination		
No	114	44.02%
Yes	145	55.98%
Adulteration due to high cost of labor		
No	259	100.00%
Yes	0	0%
Lack of sanitation in storage facilities		
No	247	95.37%
Yes	12	4.63%
Price competitiveness		
No	234	90.35%
Yes	25	9.65%
Follow-up Questions		
Other by-products produced when coco sap is fermented		
Vinegar	178	0.98342541
Honey	2	0.01104972
Mixed to harvested sap	1	0.55%
Omega	1	0.55%
Tuba	1	0.55%
Aminos	9	4.97%
Ethyl alcohol	1	0.55%
Pinakurat	1	0.55%
Soy sauce	3	1.66%
Tikoy	3	1.66%
Other by-products commercially viable		
No	1	0.55%
Yes	182	99.45%

Note: Multiple responses for the follow-up questions

Coco Sugar Appendix Table 4. Mitigating measures to address the problems encountered in coco sugar farming

Risk factors	Mitigating Measures	No. reporting	Percent
Low yield of sap from existing coconut varieties in the area	Applying fertilizer during low months	1	0.57%
	Maintenance	4	2.29%
	Fertilizer application, rest the tree for a while	4	2.29%
	Tapping	2	1.14%
	Watering	2	1.14%

	Organic fertilizer application	14	8.00%
	During dry season, rest the tree that produces small sap	7	4.00%
	Use of salt as fertilizer	2	1.14%
	None	139	79.43%
Limited number of dwarf coconut trees in the area	Continued tapping tall trees	6	10.34%
	Planting more dwarf trees	22	37.93%
	None	30	51.72%
Limited skilled manpower in collecting sap	Assisted by a family member	3	60%
	Trained tappers	2	40%
High risk in collecting sap due to tall trees	Careful collection	26	32.50%
	Established bamboo bridge connected to other trees	1	1.25%
	Fell down/massage the fractured area	1	1.25%
	Get insured	31	38.75%
	Tapping trees with the enough height	1	1.25%
	Tappers undergo necessary training	1	1.25%
	None	17	21.25%
	Used of stairs in tapping	1	1.25%
	Had established own techniques	1	1.25%
High labor cost	None	3	100%
Fermentation problem due to delays in collection and contamination	Reminding tappers about time duration	1	0.69%
	Followed the exact time of harvest	7	4.83%
	Mixed with newly harvest sap	8	5.52%
	Follow PNS SOP	12	8.28%
	Processed to other products	84	57.93%
	Sanitation	1	0.69%
	Share to neighbors	1	0.69%
	Strict protocol rates	1	0.69%
	None	30	20.69%
Lack of sanitation in storage facilities	Keeping the are clean	9	75%
	Personal expense to buy the cleaning materials	1	8.33%
	None	2	16.67%
Price competitiveness	None, let the market decides	25	100%

Coco Sugar Appendix Table 5. Assistance and support services needed in coco sugar farming by agency involved

Assistance Needed	Agency Involved					
	Any agency		Government		Private	
	No. reporting	Percent	No. reporting	Percent	No. reporting	Percent
Technical Assistance	21	19.63%	59	55.14%	2	1.87%
Training on coconut production and processing		0.00%	5	4.67%		0.00%
Trainings on value adding of coco products		0.00%	12	11.21%	3	2.80%
Training on tech improvement	1	0.93%	3	2.80%		0.00%
Capacity building		0.00%	1	0.93%		0.00%
Food safety		0.00%	1	0.93%		0.00%
Equipment and machineries						
Blower		0.00%	2	2.74%	4	5.48%
Boiling facilities		0.00%	1	1.37%	1	1.37%
Chainsaw		0.00%	4	5.48%	5	6.85%
Containers		0.00%		0.00%	3	4.11%
Hauling trucks		0.00%	1	1.37%	10	13.70%
Mechanized oven		0.00%	2	2.74%	2	2.74%
Mower and digger		0.00%	1	1.37%		0.00%
pH meter	2	2.74%	16	21.92%		0.00%
Syrup production equipment	4	5.48%	5	6.85%	3	4.11%
Tapping knife and other utensils		0.00%	1	1.37%	6	8.22%
Infrastructure and storage facilities						
Building/concrete facility	1	1.43%	6	8.57%	3	4.29%
Processing facility	3	4.29%	16	22.86%	4	5.71%
Repair assistance		0.00%	2	2.86%	3	4.29%
Roofing materials		0.00%		0.00%	3	4.29%
Storage facility	3	4.29%	18	25.71%	8	11.43%
Financial assistance						
Working capital	29	24.37%	62	52.10%	15	12.61%
Calamity assistance	2	1.68%	3	2.52%		0.00%
Loan	1	0.84%	7	5.88%		0.00%
Market assistance and linkaging						
Market and linkage	3	9.38%	23	71.88%	2	6.25%
Price instability		0.00%	2	6.25%		0.00%
Forums and seminars		0.00%	2	6.25%		0.00%
Training on GMP-HACCP						
Training on GMP-HACCP	3	0.25	9	0.75		0.00%

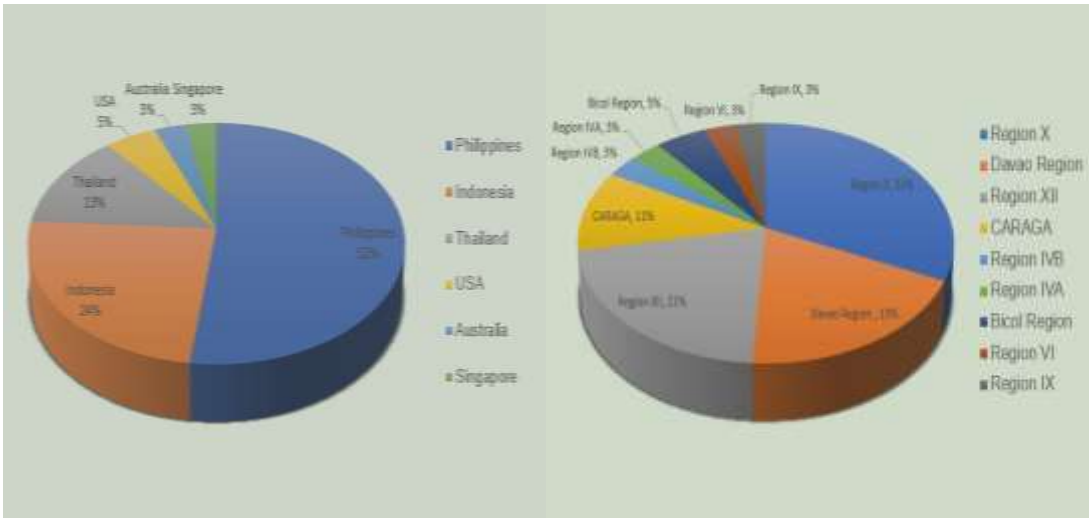
Seal of quality assurance/trade marking						
Seal of quality	4	44.44%	2	22.22%		0.00%
Training on quality assurance		0.00%	3	33.33%		0.00%
FDA/Organic certification						
Organic certification	4	44.44%	5	55.56%		0.00%

Coco Sugar Appendix Table 6. Probit results on improved packaging

imprvdpckgng	Coef.	Std. Err.	z	P>z	95% Conf. Interval	
Age	-.0219964**	.0085845	-2.56	0.010	-.0388216	-.0051712
HHIncome	.0000103*	6.45e-06	1.60	0.109	-2.29e-06	.000023
HHSize	-.0495304	.0505565	-0.98	0.327	-.1486194	.0495587
FrmtoMrkt	-.1101939**	.0464874	-2.37	0.018	-.2013076	-.0190803
AccCrdt	.5933656**	.2130567	2.79	0.005	.1757821	1.010949
FmrCond	.6194546**	.2304274	2.69	0.007	.1678252	1.071084
AccInsrnce	1.655269**	.2427524	6.82	0.000	1.179483	2.131055
_cons	-.3777561	.4140578	-0.91	0.362	-1.189294	.4337823

**Significant at 5% level; *Significant at 10% level

Coco Sugar Appendix Figure 1. Coco Sugar Producers in the World and in the Philippines



Coco Sugar Appendix Figure 2. Monthly Average Export Performance, 2017-2020