

Competition Issues in the Chicken Meat, Chicken Egg, and Pork Markets of the Philippines

CENON D. ELCA^{1,2*}, PRUDENCIANO U. GORDONCILLO¹,
CHARIS MAE T. NERIC^{1,3}, and JANINE P. CURIBOT^{1,4}

ABSTRACT. This study probed the supply chains of the Philippine markets for chicken meat, chicken egg, and pork; and identified several competition issues that present or may potentially lead to violations of the Philippine Competition Act (PCA). In the chicken meat supply chain, vertical integration in the production segment through contract growing was found to likely lead to an oligopolistic market and possible abuse of dominant position, one of the prohibited acts under PCA. There were reports that such abuse may already be in play in its transportation and consolidation segments. The practice in livestock auction markets to simply formalize pre-arranged trading agreements instead of being sites for competitive bidding was another identified violation. Common to all three supply chains was the limited access to credit that greatly restricts the market participation of small players. Small scale participants were being edged out of the market due to the competitive edge of capital-rich players. While having high capitalization is not illegal, limited market participation due to financing constraints may later lead to a highly concentrated market, which may pave the way for abuse of dominant position. To conform with the PCA, it is recommended that backyard farming be encouraged and promoted to increase market participation of backyard farmers, the private sector and the government pursue a credit guarantee system that will benefit small scale producers, locally registered meat establishments be upgraded to National Meat Inspection Service-accredited facilities, the dimension of smuggling be incorporated as a competition issue, and the practice of livestock auction markets of pre-negotiated bidding be overhauled.

Keywords: *anti-competitive agreement, dominant position, fair competition, supply chain*

¹Department of Agricultural and Applied Economics, College of Economics and Management, University of the Philippines Los Baños, Laguna, Philippines

²<https://orcid.org/0000-0003-4906-9239>

³<https://orcid.org/0000-0001-5703-0145>

⁴<https://orcid.org/0000-0003-4087-6974>

*Corresponding author: cdelca@up.edu.ph

INTRODUCTION

The Philippine livestock and poultry markets are the major sources of income and employment in the agriculture sector. In the past 16 years, it provided at least 25% of the country's gross value added in agriculture (Philippine Statistics Authority, 2018). Thousands of Filipinos are employed in live animal and egg production in the rural areas, while those who are employed in meat and egg retailing are in the country's highly urbanized regions. The latter are also involved in the product transport, storage, and processing between production and consumption points. While Filipino households can opt for alternative sources of protein (i.e., fish and legumes), chicken meat, chicken egg, and pork remain as their main protein sources (Philippine Statistics Authority, 2019a).

The supply chains of chicken meat, chicken egg, and pork are generally characterized by strong private sector participation with the government providing important facilitative functions. Those involved in the movement of primary and processed products from the farm to end users include: backyard and commercial farms; private live animal traders; slaughterhouses and dressing plants, which are either small-scale and government-run or highly diversified, integrated, and privately-owned; and small and large fresh meat and egg traders. Although the participation of the private sector is extensive, the government ensures the efficient flow of meat and egg products from farm to market by implementing policies and regulations (Gonzales et al., 2012). Given this background, it is therefore expected that the market of these three products is fairly competitive. Harrington (2008) noted that a competitive market or a situation of market competition is one where there are numerous producers with small market share, zero to low barriers to entry of new participants, and absence of collusive behavior among market participants. There are many benefits of a competitive market. One such benefit is that it can provide the highest quality product at least cost that can be afforded by the consuming public (Medalla, 2017).

The Philippine Competition Act (PCA) of 2015 promotes free and fair competition across all economic activities. This law, as implemented by the Philippine Competition Commission, penalizes the three prohibited acts such as anti-competitive agreements, abuse of dominant position, and anti-competitive mergers and acquisitions of any industry. This study, therefore, seeks to review the different segments of the chicken meat, chicken egg, and pork supply chains for potential competition issues that may require corrective measures to ensure that free and fair competition, as per PCA, is achieved.

Conceptual Framework

The study adopted the supply chain framework in analyzing the movement of material inputs and finished products from farm to market. There are five main functions performed by supply chain participants: input provision, production, assembly and collection, processing, and marketing (Da Silva & de Souza, 2007). The supply chain is influenced by various policies both at the local and national levels. Some of the more relevant policies affecting the supply chain of the markets for chicken meat, chicken egg, and pork are discussed below (Figure 1).

Under PCA, the three prohibited acts such as anti-competitive agreements or collusive behaviors, abuse of dominant position, and anti-competitive mergers and acquisitions can lead to inefficiencies of the whole chain to the detriment of the consuming public. For example, the collusive behavior of major players to offer high prices would imply a decrease in consumer welfare because the same consumers will likely lower their consumption of an expensive product. The abuse of dominant position of firms (i.e., high market share) like predatory pricing (i.e., selling below cost) can drive away other competitors, which would likely lead to a monopolistic or oligopolistic market. Another way of forming a monopolistic or oligopolistic market is through illegal mergers and acquisitions. These types of markets are detrimental to consumers as they most likely lead to high market prices and lower quality products.

Aside from the PCA, there are also other policies that can affect the performance of the supply chain. These policies serve to further enhance the flow of inputs and products along the supply chain. In terms of input provision, Republic Act 1556 or the “Livestock and Poultry Feeds Act” has long been implemented since 1956. However, the House Committee on Food and Agriculture of the 17th Congress is currently amending this law through House Bill 3355. This bill, if enacted into law, aims to regulate and control the manufacture, importation, exportation, labeling, advertising, distribution, and sale of animal feeds (Press and Public Affairs Bureau, 2017). Specifically, this bill emphasizes stricter regulation, establishment of laboratories, deputation of personnel, and provision of capability training programs. This house bill also ensures the creation of a revolving fund that will be allocated for the benefit of the animal feed industry (Nicavera, 2017).

The critical issue in producing live chicken for meat and egg, and live swine for meat is the location of farm operation. The relevant policy here is Resolution No. R-674, series of 2000 or the “Implementing Rules and Regulations to Govern the Processing of Applications for

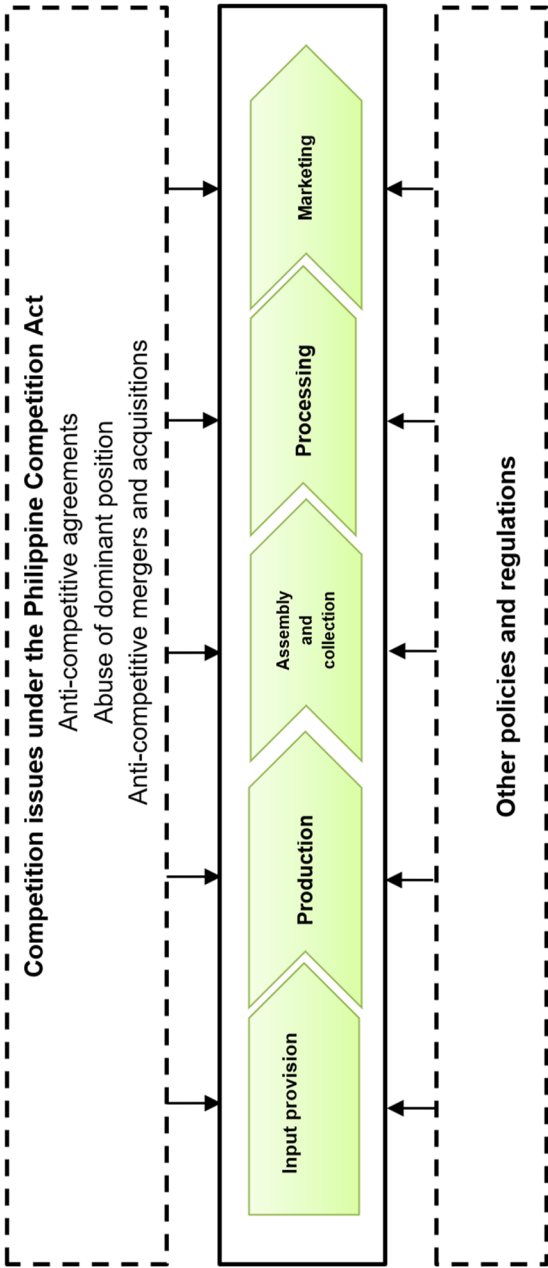


Figure 1. Conceptual framework of the competition issues study

Locational Clearance of Poultry and Piggery” of the Housing and Land Use Regulatory Board. This policy has provisions on the issuance of locational clearance of farms. Such clearance defines the rules on the expansion of small, medium, and large-scale poultry or piggery. It also sets the standards and requirements of the location, zoning, layout as well as facility and utility requirements of the piggery and poultry farm (Housing and Land Use Regulatory Board, 2000).

Specific to table eggs, there is the Philippine National Standard for Table Eggs, which was implemented in order to ensure the quality of table eggs being produced. The national standard covers minimum requirements for table eggs, classification and grading, packing, marking or labeling, and hygiene (Bureau of Agriculture and Fisheries Standards, 2005). The Philippine government provides support services to chicken and swine farmers in terms of research and development initiatives. These services come in the form of government agency partnerships that provide technologies aimed at improving farm productivity and efficiency. Two of the leading government institutions with such functions are the Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development of the Department of Science and Technology, and the Bureau of Animal Industry of the Department of Agriculture.

In live animal assembly and trading, traders have to go through animal quarantine and checkpoints in their respective municipal or provincial area of operation (Department of Agriculture, 2006). The main purpose of this policy is to ensure that traders are able to secure the proper documentation (e.g., issuance of veterinary health certificate, shipping permit, certificate of vaccination, and compliance with animal welfare laws and regulations) when transporting live chicken and swine from farm to slaughterhouses (Department of Agriculture, 2006). This ensures the proper monitoring and prevention of diseases, and the maintenance of safety and quality of live animals.

For meat processing, the Republic Act 9296 or the “Meat Inspection Code of the Philippines” ensures the protection of human and animal health against direct and indirect hazards. The National Meat Inspection Service (NMIS) is the lead agency mandated to formulate policies and regulations for meat inspection and meat hygiene (National Meat Inspection Service, 2013).

In terms of trade policy, the government plays key roles in implementing the quantitative restriction for imported chicken meat (minimum access volume of 23,000 metric tons per year) and imported

pork (minimum access volume of 54,000 metric tons per year) coming from the US. The Philippines imposes a tariff rate on US imported chicken meat and pork, ranging from 30% to 40% relative to the minimum access volume.

METHODOLOGY

Data Collection and Analysis

A supply chain case study was conducted for each of the three commodities in major production and consumption areas of the Philippines. Study areas were chosen using the following criteria to ensure that focus was on more developed markets: (a) incidence of high volume of production; (b) incidence of high volume of consumption; (c) presence of varying types of institutional markets (e.g., supermarkets, hotels, restaurants, and processors); and (d) availability of support services (e.g., research agencies, slaughterhouses, trading posts, and auction markets) within each province. Each commodity's supply chain was traced from the major sources of farm inputs to their primary producers, and finally to the final market destination of the finished products.

Primary data were collected through key informant interviews (KIIs) and focus group discussions with industry representatives and major supply chain players in the provinces of Pampanga, Bulacan, and Tarlac for chicken meat and chicken egg; and Iloilo and Cebu for pork. Tarlac was also visited to conduct key informant interviews with yellow corn producers. The key informant interviews and focus groups were conducted from late October 2017 to February 2018. Pampanga, Bulacan, and Tarlac were chosen as the study areas for the chicken meat and chicken egg supply chains, while Iloilo and Cebu for pork supply chains.

The rationale for choosing these provinces as study areas were as follows: 1) Pampanga is a major producer of live chicken and egg, which is absorbed by Bulacan as the main market for dressed chicken and chicken eggs (Philippine Statistics Authority, 2019b); whereas Tarlac was also included to conduct key informant interviews with producers of yellow corn, a major cost item in feed formulation; 2) Iloilo and Cebu were the study areas for pork as the former is a top live swine producer, while the latter is a significant market for pork (Philippine Statistics Authority, 2019b).

The specific interview activities by province, by product, and by type of respondents are shown in Table 1. The respondents involved more than 30 key informants and participants of the focus group discussions. The initial interview activity for each product started with consultations with the relevant provincial veterinary office. For chicken meat and egg, the Provincial Veterinary Office of Pampanga was consulted regarding the overall status and major players of these two industries. The Veterinary Office of Pampanga also provided the list of respondents needed for the interview of supply chain participants. The same survey strategy was employed in the case of the supply chain of pork in Iloilo. The Provincial Veterinary Office of Iloilo was initially consulted on the overall status of the pork industry in the province and provided the list of participants of the pork supply chain.

The key informant interviews and focus group discussions were conducted using a series of guide questions relevant to the structure of each industry and the identification of potential competition issues. These series of questions include: company profile and brief history; chicken meat, chicken egg, and pork production; inputs used; past engagement in contract growing schemes; involvement in product processing, rated capacity, accreditation, and estimated capital requirement; product forms marketed, pricing and possibility of product differentiation; market outlets; list of competitors; expenses in sales promotions, advertising, and research and development; investment requirements in terms of land, warehouse, cold storage, machinery, and vehicles; availment of government and private sector services and programs; problems encountered; and upgrading strategies.

All interviews and discussions were audio recorded with the permission of the respondents. The audio recordings were later transcribed and analyzed. The output of these audio recordings is a set of qualitative data, which were later analyzed using a coding system. Several segments of the data were grouped into three broad categories or themes. Because this study was anchored on the PCA, preexisting or a priori codes were used. These codes were: 1) anti-competitive agreements or collusive behaviors; 2) abuse of dominant position; and 3) anti-competitive mergers and acquisitions.

Creswell (2013), however, cautioned the use of preexisting codes. He encouraged the use of additional codes whenever emerging issues arise from the analysis. The three themes that correspond to the three provisions of the PCA were identified and included as narrative discussions across the three markets of chicken meat, chicken egg, and pork. The analysis was presented in a series of consultations with a

Table 1. Data collection schedule, 2017-2018

DATE	PROVINCE	ACTIVITIES
Oct. 27, 2017	Pampanga	FGD with staff members and head of the Provincial Veterinary Office of Pampanga KII with commercial chicken meat producer, chicken meat integrator, chicken meat contract grower, commercial chicken egg producer, and chicken egg consolidator/viajero
Nov. 9, 2017	Pampanga	KII with commercial chicken meat producer and chicken meat retailers
Nov. 10, 2017	Pampanga	KII with backyard chicken meat producer and chicken meat dealer
Nov. 22, 2017	Pampanga	KII with cooperative officers, feed millers, and chicken egg wholesaler-retailers
Nov. 23, 2017	Pampanga	KII with the staff of the Triple A NMIS accredited chicken dressing plant
Jan. 10, 2018	Iloilo	FGD with staff members and head of the Provincial Veterinary Office of Iloilo KII with locally registered meat establishment
Jan. 11, 2018	Iloilo	KII with yellow corn producers and yellow corn trader
Jan. 12, 2018	Iloilo	KII with the livestock auction market supervisor, feed millers, and pork wholesaler-retailers
Jan. 13, 2018	Cebu	KII with pork wholesaler-retailers, pork wholesaler, and pork wholesaler-retailers
Jan. 14, 2018	Cebu	KII with locally registered meat establishment
Jan. 15, 2018	Cebu	KII with the staff Triple A NMIS accredited slaughterhouse
June 7, 2018	Quezon	KII with chicken meat contract grower of San Miguel Foods, Inc.
June 20, 2018	Batangas	KII with chicken meat contract grower of Bounty Agro Ventures, Inc.
	Quezon	KII with chicken egg contract grower of San Miguel Foods, Inc.

Note:

KII - Key informant interview
 FGD - Focus group discussion
 NMIS - National Meat Inspection Service

representative of the Philippine Competition Commission. This exercise resulted in some issues being retained and other issues being dropped. The decision to either retain or drop competition issues was guided by the provisions of the PCA. Thus, the study provided for an initial screening or probing for possible violations of the PCA. The preliminary list of competition issues was then tested for validity through another set of consultations with various stakeholders including government institutions and industry representatives. After the consultations with various stakeholders, the list of potential competition issues was finalized to reflect the comments and suggestions of stakeholders knowledgeable of the industry.

RESULTS AND DISCUSSION

For each of the three supply chain case studies conducted, the findings are presented in two parts starting with a description of the supply chain then followed by a discussion of potential competition issues. Whenever possible, competition issues were identified as narrated firsthand by the chain participants interviewed.

Chicken Meat

Supply Chain. The five main participants in the Pampanga chicken meat supply chain are the input suppliers, live chicken producers, assemblers/collectors, processors/dressing plants, and wholesalers/retailers (Figure 2).

Input suppliers include integrators, feed millers, and hatcheries. They provide live chicken producers with input requirements such as feeds, day-old chicks, medicines, vaccines, and other veterinary supplies. The major input suppliers in Pampanga include San Miguel Foods, Inc.; Bounty Fresh Foods, Inc.; Charoen Pokphand Foods Phil. Corp.; Vitarich Corporation; and Robina Farms. Based on the study of Gonzales et al. (2012), these key players of the chicken meat industry usually integrate various activities of the supply chain. They perform various functions of importation of breeding animals, manufacturing of feeds, and production and marketing of live chickens.

Feed is an important input in live chicken production, comprising 70% - 80% of the total production cost. It is composed mainly of yellow corn and other raw materials such as soya, wheat, fishmeal, pollard, copra, and molasses. Feed millers procure yellow corn from domestic producers or from yellow corn importers. Isabela, Tarlac, Pampanga,

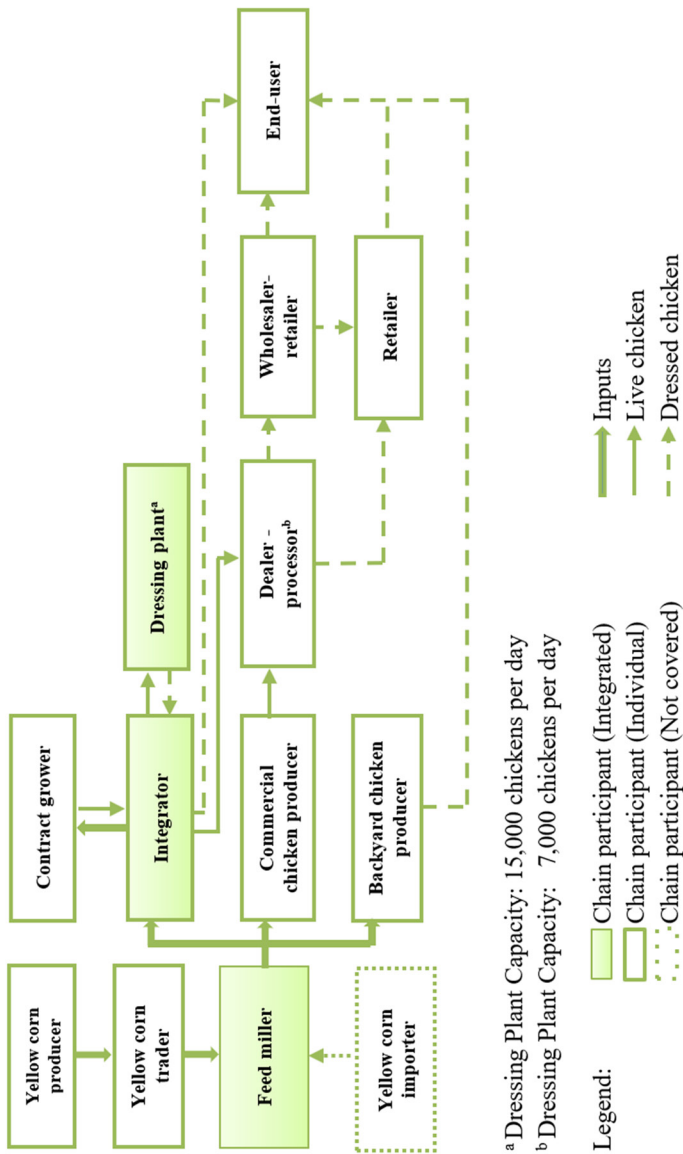


Figure 2. Supply chain of chicken meat in Pampanga

and Pangasinan supply the majority of the yellow corn requirements of feed millers in Pampanga. Yellow corn producers sell their produce to yellow corn traders, who dry the yellow corn and sell to feed millers for processing.

According to Corpuz (2018), the feed mill industry in the Philippines can be categorized into three: 1) businesses that exclusively engage in feed processing (commercial producers); 2) businesses that combine feed manufacturing with livestock production (integrated commercial feed producers); and 3) businesses that produce feeds for consumption of their own farms (on-farm feed millers). The feed milling industry in the 1980s was led by on-farm feed mixers but eventually expanded and dominated by large commercial producers.

There are three types of live chicken producers in the area: contract growers, commercial producers, and backyard raisers. Integrators engage in contract growing operations with chicken producers. Aside from taking on the processing of live chicken into dressed chicken meat, integrators provide contract growers with farm inputs including feeds, day-old chicks, veterinary supplies, technical assistance, and a ready market for produce. As their counterpart, contract growers provide the needed labor, land, and facilities for chicken production. According to Digal (2010), contractual arrangements along the different segments of the chicken meat supply chain is one of the common strategies employed by the four large local producers in the Philippines. In response to growing demand, producers employ these contractual arrangements to streamline their business operation.

In contrast, commercial and backyard producers finance their own inputs and sell their produce to dealers and end-users. Commercial and backyard chicken producers differ in terms of scale of operation, in which producers are identified as being engaged at a commercial scale if they have at least 1,000 heads of chicken.

There are two types of housing used in live chicken production: conventional housing and tunnel-ventilated building. Tunnel-ventilated buildings are more efficient because they can be used up to six or seven production cycles per year. In contrast, conventional housings can only be used for four or five production cycles per year. Production in a conventional chicken housing takes up to 30-35 days per production cycle; in a tunnel-ventilated building, each production cycle only takes 28-33 days.

While tunnel-ventilated buildings are more efficient, they come at a high cost. The investment cost for a 40x400 feet tunnel-ventilated building, which can house 45,000 heads of chicken, is about PhP 14-18 million (USD 277,778-357,143). Along with this, generator sets, which cost about PhP 500,000 (USD 9,921) each, are also a non-negotiable investment as electricity is very important in producing chickens in this type of building. Levy (2017) compared the performance of chicken meat production under a climate-controlled system (i.e., a modern type of tunnel-ventilated technology) and a conventional housing in three municipalities of Nueva Ecija. It was concluded that farms under a climate-controlled system outperformed farms using the conventional technology in terms of feed conversion ratio and farm productivity. Compared with conventional housing, the climate-controlled system was found to have provided healthier growing conditions.

At the end of each production cycle, live chickens are picked-up from the farms and delivered to dressing plants for processing mainly by integrators and dealer-processors. All the produce of contract growers is collected by integrators who transport these to their own accredited dressing plants, while dealer-processors buy live chickens from commercial producers and other integrators.

The Pampanga Public Market in Angeles City is the largest consolidating area of live chicken in Pampanga. In this market, live chicken dressing is done by dealer-processors who then distribute the dressed chicken to wholesaler-retailers and retailers in Pampanga. The public market has two operational small dressing plants, each of which produces 2,500 dressed chickens per day. This figure is small compared to large private commercial plants that produce 10,000-50,000 dressed chickens per day.

Dressed chicken is marketed by integrators, wholesaler-retailers, and retailers. Integrators supply dressed chicken to supermarkets, wet markets, and food chains. Some also have retail outlets that cater to consumers. Wholesaler-retailers procure dressed chicken from dealer-processors and sell at wholesale quantities to other retailers and at retail quantities to end-users.

Chicken meat end-users include consumers, wet markets, supermarkets, food chains, and meat processors. They buy dressed chicken from integrators, wholesaler-retailers, retailers, and, rarely, from backyard producers.

Competition Issues. Four competition issues were identified in the chicken meat supply chain: 1) the lowered pricing of the feed milling segment, which may force out smaller mills; 2) the increasing vertical integration and decreasing participation of backyard farmers in Pampanga's chicken meat market, which may lead to market oligopoly; 3) the high capital requirement to participate in the market, which is exacerbated by allegations of price fixing; and 4) limited access to credit, which is hindering continued market participation and expansion.

The offering of lower prices by larger feed mills was mentioned by the feed millers during the interviews. Weaker-positioned feed mills find it hard to compete with the lower prices and are likely to be forced out of the industry. A significant barrier to them to freely exit the industry, however, is the high sunk costs. Sunk costs are costs incurred by firms that can no longer be recovered. Examples of sunk costs are investment in machines and equipment, research and development spending, and advertising expenses.

For instance, a miller reported sunk costs of PhP 25 million (USD 496,032), while a mixer reported sunk costs of PhP 30 million (USD 595,238). This issue is made worse by the fact that milling machines and equipment are highly specialized. Thus, making it difficult for feed millers to engage in alternative business operations in an attempt to widen their market. Given that the decision to specialize in these machines and equipment is a private business decision, feed mills can pursue strategies that can lower their cost of production in order to compete with larger feed mills. For example, feed mills can try to seek cheaper sources of yellow corn raw material. Streamlining of milling activities can also be pursued in order to lower labor costs.

Another competition issue identified was the apparent move of Pampanga's chicken meat market towards vertical integration, which may potentially lead to market oligopoly. Vertical integration occurs when a firm performs more than one activity in the sequence of the supply chain process. Market oligopoly, on the other hand, refers to the significant market share of a few firms in a particular industry. While there is still a significant number of independent commercial raisers, the growing risks posed by disease incidence and typhoon occurrence may prompt them to eventually enter into contract growing schemes with integrators. Contract growing schemes have the advantage of distributing risk between the contract growers and integrators. Industry players with a large market share also have the capability to introduce market innovations and produce higher quality products that can eventually benefit the consuming public.

However, the expanding market share of integrators in Pampanga, as well as other major chicken producers within the country, may lead to an oligopolistic market where there are only a few sellers with large market shares. According to the PCA, such a dominant position may later lead to abuse of dominant position or anti-competitive practices. These practices include predatory pricing or selling below cost to drive out competitors, imposing of barriers to entry or high investment cost requirement to participate in the relevant market, and bundling of goods and services that requires the acceptance of other unrelated items before proceeding with the actual transaction.

In fact in 2014, the Philippine market for chicken meat was already oligopolistic. The top two companies, San Miguel Foods, Inc. and Bounty Fresh Group of Companies, controlled more than 50% of the national chicken meat market (Table 2). A market share of more than 50% implies an oligopolistic market (Ukav, 2017). There is nothing illegal about having a dominant position in the market. However, it is a cause of concern for the Philippine Competition Commission since having a large market share may later lead to abuse of dominant position.

The trend towards vertical integration in the chicken meat market most probably led to the limited participation of backyard farmers in Pampanga. The study encountered some difficulties in locating representative backyard chicken meat producers in the province. This is understandable considering the current structure of farm producers in Pampanga are predominantly commercialized or has market tie-up between contract growers and integrators. The dwindling number of backyard chicken producers in Pampanga may be a result of limited opportunities for financing and expansion. Among the three types of producers in Pampanga, backyard farmers were the most disadvantaged. They only earn about PhP 0.15 profit for every peso (USD 0.003 for every

Table 2. Concentration ratio of the major chicken meat producers in the Philippines, 2014

COMPANY	MARKET SHARE (%)
San Miguel Foods, Inc.	40.62
Bounty Fresh Group of Companies	12.05
Swift Foods, Inc.	0.06
Foster Foods, Inc.	0.06
Concentration Ratio (CR4)	52.79

Source: Securities and Exchange Commission, 2018

USD 1) invested in chicken meat production. The relatively high return on investment of contract growers (20%) and commercial producers (17%) disincentivizes them to continue operation.

To compete with contract growers and commercial raisers, backyard farmers can enter into collective action schemes such as forming a cooperative or engaging in block farming. This strategy allows small scale farmers to share resources and risks, thereby lowering the cost of production in order to compete with commercial and contract growers. There is a rationale for small players to be involved in collective action schemes. For instance, the study of Jimenez et al. (2018) highlighted the positive benefits of cooperative membership in improving household welfare of calamansi (*Citrofortunella macrocarpa*) farmers in the Philippines. Sumalde and Quilloy (2015) also reported about the advantage of cooperative membership in empowering small swine and cacao farmers through increased participation in the agricultural value chain and enhanced market access. Farmer-members of a cooperative were also able to attain vertical integration, economies of scale in production, and value addition for their products.

The high capital requirement to participate in Pampanga's chicken meat market is also identified as a competition issue. A key informant in the Pampanga Public Market shared how difficult it was for him to enter the chicken meat market 10 years ago. For example, a daily operation would require PhP 1-6 million (USD 19,841-31,476) to dress and market 2,500-4,000 heads of live chicken. Aside from high startup cost, strong ties and networks are needed in order to start and sustain normal business operations. Since there are only about nine trucker-dealers in the market, they are able to control the chicken market by imposing stringent requirements on new entrants (e.g., proof of high investment capital). While there are many small entrants trying to join the chicken market, they may be discouraged by the requirements of this "big nine". From the key informant interviews, it was found that these nine trucker-dealers often meet to discuss market operations and how much to price the product. This warrants further investigation because if confirmed, this alleged anti-competitive agreement through price fixing is a violation of the PCA.

High capital requirement, exacerbated by limited credit access, is also hindering chicken meat producers from making the needed operational improvements to expand their market, or even to stay in the industry. For instance, it has been noted that integrators have a growing preference for contract growers with tunnel-ventilated confinement facilities as this technology is more cost-efficient and profitable as

compared with conventional technology. Tunnel-ventilated buildings, however, require a huge investment. This not only limits the potential entry of interested participants in live chicken production but also hinders current producers from expanding. For instance, one of the contract growers interviewed relayed that as he was not able to convert to a tunnel-ventilated confinement building because he had no access to credit, he was forced to shift from chicken meat to chicken layer production, a move that gave him considerably lower returns.

The need to foster greater competition in Pampanga is clear. There are currently four large dressing plants in Pampanga, two of which are accredited by NMIS. This pales in comparison to the 16 large dressing plants in Bulacan, most of which are accredited by NMIS. While there are several small dressing plants in Pampanga's public markets, the large capital requirement serves as a barrier to entry even at this level of small-scale operation. In order to foster vibrant competition in the primary processing segment of chicken meat, there needs to be greater participation from other potential competitors.

Chicken Egg

Supply Chain. The four main participants in the supply chain of chicken egg in Pampanga were input suppliers, chicken egg producers, consolidators, and wholesalers/retailers (Figure 3).

The input supply segment of the Pampanga's chicken meat and chicken egg markets were essentially the same except for the greater role played by cooperatives in the latter part of production. Input suppliers in Pampanga included private businesses and some locally-based cooperatives. These cooperatives produce their own feeds and grow day-old chicks, which they sell to their members at discounted prices.

Expenses on feeds constitute the major costs involved in chicken egg production. Yellow corn is also the main component of the feeds for layer chickens. Feed millers in Pampanga source yellow corn from domestic producers in nearby provinces and yellow corn importers. Feeds produced for chicken eggs include booster, starter, grower, pre-layer, and layer feeds.

Chicken egg producers in Pampanga are all engaged at a commercial scale with at least 1,000 heads of layer chicken. They provide their own inputs and have no market tie-up with integrators. Many commercial producers in Pampanga are members of a cooperative.

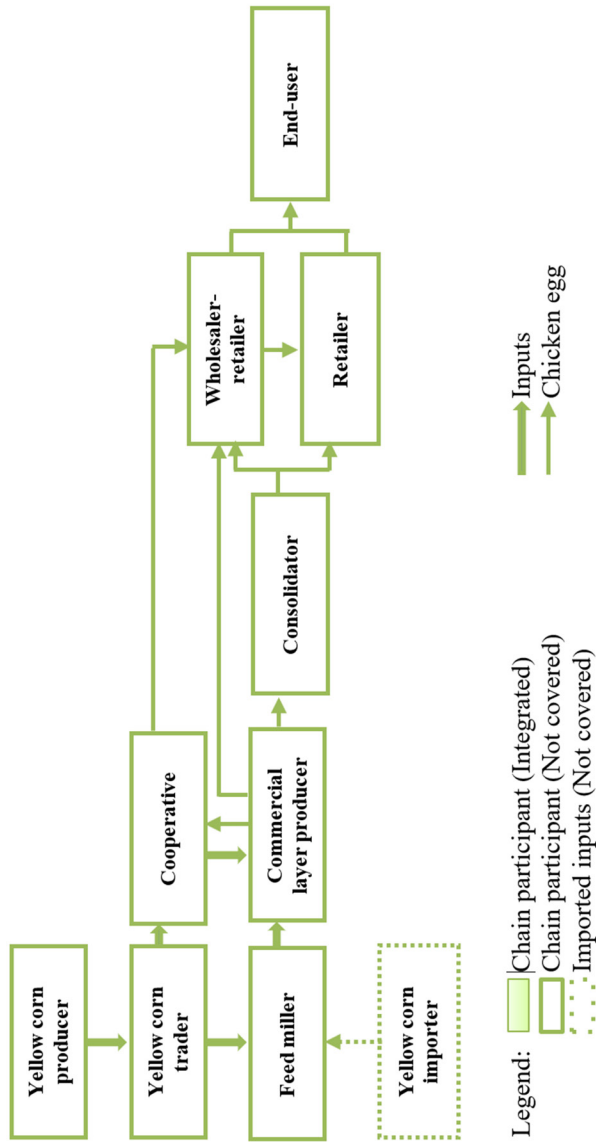


Figure 3. Supply chain of chicken egg in Pampanga

Commercial producers procure inputs, especially feeds, from the cooperative they belong to and sell part of their produce back to the cooperative. Other market outlets tapped by producers are the consolidators and wholesaler-retailers. The study of Gonzales et al. (2012) provided three classifications of chicken egg producers on a national level. Small-scale producers maintain less than 10,000 chicken layers and buy commercial feeds. Layer houses are made from either wood or bamboo. Medium-scale producers are those with 10,000-80,000 chicken layers. They can either buy commercial feeds or make their own feeds. Layer houses can be made of wood, bamboo, or steel depending on the scale of operation. Finally, large-scale producers maintain more than 80,000 chicken layers and have their own feed mills. The layer houses for large-scale operation are tunnel-ventilated.

Consolidators pick up the chicken eggs directly from farms and perform the postharvest activities of cleaning, sorting, grading, weighing, packaging, and marketing. Chicken eggs are sorted according to size, i.e., jumbo, extra-large, large, medium, small, extra small, peewee, no weight, and no value. Chicken eggs are sold on a per tray or per case basis. One tray contains 30 eggs, while one case is composed of 12 trays. On the average, consolidators buy 700 cases of chicken eggs per week. They distribute the chicken eggs to different markets located in other parts of Luzon, the largest island in the Philippines. The study of Lat and Delos Reyes (2017) in San Jose, Batangas found that manual sorting and grading of chicken eggs are practiced by small to medium-scale farmers and traders, while only a few large-scale chain participants used mechanized facilities. The study also reported that all chain participants did not adhere to the requirements set forth by the Philippine National Standard for Table Eggs.

The cooperatives also serve as consolidators in the marketing of chicken eggs. As earlier mentioned, members sell a portion of their produce to cooperatives and receive payment based on agreed terms. Minalin Poultry and Livestock Cooperative and Mupra Multipurpose Cooperative are among those involved in chicken egg production and distribution in Pampanga.

Wholesaler-retailers and retailers market the chicken eggs to end-users. Chicken eggs are either picked up by the wholesaler-retailers from commercial producers or are delivered by the producers to consolidators. Wholesaler-retailers supply chicken eggs to some retailers within their area. End-users of chicken eggs include consumers, wet markets, and supermarkets.

Competition Issues. Similar to chicken meat production, an important competition issue in chicken egg production is limited credit access to facilitate market participation and expansion through the adoption of more cost-efficient technology. Key informants shared that commercial banks prefer to grant loans to tunnel-ventilated operations over conventional housing. Tunnel-ventilated buildings have a higher value, which means that banks can secure a higher amount as collateral in case of default payment. Egg farmers that use tunnel ventilation technology, therefore, have a higher capability to secure loans and finance farm operations.

According to the Pampanga chicken growers interviewed, the investment cost is PhP 2.5 million (USD 49,603) per building for conventional housing and PhP 14 million (USD 277,778) per building for tunnel-ventilated operation. Obviously, the huge capital requirement hinders small players from participating as a substantial amount of loans will require higher counterpart collateral from borrowers.

Shifting to a tunnel-ventilated operation requires significant capitalization. Aside from its significantly higher initial investment cost, operational costs will also be doubled, especially in terms of electricity and water use, as the technology involves providing layers with additional cooling to avoid heat stress. Tunnel ventilation technology also requires reliable generators be procured for use in case of power interruption. According to a key informant, two generators are needed in order to avoid high mortality in case of power loss. This also implies that operators should have a stable source of electricity and water, which serves as yet another constraint for those whose layer farms are located remotely.

The need for credit access may also extend to small-scale sellers at the wholesale and retail levels. This will allow them to better compete with large-scale sellers who tend to offer lower egg prices, a behavior that ultimately hurts smaller scale sellers as they lower their own prices and, therefore, incur smaller returns.

Pork

Supply Chain. There are five main participants in the Iloilo pork supply chain. These are input suppliers, swine producers, assemblers, processors, and wholesalers/retailers (Figure 4). In this supply chain, live swine are processed into fresh meat or pork.

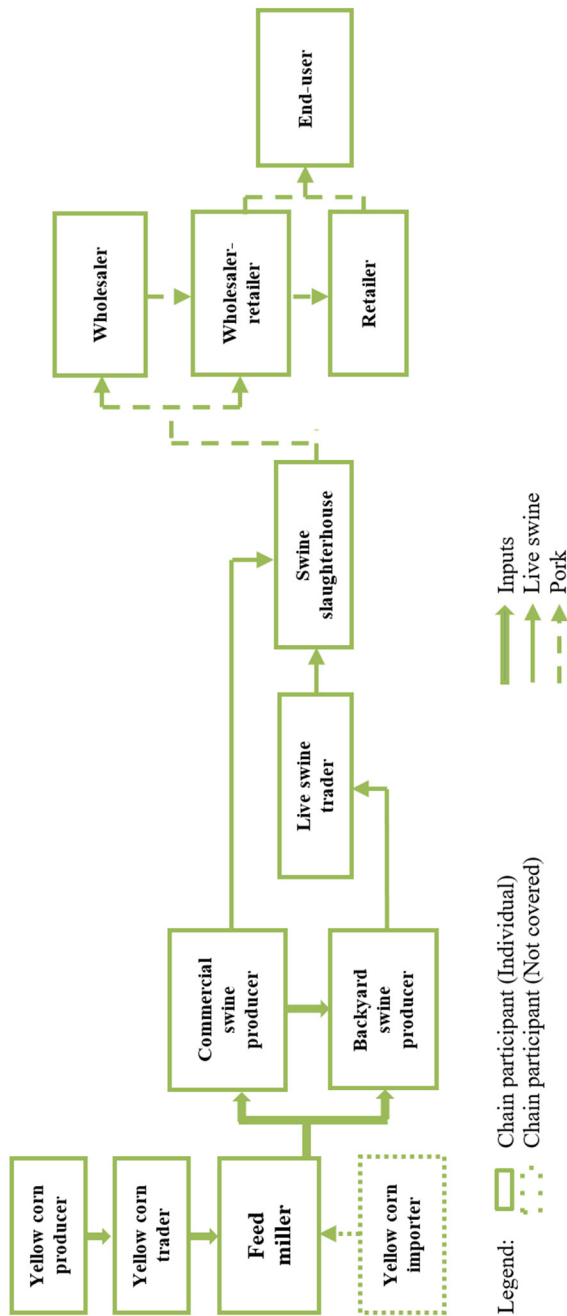


Figure 4. Supply chain of pork in Iloilo

Input suppliers provide swine producers with feeds, breeder swine, and other veterinary supplies. Commercial and backyard swine operators procure inputs from various sources. They buy feeds and other veterinary supplies from commercial input suppliers and breeder swine from commercial breeders. Feed millers are dependent on imported yellow corn due to the limited local supply, which mostly comes from the northern part of Iloilo. Hence, feed millers also procure yellow corn from Mindoro in Luzon, Samar in Visayas, and various provinces in Mindanao. Philippine Foremost Milling Corporation; Vitarich Corporation; New Panay Agri-venture Development, Inc.; and San Miguel Foods, Inc. are the large feed suppliers in Iloilo.

Based on the study of Philippine Rural Development Project (2018) of the Department of Agriculture, good quality yellow corn needed for feed milling and modern technology are readily accessible to supply chain participants. However, some inputs like feeds and veterinary products are costly since most of these are imported. Based on the study of the Bureau of Animal Industry (2003), 85% of ingredients needed for feed formulation are imported. This makes feeds needed for swine production expensive.

There are two types of swine operations in Iloilo: commercial and backyard. Commercial swine producers are those who raise at least 21 sow heads. They buy feeds from commercial feed millers and mix their own feeds. They produce and sell live swine to wholesalers, wholesaler-retailers, and backyard producers. Major markets of commercial producers are hotels and restaurants located in Iloilo City, Panay, and Cebu.

Backyard producers raise less than 21 sow heads. Majority of Iloilo swine producers are backyard producers who raise swine to augment household income. Backyard producers buy feeds from commercial feed millers and piglets from commercial breeder farms.

The study of Gonzales et al. (2012) offered four classifications of swine farms: backyard, small commercial, medium commercial, and large commercial. Backyard farms have less than 10 heads of animals and purchase commercial feeds. Small commercial farms maintain less than 100 swine and also buy commercial feeds. Medium commercial farms have 100 to 300 heads of swine and can either buy commercial feeds or manufacture their own feeds. Finally, large commercial farms operate at more than 300 swine animals, own breeding animals, implement artificial insemination, and operate their own feed mills.

According to the Philippine Rural Development Project (2018), swine production is a major source of livelihood in the CALABARZON region. Most of the swine farms in the CALABARZON region are of the commercial type. In contrast, swine farms in the MIMAROPA and Bicol region are dominated by backyard farms. Swine produced in backyard farms are priced lower than swine produced in commercial farms. Since piglets used in backyard farms have generally weak genetic make-up, ready-to-market swine will have low quality, commanding lower prices.

Swines are commonly traded in livestock auction markets in Iloilo. Buyers and sellers meet in livestock auction markets to trade live swine. Traders procure swine from producers and sell to wholesalers and wholesaler-retailers. They are responsible for transporting live swine to slaughterhouses. Other traders also buy live swine from livestock auction markets and trade it again in other livestock auction markets for higher prices. Traders buy live swine from producers in Iloilo as well as from nearby provinces of Antique and Guimaras.

To be able to trade live swine in livestock auction markets, traders pay fees such as those for registration and transport. They also secure barangay certification, proof of transfer of ownership, and transport form while trading in livestock auction markets. Most of the producers involved in livestock auction markets trading are backyard producers. Live swine are weighed in livestock auction markets and when the producers and traders are satisfied with the deal, the live swine are then sold to the traders. Major markets of traders include Iloilo City and Roxas City.

Slaughterhouses process live swine into meat carcass or pork and deliver the meat carcass to wholesalers and wholesaler-retailers. Unfortunately, Iloilo slaughterhouses are not accredited by NMIS. They are called Locally Registered Meat Establishments as they are only registered with the local government. Swine slaughtered in these meat establishments are only sold in Iloilo's wet markets. To meet the demand of institutional buyers in Iloilo such as hotels and restaurants, traders transport the swine to accredited slaughterhouses located in Cebu and Cagayan de Oro and then transport the meat back to Iloilo. The costs incurred in doing this are expectedly passed on to the end-users.

Wholesalers, wholesaler-retailers, and retailers clean, store, and sell the meat carcass, offal, and blood to end-users. The meat carcass is chopped into retail or choice cuts. Wholesalers get their supply of swine from commercial producers. They procure bulk quantities of swine, at least 15 head carcasses per day weighing 60-100 kg per head. On the

other hand, the wholesaler-retailers buy only 2-3 heads of carcass per day. Retailers are involved in the sale of smaller quantities of pork. On the average, retailers buy an average of 60 kg of meat carcass per day from wholesaler-retailers.

Competition Issues. Four main competition issues were identified in the pork supply chain: 1) the absence of a complementing policy on land use plan, which prohibits the expansion of swine production; 2) the practice of anti-competitive agreements in livestock auction markets; 3) limited access to credit, which hinders market participation and, more importantly, technology adoption deemed crucial to ensuring the production of good quality pork; and 4) reports of smuggled pork entering Iloilo.

Two out of the 10 participants of the focus group discussion mentioned the importance of enacting a local ordinance on the land use plan of Iloilo. The plan should clearly state and specify the areas as well as the boundaries for swine production. Not doing so could serve as a possible threat to the province's swine industry given that existing and future areas for production, slaughterhouse locations, or even auction market areas may be recommended for relocation or worse, displacement without proper notice. The non-implementation of this land use plan will have dire consequences to the swine industry of Iloilo.

A scenario of relocation, for example, will imply additional cost to pay for the transfer of expensive fixed assets like building, machinery, and equipment. From a business standpoint, a weak local ordinance on land use poses a certain level of risk to potential investors. According to a major player in the swine industry of Iloilo, there are many potential investors in swine production. However, the possibility of their business being displaced to accommodate complaints of housing residents is a big risk that investors are not willing to take.

A major competition issue in the Iloilo pork supply chain is the fact that auctions do not really take place in livestock auction markets. Ideally, livestock auction markets should serve as a place where buyers (traders) bid for the highest price they are willing to pay and sellers (producers) offer the lowest price they are willing to accept. Trade happens when both agree on a price. However, in the livestock auction market visited by the research team, it was noted that producers and traders already had pre-arranged agreements and the trading practiced in livestock auction markets is simply the formality of selling. As such, producers are simply price takers and no actual competitive bidding takes place. This is a potential violation of the PCA as this, in essence,

is a form of anti-competitive agreement among the sellers, buyers, and livestock auction market operators.

It is also worth noting that the grading system is not yet fully implemented in the livestock auction market that was visited. For example, the weighing scale currently used is not yet digital. While the Livestock Auction Market-in-charge reports that swine are classified based on the Philippine National Standards, buyers still practice *mata-mata* system whereby they base the classification of swine on the buyers' eyeball estimates. This further poses a problem for the producers who have incomplete or no knowledge about the market.

Another competition issue is similar to that experienced in the chicken meat and egg supply chains, that is, limited credit access to improve pork processing operations. Market access to institutional buyers is not open to locally registered meat establishments as these markets require NMIS accreditation, which is a very tedious process. For example, to gain Triple A accreditation, which provides abattoirs with international market access, significant investment in machinery and equipment is required. Aside from having state-of-the-art facilities, the NMIS also requires its accredited abattoirs to have a stable source of clean water, a wastewater treatment facility, an office, and meat delivery vehicles. The abattoir's slaughtering process should also conform to the established standards set by the Good Manufacturing Practice system, the Hazard Analysis and Critical Control Point approach, and the Animal Welfare Act (RA 8485).

Therefore, in order to obtain a meat establishment accreditation from NMIS, the applicant should accomplish all the documentary, structural, and operational requirements. Obviously, all these entails high capital investment, which is clearly a barrier to slaughterhouses with poor access to capital. Key informants from Locally Registered Meat Establishments shared that they encounter difficulty in getting NMIS accreditation because it requires high initial capital investment, which could reach up to PHP 150 million for Triple A accreditation. Even for Single A accreditation, which provides abattoirs access to markets within the city or municipality where the facility is located, accreditation can still be costly and very stringent.

According to the study's key informants, this has been the main problem of the 36 Iloilo Locally Registered Meat Establishments. In particular, the locally-registered Iloilo City Slaughterhouse has a long pending case of Single A accreditation. Among its problems that need addressing in order to comply with the NMIS requirements are the lack

of funds for repair and maintenance, the lack of skilled technicians, and poor sanitation.

While the stringent accreditation requirements of NMIS hinder market entry and participation, it also ensures the safeness and high quality of food available to the public. The NMIS is the sole controlling authority of the Meat Inspection Code of the Philippines (RA 9296) and its Implementing Rules and Regulations (IRR). These policy instruments ensure the protection of human and animal health against direct and indirect hazards. However, as noted by the key informants, there are several key concerns as regards to the implementation of RA 9296.

Firstly, as Locally Registered Meat Establishments are still allowed to slaughter as long as they can secure clearance from the local government unit, then in effect only end-users who buy meat from markets that require NMIS accreditation are protected by the law. Secondly, compared to traders who patronize NMIS-accredited abattoirs, traders who patronize Locally Registered Meat Establishment that offer cheaper slaughter fees can, in turn, offer cheaper pork. This might be beneficial to pork consumers in the short term as the participation of many players in pork processing can result in lower slaughtering fees, which can lead to lower pork prices. However, as pointed out, meat quality may be sacrificed as Locally Registered Meat Establishments are not properly regulated.

The public markets in Iloilo and Cebu are poorly sanitized, not properly ventilated, and require more regular cleaning. While the market administrators are very keen to have the public markets rehabilitated, it will still take some time because of the local government's inadequate access to credit. Hence, public market wholesaler-retailers and retailers are at a disadvantage since buyers would often opt to purchase pork from meat shops and supermarkets that offer good quality and uncontaminated pork products. Wet market retailers, on the other hand, sometimes end up lowering their prices so that they may immediately sell their products. Such small-scale retailers lack the necessary equipment for long-term storage, which means that they not only incur smaller returns, they also end up selling poor quality pork products.

The competitiveness of locally-produced pork, according to Iloilo key informants, is also threatened by reports of smuggled pork coming from nearby ASEAN countries as well as cases of misdeclaration of imports (e.g., pork was declared as offal to take advantage of lower taxes, insurance, and freight costs). These illegally imported pork products threaten the competitiveness of locally-produced pork as well

as endanger consumers as their quality cannot be ensured given that official channels have been sidestepped. In fact, the study of Gordoncillo et al. (2013) showed evidence that, on a national level, pork is among the many commodities being smuggled into the country. Additionally, variations in retail prices of chicken meat, chicken egg, and pork were found to be associated with the occurrence of technical smuggling (Neric et al., 2019). Although smuggling has dampened the local prices of pork, the safety of smuggled products for human consumption cannot be guaranteed.

Further, the supply of pork in Iloilo is low relative to demand. One trader reported that he had to go to Mindoro in order to look for swine and bring these to Iloilo for slaughter. For some of the traders, they have to scout for swine from nearby provinces in order to slaughter and sell these as pork in Iloilo public markets. A low supply of swine at the farm level may translate to high pork prices paid by consumers. Additionally, this low supply of swine at the farm level is primarily due to relatively low farmgate prices in Iloilo. In fact, according to the key informants, Iloilo farmers are generally discouraged to raise swine. The main reason is that the swine farmgate price in Iloilo is PhP 5-10 lower than the farmgate price in Negros and in Mindanao. This creates a disincentive for farmers to engage in swine production. Moreover, low prices coupled with inadequate local government planning and regulation (i.e., unclear land use plan for swine production) could discourage the participation of new market players.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

The supply chains of chicken meat, chicken egg, and pork in selected markets presented some form of uniqueness and commonality. All depend on the availability of feeds in farm production and, in the case of the chicken meat and pork supply chains, on the quality of processing facilities. Each market, of course, exhibited a unique characteristic. For instance, the chicken meat supply chain showed complex producer-buyer marketing arrangements; cooperatives were found to have a huge role in the chicken egg supply chain; and livestock auction markets figure prominently in the trading of live swine in the pork supply chain.

Several competition issues that present or may lead to potential PCA violations were noted in each supply chain. In the chicken meat supply chain in Pampanga, while the increasing trend of vertical integration in the form of complex marketing arrangements between producers and integrators serve to lower production risks, it may also lead to market oligopoly and this may later lead to the abuse of dominant position. Such abuse may already be in play in the trading and consolidation segment of the supply chain where there are reports of price fixing among the nine major truck-dealers in the province who are said to impose high capital requirements for market participation.

Limited access to credit to facilitate market participation and expansion through the adoption of improved technology is the main issue in the chicken egg supply chain. This same issue also figures prominently in the other two supply chains studied. In the chicken meat and chicken egg supply chains, improved access to credit is seen to likely facilitate tunnel ventilation technology adoption. This technology can increase production cost efficiency, but its high initial and operational cost requirement is prohibitive for small-scale operators, thereby, limiting their market participation and expansion.

In the pork supply chain, improved access to credit may assist Locally Registered Meat Establishments to acquire the needed technology necessary to obtain NMIS accreditation. This is becoming increasingly urgent as the competitive edge of NMIS-accredited abattoirs against Locally Registered Meat Establishments is slowly eroding given that the latter can offer lower slaughtering fees due to cheaper and more relaxed registration requirements. This has, therefore, led to lower meat quality as Locally Registered Meat Establishments have lower standards and are not properly monitored. This situation is aggravated by reports of pork smuggling into the province, which not only erodes the competitive edge of locally-produced pork but also endangers consumers as their quality cannot be ensured given that official channels have been bypassed.

Lastly, the study noted the practice of the livestock auction markets in Iloilo. It was found that instead of serving as sites for competitive bidding, the livestock auction markets became sites to formalize pre-negotiated trading agreements, which is a violation of the anti-competitive agreement provision of the PCA.

This study has several limitations. Among them is the generalizability of its findings. This, however, is a limitation which is inherent to all case studies.

Recommendations

Several corrective measures can be explored to address the above-mentioned competition issues. These are presented as recommendations in this section.

1. **Vertical integration, market oligopoly, and backyard producers.** Like any agricultural enterprise, chicken meat production faces a high degree of risk and uncertainty. One of the major strategies adopted by producers is to enter into contract growing arrangements, thereby leading to vertical integration of activities, which may later result in an oligopolistic market. The trend toward contract growing has been increasing and will continue in the long run considering the advantages of the arrangement such as risk sharing and market access.

However, the trend toward contract growing had an adverse effect on backyard producers. In Pampanga, the number of backyard producers significantly decreased. Hence, the researchers were only able to find backyard-produced chicken in remote rural communities. While the practice of backyard farms may yield efficiency in production, it may be inefficient in the marketing side. Hence, measures are necessary to support and promote backyard chicken meat production not only for marketing efficiency but also to spread the sharing of economic benefits. One way to promote backyard farming is through the formation of collective action schemes such as a cooperative or block farming. This strategy permits the pooling of resources and enables better bargaining power when applying for agricultural loans.

2. **Financial assistance, technology, and credit guarantee system.** Most key informants shared that banks prefer loan applications from entrepreneurs intending to establish a specific production technology. For instance, in egg production, banks prefer to provide financial assistance to producers who propose to put up a facility using tunnel ventilation as opposed to conventional housing. The argument is that banks would more likely lend to a borrower with a tunnel-ventilated system because of its higher collateral value. A conventional housing for layers is about PhP 2.5 million (USD 49,603), whereas the tunnel-ventilated system is about PhP 14 million (USD 277,778).

A guarantee system should be put in place that can help small scale producers have access to capital in formal lending institutions. The private sector can forge a partnership with the government in the form of joint funding. The fund can be used to provide third party credit absorption to small scale producers in case of default payments. Understandably, the use of this fund should be paid in the form of a user fee.

3. **Low slaughter fees, meat quality, and upgrading of facilities.** Most swine producers preferred to have their stock slaughtered in Locally Registered Meat Establishments than in NMIS-accredited primary processing facilities due to the lower cost of slaughtering. However, quality becomes an issue as, based on interviews, there had been instances where meat processed from Locally Registered Meat Establishments were found to be unsafe for human consumption. Therefore, it is recommended that the facilities and standards of the Locally Registered Meat Establishments must be upgraded to ensure product quality. A way to do this is through the conversion of Locally Registered Meat Establishments to NMIS-accredited slaughterhouses.

The benefits of upgrading are higher quality of meat, greater area of operation from local to national/foreign markets, and having market access to institutional buyers like hotels and restaurants. The conversion will come at a high cost. However, the investment requirement can be easily offset by the long-term benefits mentioned above. The local government can pursue funding by partnering with international funding institutions through grants, public-private partnerships, and loans.

4. **Smuggling, lower prices, and competition.** The key informants reported cases of pork smuggling in Iloilo. Smuggling lowers domestic prices of goods. While these may seem beneficial to consumers, it has to be tackled as an issue of safety. Since smuggled goods do not undergo checks by regulating agencies, food quality may be compromised. From the producers' side, the effect on competition is at the small scale and backyard producers. Low prices as a result of smuggling will erode the competitive edge of small scale and backyard producers.

Therefore, the Philippine Competition Commission should argue for the merit of anti-smuggling from a competition perspective. The implication is that the Philippine Competition

Commission should look beyond the three prohibited acts of the PCA such as anti-competitive agreements, abuse of dominant position, and anti-competitive mergers and acquisitions. To date, smuggling can be considered as a regulatory issue rather than a competition issue. In order to formally consider smuggling as a competition issue, an amendment of the PCA must be pursued.

5. **Auction markets, price competition, and system overhaul.** Livestock auction markets are designed to benefit small scale or backyard producers through better prices from competing buyers via an auction process. However, the practice in the livestock auction markets visited in Iloilo is no longer aligned to the ideal process of the said markets. What happens in the auction market is only for formality because a seller and a buyer have already pre-negotiated the price of the animal prior to the auction, which defeats the entire purpose of the auction market. An overhaul of the system is necessary to ensure that livestock auction markets remain faithful to their functions. This recommendation requires coordination of local government units and regulating agencies like the Philippine Competition Commission.

ACKNOWLEDGMENT

The authors would like to thank the Philippine Competition Commission for funding the research project “Issues Paper on the Philippine Livestock and Poultry Industry,” which is the basis of this article.

REFERENCES

- Bureau of Agriculture and Fisheries Standards. (2005). *Philippine national standard for table eggs*. Republic of the Philippines, Department of Agriculture. <http://spsissuances.da.gov.ph/attachments/article/1101/PNS-BAFS35-2005-TableEggs.pdf>
- Bureau of Animal Industry. (2003). *Philippine hog industry roadmap*. Republic of the Philippines, Department of Agriculture.
- Corpuz, P. (2018). *Grain and feed annual: Philippine grain and feed situation outlook*. Global Agricultural Information Network, USDA Foreign Agricultural Service. <https://apps.fas.usda.gov/newgainapi/>

api/report/downloadreportbyfilename?filename=Grain%20and%20Feed%20Annual_Manila_Philippines_3-9-2018.pdf

Creswell, J. W. (2013). *Qualitative inquiry and research design: Choosing among five approaches* (3rd ed.). SAGE.

Da Silva, C. A., & de Souza, H. F. (2007). *Guidelines for rapid appraisals of agrifood chain performance in developing countries*. Food and Agriculture Organization of the United Nations.

Department of Agriculture. (2006). *Rules and regulations on the transport of live animals by land*. Philippine Animal Welfare Society. https://paws.org.ph/downloads/ao_19_-_transport_of_live_animals_by_land.pdf

Digal, L. N. (2010). Market power analysis: The case of poultry industry in the Philippines. *Journal of International Food & Agribusiness Marketing* 23(1), 5-31. <https://doi.org/10.1080/08974438.2011.534025>

Gonzales, L. A., Dy, R. T., Galvez-Dacul, M., Gonzales, A. A., Macabasco, D. R., Reyes, S. U., & Mojica-Sevilla, F. (2012). *Benchmarking the livestock and poultry industries: A cross-country analysis of the Philippines and four other Southeast Asian countries*. SIKAP/STRIVE Foundation, University of Asia and the Pacific, & Livestock Development Council. <https://www.nast.ph/images/pdf%20files/Publications/Outstanding-Awardees%20BOOKS/2014/Benchmarking%20the%20Livestock%20and%20Poultry%20Industries.pdf>

Gordoncillo, P. U., Quicoy, C. B., de los Reyes, J. A., & Vista, A. B. (2013). Effectiveness of anti-smuggling policies for selected agricultural commodities in the Philippines. *Journal of International Society for Southeast Asian Agricultural Sciences*, 19(1), 18-23.

Harrington, J. E., Jr. (2008). Detecting cartels. In P. Buccirossi (Ed.), *Handbook of antitrust economics* (pp. 213-258). MIT Press.

Housing and Land Use Regulatory Board. (2000). *Implementing rules and regulations to govern the processing of applications for locational clearance of poultry and piggery as amended*. Republic of the Philippines, Housing and Urban Development Coordinating Council. <http://hlurb.gov.ph/wp-content/uploads/laws-and-issuances/policies/R674s2000.pdf>

-
- Jimenez, C. D., Catelo, S. P., Elauria, M. M., & Sajise, A. J. U. (2018). Impact of cooperative membership on household welfare: Evidence from calamansi farmers in Oriental Mindoro, Philippines. *Journal of Economics, Management & Agricultural Development*, 4(2), 27-44.
- Lat, A. T., & Delos Reyes, J. A. (2017). Analysis of postharvest handling of table eggs produced in San Jose, Batangas, Philippines. *The International Society for Southeast Asian Agricultural Sciences*, 23(2): 169-181.
- Levy, K. K. (2017). Comparative productivity analysis of broiler under climate controlled system and conventional housing in selected municipalities of Nueva Ecija, Philippines. *IOSR Journal of Economics and Finance*, 8(4), 39-48.
- Medalla, E. M. (2017). *Understanding the principles underlying the Philippine competition law [White paper]*. Policy Notes, 2017-15. Philippine Institute for Development Studies. https://pidswebs.pids.gov.ph/CDN/PUBLICATIONS/pidspn1715_rev2.pdf
- National Meat Inspection Service. (2013). *Rules and regulations governing the accreditation of meat establishments*. Republic of the Philippines, Department of Agriculture. <https://www.nmis.gov.ph/images/pdf/ao-09-2013.pdf>
- Neric, C. M. T., Gordoncillo, P. U., Elca, C. D., & Curibot, J. P. (2019). Screening for collusion in the Philippine chicken meat, chicken egg, and pork markets. *The International Society for Southeast Asian Agricultural Sciences*, 25(1): 135-147.
- Nicavera, E. P. (2017, January 21). PVO: Strengthen implementation of Feeds Act. *SunStar Philippines*. <https://www.sunstar.com.ph/article/121670>
- Philippine Rural Development Project. (2018). *Value chain analysis of swine in Southern Luzon: CALABARZON, MIMAROPA and Bicol regions*. Republic of the Philippines, Department of Agriculture.
- Philippine Statistics Authority. (2018). *Selected statistics on gross value added of Philippine agriculture*. <http://openstat.psa.gov.ph/>
- Philippine Statistics Authority. (2019a). *Selected statistics on food available per capita by commodity*. <http://openstat.psa.gov.ph/>

- Philippine Statistics Authority. (2019b). *Selected statistics on production of livestock, poultry, and eggs by province*. <http://openstat.psa.gov.ph/>
- Press and Public Affairs Bureau. (2017, February 8). *Livestock and poultry law gets a facelift*. Republic of the Philippines, House of Representatives. <http://www.congress.gov.ph/press/details.php?pressid=9937>
- Securities and Exchange Commission. (2018). *Selected financial statements of chicken meat companies*. <http://www.sec.gov.ph/>
- Sumalde, Z. M., & Quilloy, K. P. (2015, October 7). *Improving marketing efficiency through agricultural cooperatives: Successful cases in the Philippines*. Food and Fertilizer Technology Center for the Asian and Pacific Region. http://ap.fftc.agnet.org/ap_db.php?id=514
- Ukav, I. (2017). Market structures and concentration measuring techniques. *Asian Journal of Agricultural Extension, Economics and Sociology*, 19(4), 1–16. <https://doi.org/10.9734/AJAEES/2017/36066>