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Poultry value chain and cluster development in Papua New Guinea:

Insights from a recent field study

Peixun Fang
Harry Gimiseve
Rishabh Mukerjee
Emily Schmidt
Xiaobo Zhang

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ABSTRACT

Despite poultry being lauded as a relatively affordable source of protein and micronutrients in many lower-income countries, chicken meat is twice as expensive in PNG compared to nearby Southeast Asian countries. Recent rural household consumption data collected by the International Food Policy Research Institute (IFPRI) suggests that an important share of households do not eat enough protein to meet healthy dietary guidelines (Schmidt et al., 2024). Poultry, along with fish and pork, are the three most important animal-source protein foods in the country, yet these products remain financially prohibitive to a large share of the population.

This paper explores the unique challenges and opportunities within PNG's poultry sector using a "growth diagnostic" approach (pioneered by Rodrik, 2010). Through interviews with key stakeholders across the poultry value chain, we found that while high feed costs persist as a significant challenge, poultry farmers have yet to adopt additional cost-reduction strategies, such as establishing small-scale regional feed mills, utilizing local feed ingredients, and diversifying feed and input imports.

An intriguing puzzle of PNG's poultry sector is the limited number of small-scale producers successfully transitioning to medium-scale operations. This primarily stems from high transport costs and restricted access to input and sales markets. The challenges of marketing chicken in PNG have received less attention than production. Drawing on the experiences of successful models in other countries and considering the specific situation of PNG's poultry sector, fostering poultry production and processing clusters (e.g., in Lae suburban areas) emerges as a potential strategy to address production, transportation, and marketing constraints. By concentrating production, value chain clustering can enhance access to essential services (e.g. slaughtering and cold storage), improve market access, and reduce overall costs. While clustering holds promise for PNG's poultry value chain, its success hinges upon joint action between the public and private sectors, as well as NGOs operating within the value chain.

Keywords: Papua New Guinea, Poultry, Value chain, livestock feed.

INTRODUCTION

Papua New Guinea (PNG), a country blessed with abundant minerals and fertile soil, struggles to supply enough livestock to meet the demand for animal-source protein at competitive domestic market prices. Coupled with inadequate protein intake (Schmidt et al., 2024), poultry meat and eggs are comparatively expensive throughout PNG, costing on average 50 percent more in PNG than in the United States (Table 1).

Recent literature on agricultural value chain organization and function in Papua New Guinea is scarce, especially for the poultry sector. One exception is a 2022 qualitative study conducted jointly by the International Food Policy Research Institute (IFPRI) and the National Agriculture Research Institute (NARI) in the Highlands of PNG (Fang et al., 2023). This study explored the feasibility of expanding the local mini livestock feed mills in rural PNG to improve poultry feed access in underserved areas. The study showed that poultry farmers that purchased from local mini feed mills significantly reduced their feed costs, however expansion of mini feed mills continues to meet restrictive challenges including procuring feed mill equipment, ensuring reliable electricity and raw ingredient supply, and establishing a retail network to secure a customer base.

While the previous study focused on small-scale rural poultry production, this paper reports major findings from an expansive qualitative value chain study that includes PNG's major suburban poultry production areas. We collaborated with local partners (the Fresh Produce Development Agency (FPDA), the Farmers & Settlers Association (FSA), and NARI) to conduct in-depth focus group discussions among producers, traders, and sellers within the poultry sector to identify key bottlenecks. This report draws upon extensive primary interviews with key stakeholders of varying scales across both rural and urban areas of PNG between October and November of 2023. In doing so, we developed separate value chain mappings for small, medium, and large-scale poultry producers. These disaggregated mappings offer greater detail and clarity to key actors and linkages within different scales of poultry production compared to previous studies. Additionally, we linked the interview notes (in Appendix) to the value chain mapping by assigning each interview a unique identifier that corresponds to the relevant actor in the value chain mapping. After the value chain mapping exercise, we identified two main puzzles: in addition to the commonly recognized challenge of high cost of feed, challenge in marketing chicken seems a key bottleneck that hinders the small-scale poultry producers from scaling up. Our Word Cloud graph results on the interview transcripts are in line with these puzzles.

BACKGROUND

Value chains thrive on the smooth interaction of numerous interconnected linkages. The productivity of every participant depends on the performance of these linkages. A single broken link can compromise the chain's overall efficiency, as theorized by Kremer (1993) when he put forth his O-ring theory. This risk is particularly amplified in island economies such as PNG, where most intermediate inputs such as seeds, animal feed and feed ingredients, fertilizer, and pesticide are imported. The vast geographic distance of these vital inputs significantly increases the vulnerability of PNG's agricultural value chains to disruptions and missing linkages.

The challenge of promoting competitive value chains is further compounded by the country's poor infrastructure and prohibitive regulatory burdens facing importers. Poor infrastructure translates to high transportation costs for both inputs and final products. PNG also faces significant vulnerability to

transport disruptions such as roadblocks due to conflicts, landslides, and political campaigns. Additionally, due to lack of input supply information and availability, it often takes producers multiple return trips to buy inputs, compounding transportation costs.

The country's stringent biosafety protocols mandate costly on-site inspections at source countries for agricultural inputs. These costs create an oligopoly in the import market, leading to higher prices and limited sourcing options for essential agricultural inputs.

Despite the enormous challenges, a handful of resourceful entrepreneurs have implemented successful business models. Clustering emerges as a key strategy of successful entrepreneurs, particularly around major cities like Port Moresby and Lae. Proximity to urban markets grants poultry producers improved access to essential inputs like feed and day-old-chicks (DOCs). Additionally, producers can directly sell their chickens and eggs to consumers or collectors / aggregators. In addition, these clusters foster a unique environment for knowledge sharing among all nodes in the value chain.

Despite better access to inputs and markets near major cities, the scale of individual (household) poultry production remains limited, typically hovering around fifty to one hundred chickens per household per cycle (each cycle is about 6 weeks). Producers who used to manage largescale out-grower operations (several thousand chickens per cycle) have scaled back their production citing high transport costs, which require producers to sell directly to collectors or consumers, compounded with high feed costs. Without personal vehicles, producers rely on public transport, restricting them to transporting only fifteen chickens at a time in sacks. Selling 100 birds may require over a week of back-and-forth transport, raising concerns about undo feed costs if the chickens aren't sold promptly after reaching maturity.

Contract farming offers a potential solution, connecting small producers with larger buyers like hotels, hospitals, and schools, who require a stable supply. However, ensuring a stable supply requires cold storage – a significant hurdle due to frequent power outages and expensive generators. Traditional, smaller-scale aggregators often find these risks cost prohibitive.

One entrepreneur found an innovative approach by acquiring a U.S brand generator from Alibaba, which allowed him to establish a centralized slaughterhouse with cold storage. This entrepreneur subcontracts poultry production to neighboring producers, consolidating their output and streamlining delivery to larger buyers. While this entrepreneur has managed to bypass certain constraints through independently investing in reliable power supply, it does not negate the importance of government provision of basic infrastructure, particularly stable electricity and improved road connections.

While this study focuses on PNG, the reported findings hold relevance for understanding the formation of agricultural value chains in other developing countries facing similar challenges, including poor infrastructure and a heavy reliance on external markets for intermediate goods. The remainder of this paper is structured as follows. The following section discusses the methodology employed to evaluate key challenges and opportunities for the PNG poultry value chain. Section 3 presents the key insights from our focus group exercise with poultry producers, input suppliers, and poultry retailers. Section 4 concludes. The detailed interview notes are attached as an appendix.

METHODOLOGY

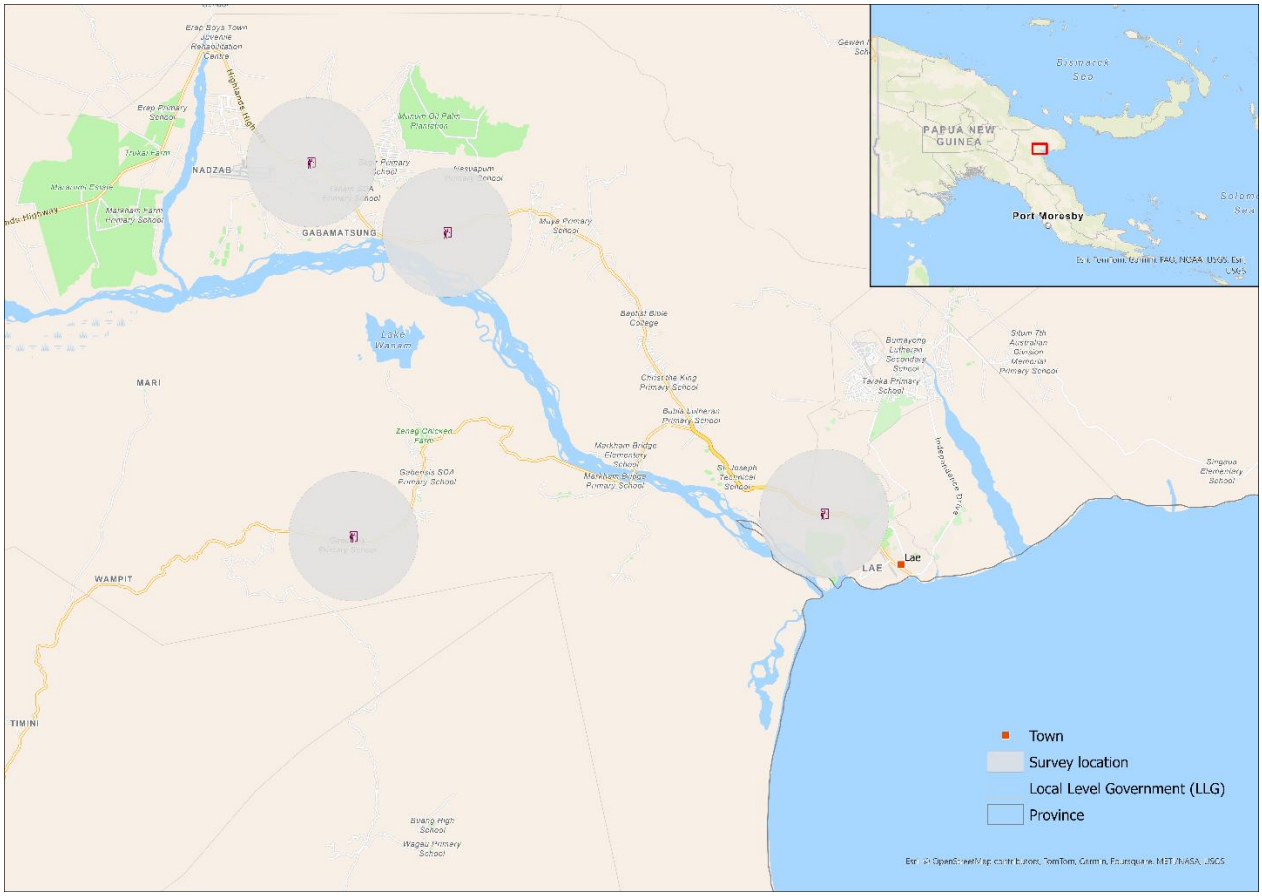
To delve into the unique challenges and opportunities within PNG's poultry value chain, we employ a "growth diagnostic" approach pioneered by Rodrik (2010). This method recognizes that each country

faces specific obstacles to growth, and there's no one-size-fits-all solution. By applying this approach, we aim to uncover crucial "ground truths" about the sector and inform tailored policy recommendations for its development. Our approach involves 4 key steps.

First, we reviewed existing resources, including both published and unpublished studies, related to the sector. We evaluated PNG consumption trends of animal-sourced food including poultry, and compared the price of chicken, eggs, and feed ingredients imported by PNG with nearby countries.

Second, we conducted a set of interviews with sector experts (e.g. from FSA, NARI and the Poultry Industry Association) to identify key poultry production clusters to visit during a more in-depth, structured interview exercise. These initial interviews also aided in creating a preliminary value chain map.

Figure 1: Main locations of poultry value chain stakeholders surveyed



Source: Authors compiled based on the survey locations in the suburban area of Lae.

Third, during October and November 2023, we visited the identified poultry production clusters and interviewed stakeholders within every node of the value chain along the entirety of the Highlands highway in PNG, with a focus on the suburban area of Lae, where the main feed and DOC supplier and the large commercial enterprises are located (Figure 1). Structured interviews were conducted with 22 stakeholders, and their insights were meticulously documented in a structured data entry form. For each stage of production, we interviewed multiple stakeholders to corroborate their viewpoints. Our core questions explored personal background, operations, major challenges, and relationships with other actors (competitors, customers, suppliers, and government agencies). These in-depth interviews helped to refine the value chain map and gain a more detailed understanding of the sector's dynamics.

The detailed interview transcripts are provided in the Appendix with respondents' names having been replaced with fictitious names to preserve anonymity. We also conducted textual analyses on the interview transcripts to visualize the most common risks that the poultry sector individuals identified during the focus groups.

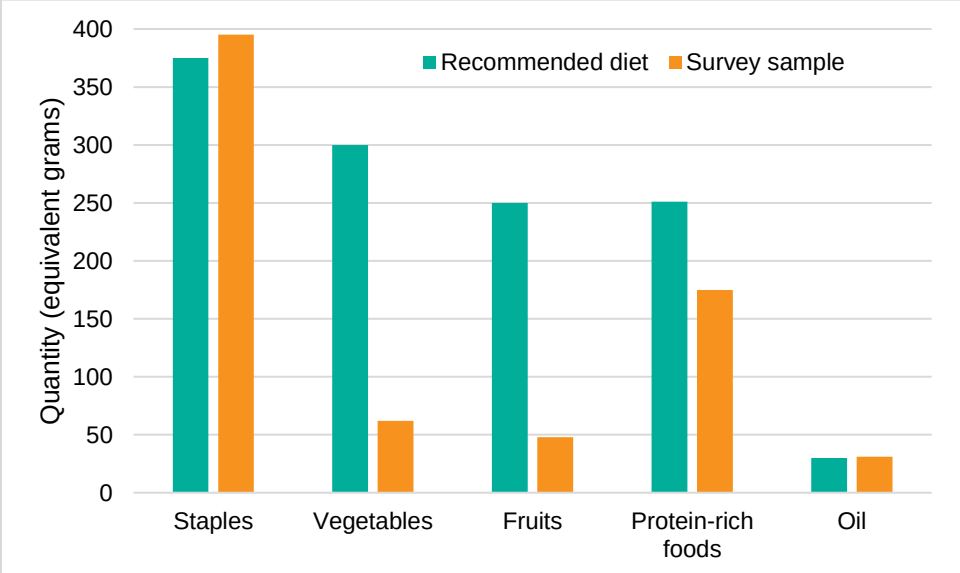
Fourth, we presented our findings to diverse stakeholders (e.g., NARI, University of Goroka, and the Institute of National Affairs) to obtain informed expert advice to validate and enrich the findings.

CONTEXT OF THE PNG POULTRY SECTOR

Consumption of animal-sourced food in PNG

Both the 2018 PNG Rural Survey on Food Systems and the 2023 PNG Rural Household survey conducted by the International Food Policy Research Institute indicate that rural Papua New Guineans are not consuming sufficient protein to meet recommended intake levels (Schmidt et al., 2024, 2022). Using the Indonesia Food Based Dietary Guideline (FBDG), Schmidt et al. (2022) developed a recommended diet table tailored to PNG to allow comparisons between recommended food group intake and actual food consumption (Figure 2). The recommended daily quantity of protein-rich foods is 250 grams per adult-equivalent, whereas the surveyed households in the 2018 survey only consumed 175 grams, revealing a concerning 30 percent deficit.

Figure 2: Quantity (grams) consumed of each food group, per adult equivalent/day



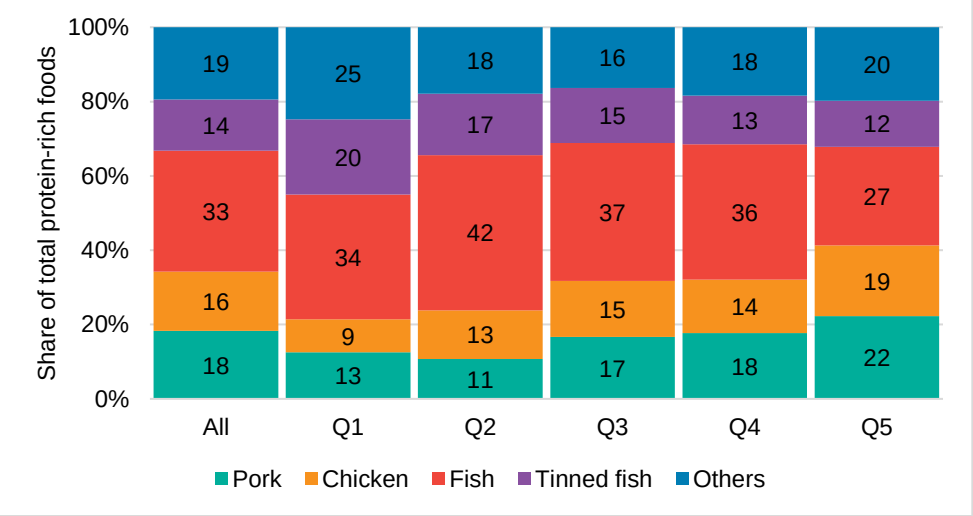
Source: Authors' calculations using the 2018 PNG Rural Survey on Food Systems.

Note: We convert every food item into food group equivalent grams and associated nutrient composition using the recommended diet and food composition tables.

In 2023, IFPRI conducted a rural household survey across 14 provinces that aimed to understand household consumption trends. A recent report (Schmidt et al., 2024) publishing descriptive results suggests that fish, pork, and chicken are the three most important protein-rich foods in rural areas (Figure 3). Higher income households allocate a greater share of their expenditure to chicken and pork and

a lower share to fish compared to less affluent households, implying that chicken is perceived as a favorable yet relatively costly protein-rich food. The most recent Household Income Expenditure Survey 2009/10 (HIES 2009/10) also reports the same three main protein-rich foods in PNG in both rural and urban settings, revealing that animal source food consumption remains an important source of protein (Figure A1).

Figure 3: Expenditure share of protein-rich foods by food item and consumption-expenditure quintile



Source: Authors' calculations from the 2023 PNG Rural Household survey.

Note: The household quintiles are defined based on the overall household's per-adult-equivalent consumption expenditure, with Q1 being the lowest quintile and Q5 being the highest quintile.

Prices of chicken and eggs in PNG and nearby countries

Considering that chicken and eggs are commonly recognized as an affordable source of protein-rich food (OECD-FAO, 2022) compared to other animal-sourced foods in neighboring countries, we conduct a comparative analysis of poultry retail prices in Table 1.

Chicken and eggs are more expensive in the Pacific Islands countries than in other regions. The price of a whole chicken in PNG is 27 percent lower than in the Solomon Islands, but it is 13 percent higher than in Fiji. Compared to Australia and the US, the price of a whole chicken in PNG is about 50 percent higher. When compared to nearby Southeast Asian countries, the price of a whole chicken in PNG is about three times that of Indonesia, and about double that of Malaysia and the Philippines. The price of eggs follows a similar price pattern. For example, the price of eggs in PNG is about twice that of Indonesia, Malaysia, and the Philippines.

Table 1: Price of Eggs and Chicken Meat of PNG and nearby countries in 2024.

	Egg (USD/dozen)	Whole dressed chicken (USD/kg)	PNG's egg price over other countries' (%)	PNG's chicken price over other countries' (%)
PNG	3.6	6.6	100	100
Indonesia	1.6	2.1	228	316
Malaysia	1.8	3.1	203	213
Philippines	2.1	3.6	177	184
Fiji	2.6	5.9	139	113
Solomon Islands	5.7	9.1	64	73
Australia	3.9	4.6	93	144
U.S.A.	2.5	4.3	145	154

Note: (1) The prices of eggs are mainly sourced from 'Cost of Living ' in 2024 on https://www.numbeo.com/cost-of-living/. The reported egg price of PNG in the 'Cost of Living' (2024) is the same as what we observed in PNG. The price of eggs of Indonesia, Malaysia, the Philippines, and Australia are also closed to their values on https://www.globalproductprices.com/rankings/egg_prices/. (2) The price of eggs and chicken meat fluctuated significantly in the U.S. in the last 2 years due to the shortages, so the average monthly egg price of the last 12 months from the U.S. Bureau of Labor Statistics was used. (3) The prices of eggs of Indonesia, Malaysia, Philippines, and Australia are mainly sourced from https://www.globalproductprices.com/rankings/egg_prices/. (4) The price of chicken of Fiji is sourced from an online store (https://www.mh.com.fj). (5) The price of chicken of Solomon Islands is sourced from https://www.selinawamucii.com/insights/prices/solomon-islands/chicken-meat/.

Costs of feed and DOC in PNG and nearby countries

As the high prices of chicken and eggs are likely related to their high production costs, we compared the retail prices of feed and DOC, the two primary cost components in PNG, with those in Indonesia, Malaysia, and the Philippines in Table 2. Feed normally accounts for about three-quarters of the total production costs for full-grown broilers in most countries. The retail price of feed in PNG is about 25 to 50 percent higher than in Indonesia, Malaysia, and the Philippines, while the retail price of DOC in PNG is about 50 to 100 percent higher. These substantial disparities in feed and DOC prices contribute to the higher price of chicken and eggs in PNG.

Many countries, including Indonesia, Malaysia, and the Philippines in Southeast Asia, import a large amount of feed ingredients (e.g. maize/corn, wheat, soybean) to produce feed. We compare PNG's unit values of feed ingredient imports with those of nearby countries. Wheat and soybean have been the two main imported ingredients used by PNG feed mills. The unit values of wheat and soya bean imported by PNG are both about 10 percent higher than Indonesia, Malaysia, and the Philippines. Furthermore, the unit value of soya-bean oilcake imported by PNG is about 25 percent higher than that of nearby countries. Analyzing the unit values of imported feed ingredients (in Table 3) together with the retail prices of complete feed (in Table 2) in PNG and nearby countries, the relatively higher unit values of imported feed ingredients in PNG contributes to the comparatively high retail price of feed.

Table 2: Retail prices of complete feed and DOC in broiler chicken production of PNG and nearby countries

	Feed (USD/kg)	Feed (USD/bird)	DOC (USD/bird)	PNG's feed price over other countries' (%)	PNG's DOC price over other countries' (%)
PNG	**0.86**	**3.88**	**1.28**	**100**	**100**
Indonesia	0.59	2.66	0.66	146	194
Malaysia	0.62	2.80	0.72	139	176
Philippines	0.68	3.06	0.81	127	158

Note: (1) The costs of the stock feed and DOC of PNG are collected from authors' field visits in 2023. (2) The prices of feed and DOC of the other countries are based on the following online sources and being cross-checked with other additional sources. Indonesia feed: https://www.tridge.com/news/feed-prices-soar-gopan-is-worried-that-chicken-mea. Indonesia DOC: https://chickin.id/blog/cara-memilih-doc-ayam-broiler-yang-berkualitas/. Malaysia feed: https://themalaysianreserve.com/2023/03/23/analysts-call-for-govt-support-on-domestic-poultry-feed-industry/. Malaysia DOC: https://theedgemalaysia.com/node/688283. Philippines feed: https://agrilife.ph/product/proboost-vp-1000/. Philippines DOC: https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=Livestock%20and%20Poultry%20Update%202023_Manila_Philippines_RP2023-0040.pdf. (3) It is assumed that it takes 4.5 kg of feed for each broiler before harvest in every country. (4) The prices of feed and DOC of the other nearby Pacific Islands countries are not available online.

Table 3: Unit values of imported main feed ingredients of PNG and nearby countries between 2013 and 2022

Imported feed ingredients	Countries	Value of import (million USD)	Quantity of import (thousand tons)	Unit value of import (USD/kg)	PNG's unit values over other countries' (%)
Wheat	**PNG**	**538**	**2,283**	**0.24**	**100**
Wheat	Indonesia	20,200	94,970	0.21	111
Wheat	Malaysia	3,392	15,307	0.22	106
Wheat	Philippines	12,100	55,208	0.22	108
Soya bean	**PNG**	**2**	**4**	**0.46**	**100**
Soya bean	Indonesia	9,437	23,614	0.40	114
Soya bean	Malaysia	2,800	6,901	0.41	113
Soya bean	Philippines	659	1,621	0.41	112
Soya-bean oilcake	**PNG**	**39**	**89**	**0.44**	**100**
Soya-bean oilcake	Indonesia	15,800	44,933	0.35	125
Soya-bean oilcake	Malaysia	4,354	12,740	0.34	129
Soya-bean oilcake	Philippines	5,388	15,246	0.35	124

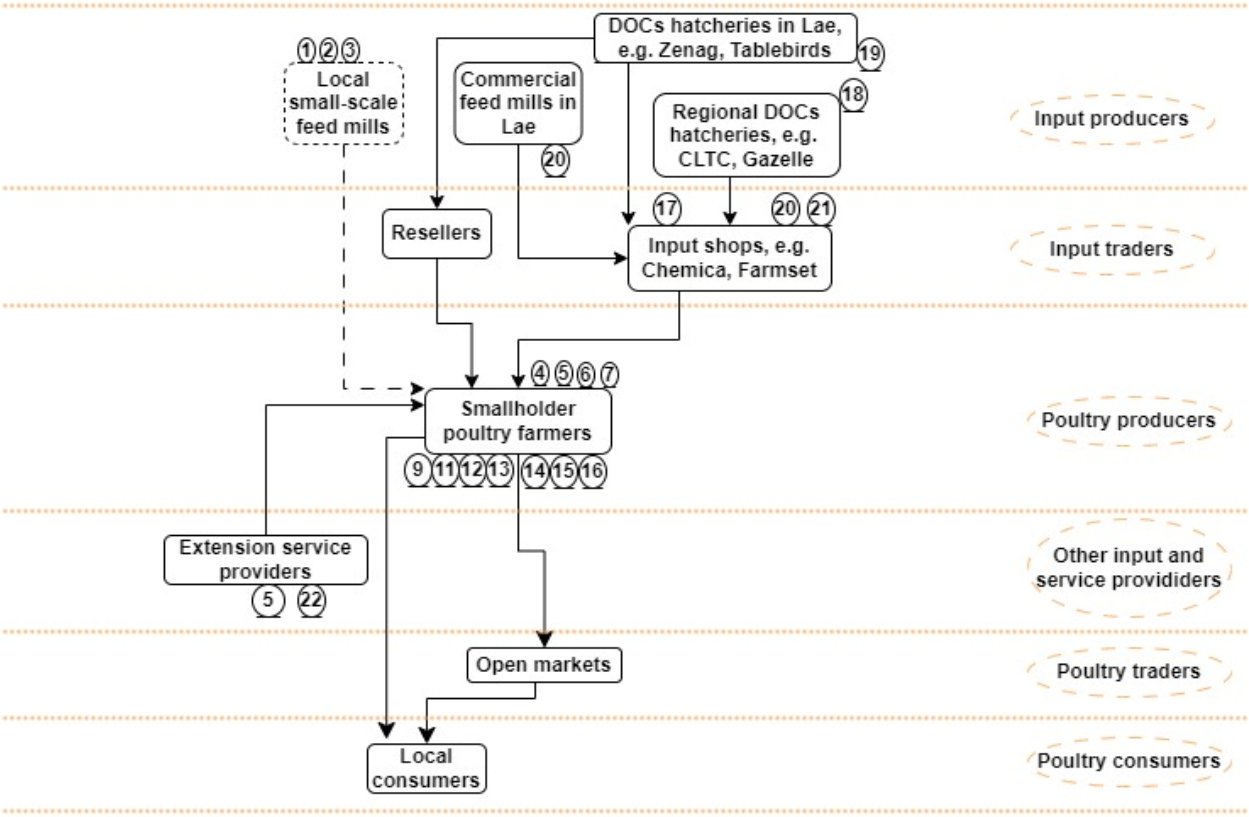
Source: BACI trade data (accessed in 2024).

Note: The import values and unit values of all various years were all converted to the 2022 price level using the import unit value index from World Development Indicators.

Poultry (broiler chicken) value chain mapping

Figure 4 illustrates the mapping for small-scale poultry producers (typically raising 50 to 100 chickens), which are common across different regions and dominate the broiler chicken sector in PNG. Particularly in rural areas and the areas distant from Lae, small-scale producers are the main suppliers of live chicken. Some small-scale producers that we interviewed in the Lae area downsized from medium-scale out-growers, previously raising over 2,000 chickens for large commercial enterprises, to small-scale producers following the 2020/21 down-scaling of the out-grower program in the Lae area.

Figure 4: Value chain mapping for small-scale poultry business



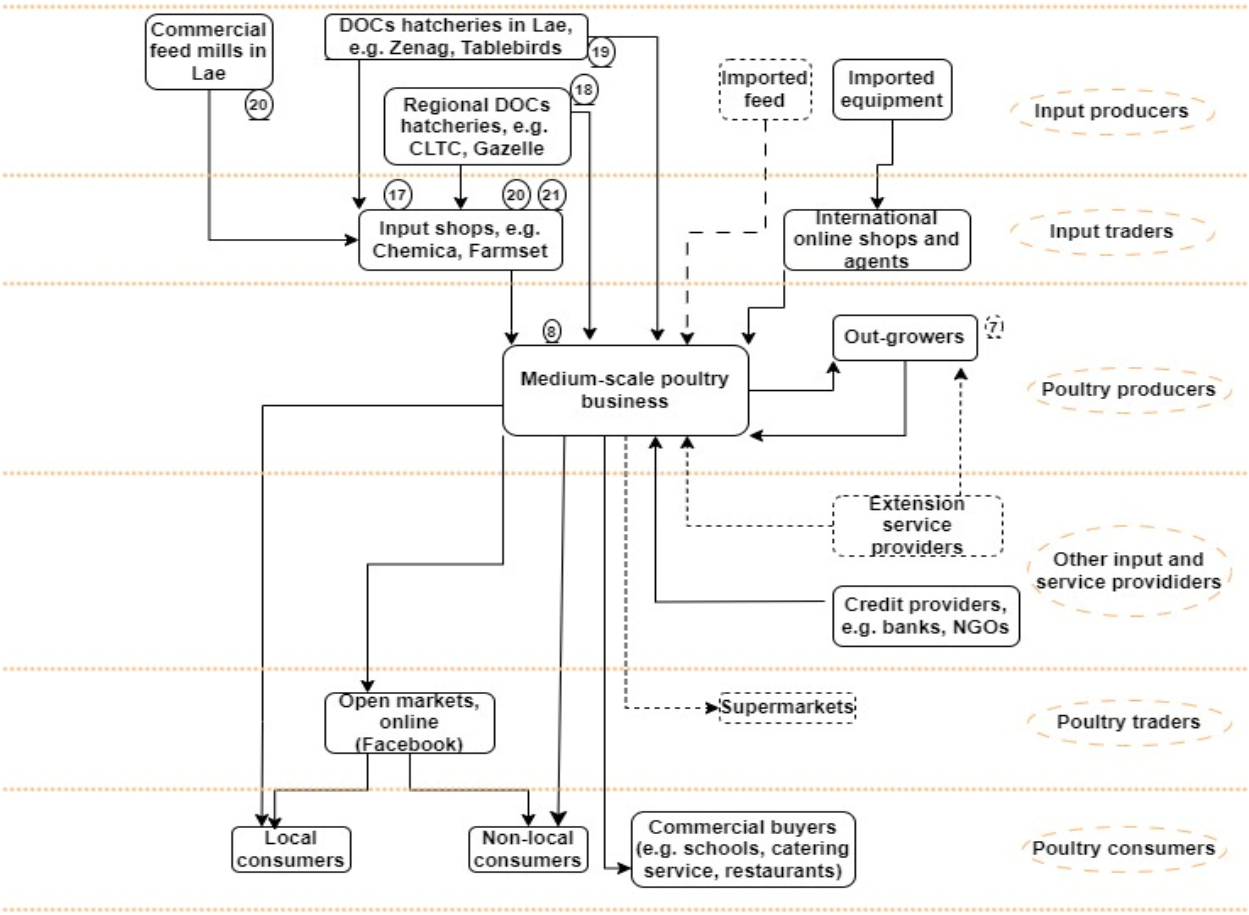
Note: The local small-scale feed mills in dash rectangles are in the early stage of their business and are not yet supplying feed to smallholder poultry farmers but they plan to do so in the future.

Regardless of their location, small-scale producers predominantly rely on the DOCs and feed from the poultry and feed enterprises in Lae. These enterprises distribute their DOCs and feed through third-party chain input shops in major cities. Due to limited supply and high costs of DOCs in areas distant from Lae, a few regional hatcheries (e.g. Gazelle, and CLTC) supply some DOCs locally to fill the gap. With small-scale production, the producers typically limit their sales to nearby markets or farm gate aggregators over the course of one to two weeks. A few key constraints impede them from scaling up, which we will discuss in the next section.

Figure 5 depicts the mapping for medium-scale poultry producers. Thanks to their larger scale of operation, medium-scale producers are capable of directly supplying chicken to more diverse and larger-scale customers, including catering services, schools, and chain restaurants. One business that we interviewed manages its own marketing on Facebook to reach a wider and more distant customer base.

However, the scale of these businesses is not large enough to become a consistent supplier for a supermarket chain.

Figure 5: Value chain mapping for medium-scale poultry business



Note: The actors represented in dash rectangles are in the early stages of collaboration with the medium-scale poultry business. For example, a medium-scale poultry business is in the process of applying approval from NAQIA to import feed from additional countries.

Processing chicken allows for transporting large volumes and avoids the risks of ongoing feed costs associated with slow sales of mature live chicken (Amanor-Boadu et al., 2016). However, processing requires slaughtering equipment and cold storage facilities, which pose a significant challenge for medium-scale poultry producers in PNG due to the high costs of infrastructure and technology, and a general lack of information and extension support. One business we interviewed overcame this barrier by using an international online platform to directly purchase from equipment sellers. This platform also offered insulated packaging solutions, allowing customers in remote locations to maintain the freshness of purchased, processed chicken.

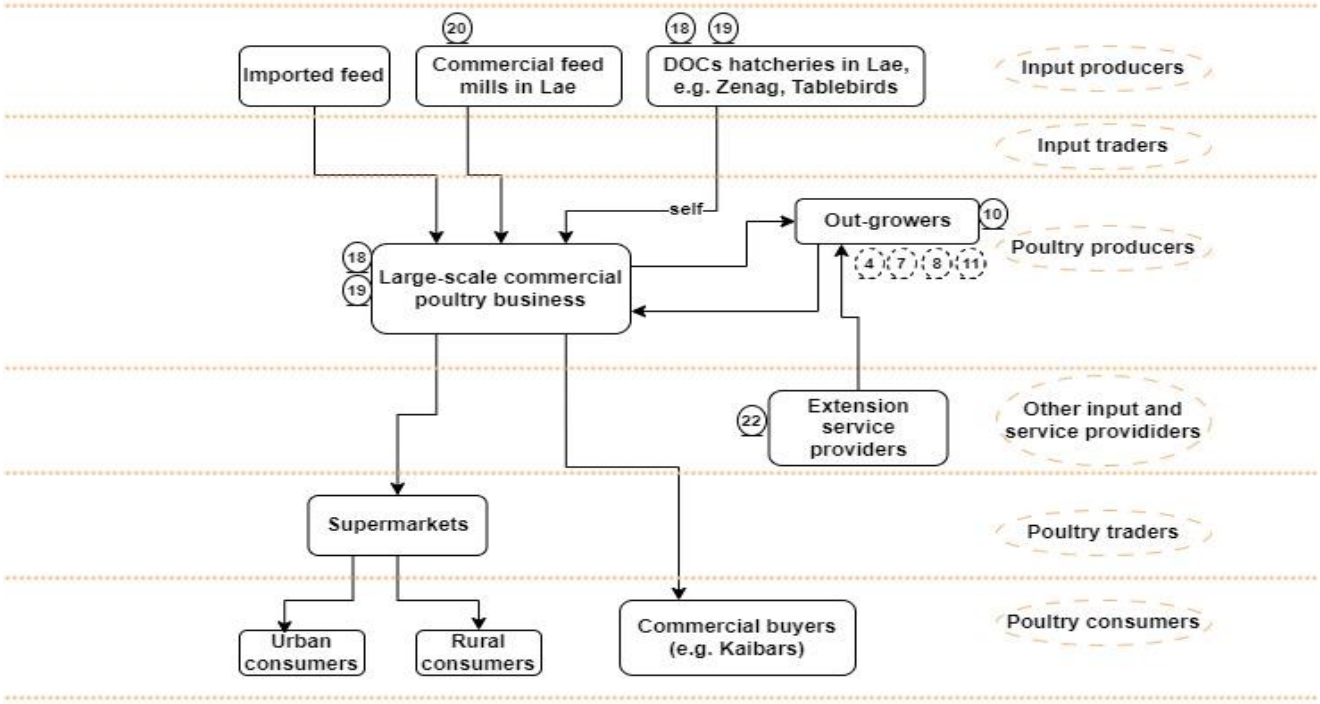
Medium-scale poultry producers typically benefit from economies of scale, allowing them to negotiate bulk purchases of DOCs and feed at lower prices. While some businesses managed to secure discounts for the DOCs directly from hatcheries, obtaining favorable deals from feed suppliers remains a challenge. In response, one producer we interviewed contacted international feed suppliers and received a price quote at a lower rate than the domestic feed. However, successfully importing feed requires navigating regulations and securing approval from the National Agriculture Quarantine and Inspection Authority (NAQIA).

Medium-scale poultry businesses contribute to local employment by hiring workers for various tasks, including raising and processing chicken. Additionally, medium-scale businesses partner with small-scale producers through contract farming. This collaboration benefits both parties. Medium-scale businesses harness greater production capacity, while small-scale producers receive access to cheaper inputs and a guaranteed market for their products, ultimately facilitating their own growth.

One medium-scale poultry business we interviewed successfully secured a grant from an international donor to expand operations. The entrepreneur learned about the opportunity from a previous job in Fiji. Entrepreneurs of medium-scale poultry businesses often access a wealth of information on production, marketing, and finance through market interactions with a wider portfolio of business partners, government actors and, in some cases, NGOs. Additionally, they often maintain strong connections with both upstream and downstream actors in the value chain, empowering them to innovate and devise efficient strategies to overcome various bottlenecks.

Figure 6 shows the value chain mapping for two large-scale poultry enterprises in Lae. They operate as vertically integrated poultry businesses, managing the entire production cycle from producing their own DOCs and feed, to processing chickens in their own facilities before supplying supermarkets and other commercial buyers. While one of the enterprises used to collaborate with a large number of out-growers, it has downsized the out-grower program. The highly vertical integration enables the large-scale enterprises to produce chicken efficiently and supply substantial quantities of frozen chicken to PNG, particularly in urban areas. In addition, they serve as the primary suppliers of DOCs for other small and medium-scale poultry producers across PNG, thus playing a crucial role in the country's poultry sector.

Figure 6: Value chain mapping for commercial large-scale poultry business



Word frequency of the interview transcripts

Focus group interviews provide a rich and detailed understanding of a specific topic, however summarizing this depth of information into key takeaways often proves challenging. To capture major topics discussed repeatedly throughout the interviews, we use Word Cloud graphs to visualize the most common concerns raised by respondents. Focusing on four key aspects of the poultry value chain identified during the literature review stage of our growth diagnostic study – production, marketing, collaboration, and main challenges – each word cloud graph presents the top 100 frequent words from the interview transcripts related to each aspect. Notably, “feed” emerged as the most frequently used word in all four aspects (Figure 7).

To create a word cloud that describes the major topics related to poultry production in PNG, we limited the analysis to take into account only the focus group questions that asked specifically about chicken rearing, including those that explored input use (e.g. DOCs and feed), input procurement, and feeding practices. Feed was discussed more frequently than the other inputs, such as DOCs, chicken sheds/houses, and water. High mortality rate due to heat stress also emerged as a significant challenge.

The challenges of marketing chicken in PNG have received less attention than production. We generated a word cloud using interview responses on marketing methods, location, time period, and difficulties of selling chickens. Many respondents highlighted that they need to increase the selling price of chicken due to increased feed costs. They also often brought up the difficulties and expenses associated with transporting their chickens to the markets, a primary obstacle for producers seeking to expand their operations.

It is often assumed that poultry producers primarily compete with one another. To explore potential collaborations, we asked a series of questions about interactions with other poultry producers and organizations. The "collaboration" word cloud aligns with respondent reports of frequently accessing information from local input shops (e.g., Farmset) and sharing knowledge about feed and feed alternatives. Therefore, collaborations do exist among poultry producers despite they also compete with each other on selling chickens.

Our final word cloud is generated based on responses to the interview questions regarding the overall challenges in the poultry business. Unsurprisingly, high feed cost dominates the reported challenges given it accounts for about two-thirds of the total cost of production. In addition, low or unreliable local demand or market access emerged as common challenges.

Overall, the main key words in the four graphs align with the initial puzzles we identified in PNG’s poultry value chain, as discussed in the next section.

Figure 7: Word Cloud based on the interview transcripts

Production

Marketing/sales

Collaboration

Challenges

PUZZLES, CONSTRAINTS, AND OPPORTUNITIES

Intriguing puzzles and binding constraints within the PNG poultry value chain

By examining both apparent and underlying obstacles faced by PNG poultry producers, we unearthed several intriguing puzzles within the value chain. These puzzles force us to think about the core challenges to developing targeted policy recommendations for effective intervention.

What motivates poultry producers to persist in utilizing expensive stock feed?

Ensuring quality livestock through high-cost feed

The high cost of stock feed is a recurring complaint among poultry producers in our interviews and among documented literature, which prompts a critical question: Why do producers continue to purchase expensive feed when exploring more economical alternatives might be beneficial?

Adopting costly stock feed is reasonable based on Kremer's (1993) O-ring theory. Chicken farming is a high-input and high-output activity characterized by a series of critical steps, from purchasing DOCs to feeding chickens, and ultimately selling chickens. Each step within the 6-week production cycle is crucial for success. Missteps at any point can drastically reduce both productivity and profits. The O-ring theory posits that in interdependent processes, the strength of the entire chain is limited by its weakest link. Applied to chicken farming, this suggests that even high-quality inputs in some areas (e.g., expensive DOCs or chicken sheds) won't guarantee success if another stage, such as feed, is compromised. Focus group conversations uncovered that many producers prefer the more expensive brand, believing it leads to healthier and heavier chickens. Therefore, it is reasonable for the small-scale poultry producers to choose costly commercial stock feed to ensure healthy chickens, given their substantial investments in other inputs (such as chicken sheds and DOCs).

Limited options and knowledge of feed and feed alternatives for PNG poultry producers

Complete feed (which includes all components for livestock feed) is expensive in PNG compared to neighboring countries. Additionally, it can only be purchased from select feed mills in Lae. Unlike other countries, where poultry feed concentrates (mixed with local staples for cost reduction) are available for purchase, Lae's feed mills don't produce feed concentrates for sale.

Despite proposals for small-scale regional feed mills circulating for over a decade, this sector has seen sluggish development. Currently, only a handful of small PNG businesses are venturing into this space. However, none have yet achieved commercial viability to supply nearby poultry producers with locally produced feed.

Another potential option for supplementing animal feed is using raw agricultural and agro-industrial by-products as cost-effective feed supplements. While if practiced improperly, these supplements can have negative, anti-nutritional factors that can reduce nutrient availability and digestibility among chicken, feed mixing is a common practice in many countries (Yafetto et al., 2023). Fermentation has been a successful strategy to reduce these anti-nutritional factors in various feed systems around the region. Examples include fermented banana stalks in the Philippines and Thailand (Mikkelson, 2015), sweet potato vines and cassava leaves in Uganda (Kabirizi et al., 2017) and Vietnam (Ly et al., 2010),

and sago waste in Malaysia (Lani et al., 2021). However, PNG poultry producers lack awareness of these strategies, hindering their ability to prepare and utilize local ingredients to reduce feed costs.

The above constraints shed light on why PNG poultry producers persist in utilizing costly stock feed, which drives up consumer prices of chicken and eggs.

Why do most poultry producers opt to raise only 50 or 100 chickens (1 or 2 boxes of DOC)?

Most poultry producers that we interviewed across various regions of PNG limit their production to 50 or 100 chickens (from 1 or 2 boxes of DOCs) per cycle. Even producers who once managed 2,000 chickens as out-growers for commercial poultry enterprises have downsized to about 100 chickens after the termination of their contract farming agreement. Some producers invested a large amount of money in building large chicken sheds for contract farming purposes but are currently only utilizing a small corner of the shed, leaving idle the remainder of the shed space.

The primary reason for most poultry producers being small-scale is related to the practical limitation on sales volume. The vast majority rely on direct sales either at their farmgate or local markets. A key constraint to expanding production is tied to logistical constraints. After 6 weeks, when the chicken is mature, small-scale producers normally transport around 15 chickens in sacks using wheelbarrows or on foot to nearby daily markets, occasionally taking a public motorized vehicle (PMV) to reach further markets. Therefore, it takes about a week to sell 100 chickens. Raising more than 100 chickens would entail longer selling periods, resulting in higher feed costs as the feed conversion ratio worsens for mature chickens. Thus, raising large flocks would be challenging without personal vehicles.

One way to avoid feed waste after chickens reach maturity is to slaughter and process the meat upon maturity. However, this requires access to slaughtering and storage facilities with consistent reliable electricity. Currently, this type of infrastructure would require a substantial investment beyond the means of small- and medium-scale producers. Therefore, restricted by transportation, market size, and lack of processing and storage facilities, poultry producers tend to maintain production size within 100 chickens in a cycle.

Potential suited solutions to the key constraints after diagnoses

The above analysis represents the initial stage of the “growth diagnostics” framework (Rodrik, 2010), pinpointing the key binding constraints of the PNG poultry value chain. The next step is to identify context-specific solutions to alleviate these constraints.

Clustering can be an alternative method to address various constraints for the PNG poultry value chain

Better access to markets (both input and sales), facilitated learning from others, and labor pooling are the three most noted features of positive externalities in clusters (Marshall, 1920). Poultry clusters have developed in the Lae area in the incipient stage, driven both naturally by geographical advantages and initiatives such as the poultry out-grower programs. Producers are attracted to clusters around Lae due to its proximity to feed mills, feed ingredient cultivation sites (e.g., maize/corn), hatcheries, and urban

markets. This proximity allows them to benefit from lower input costs and higher consumer demand compared to other regions of the country.

Even businesses with competitive relationships can benefit from clustering due to the potential for co-operation. Studies in other countries suggest that cooperation within clusters likely reduces the operational cost for businesses, further attracting new entrants to the sector. For example, in Bangladesh's fish clusters, fish farmers in highly clustered areas were more likely to share tools, vehicles, labor and trading information than those in less clustered areas (Zhang et al., 2019). In the case of PNG's potential poultry clusters, small-scale poultry producers could benefit by sharing expensive equipment like vehicles and by accessing slaughtering service and cold storage facilities offered by specialized service providers or larger producers at lower cost. This would facilitate expansion of small-scale producers. With a high concentration of poultry producers in a cluster, the increased demand would naturally attract specialized service providers.

A stable supply for large orders is crucial for business growth, but there's often a mismatch between available supply and demand. A common strategy to address this challenge is outsourcing orders to nearby small producers within clusters. Clustering facilitates outsourcing because member businesses normally have closer relationships and greater trust (Fleisher et al., 2010). The dilemma in PNG's current poultry sector is that small-scale producers typically raise only 50 to 100 chickens per cycle, while medium-scale producers often struggle to achieve consistent or sufficient volume for formal contracts (e.g. supermarket). Such a dilemma is more likely to be resolved organically within a value chain cluster. The focus group exercise presented here interviewed a medium-scale poultry producer who lacked sufficient production capacity outsourced orders to nearby smaller producers. However, this medium-scale producer lacks additional cold storage capacity and cash flow to further expand.

Clustering can also ease financial constraints when businesses establish and operate their business, even in the absence of a well-functioning capital market (Ali et al., 2014). Some transactions within clusters can happen in the form of trust-based trade credit, which can greatly ameliorate working capital constraints. This arrangement enables small-scale poultry producers to access costly inputs (e.g. DOCs and feeds) without paying full upfront payment. Obtaining a formal bank loan is not easy in PNG, especially for businesses lacking capital. Therefore, clustering can act as an alternative avenue for poultry businesses to circumvent credit constraints.

PNG boasts numerous poultry entrepreneurs who have been innovatively overcoming challenges within their businesses. By collaborating in clusters, these entrepreneurs can leverage their combined resources and skills for mutual benefit (Xu and Zhang, 2009). For example, poultry producers we interviewed near Lae with prior experience as extension officers in the out-grower program have helped newcomers to launch their poultry farming businesses. This example highlights the role of knowledge spillovers in cluster formation, a feature widely observed in clusters in other countries (Omondi, 2022). Clusters can also mitigate both technical and capital barriers to enter the poultry value chain (Fleisher et al., 2010). With established knowledge and expertise, Lae's poultry clusters have the potential to become future resources for other regions.

Targeted support for large and medium-scale poultry producers / key aggregators

While clustering seems to be a promising strategy for PNG's poultry value chain, joint action is crucial to facilitate the development of poultry clusters. Some of the existing bottlenecks, such as lack of electricity and slaughtering houses and cold storage facilities are beyond the capacity of individual small poultry farmers. Local government can play a key role in the provision of public goods essential for clustered private firms (Zhang, 2023).

Since cluster formation is an ongoing process, encountering various binding constraints along the way is to be expected. Thus, the incentives of local leaders need to be aligned with local economic development. If this is not feasible in the short run, a more viable option is to encourage non-government organizations to play a more active role in initiating joint action (Zhang, 2023). For example, developing and expanding producer associations might be needed to lead joint action initiatives.

Clusters typically require only a few specialized service providers, such as those for slaughtering and storage, to cater the needs of small and medium-scale producers. However, attracting these specialized providers may be difficult in the short term. An alternative approach in the near future could involve leveraging existing medium-scale poultry enterprises to offer these services to nearby smaller businesses. This approach is inspired by successful models in other countries, where larger producers often play a leading role by outsourcing orders and providing support services to nearby smallholders (e.g. Bah and Gajigo, 2019; Omondi, 2022; USAID, 2013). While PNG currently has a limited number of medium-scale poultry businesses, a selection is already offering slaughtering and cold storage services. Although leveraging existing medium-scale businesses offers advantages, it also introduces additional complexities. These businesses would need to manage slaughtering, cold storage, and their core production activities, potentially increasing costs and operational challenges.

Finally, reducing barriers to importing essential poultry production and processing equipment is crucial for stimulating production outside of Lae. Our interviews revealed limited knowledge about equipment import procedures among non-Lae businesses, despite their keen interest. Government or NGO assistance in providing information and training on equipment importation could significantly ease this bottleneck. The government could even consider adopting a successful model from Indonesia, where their self-made feed program provided small feed-making machine packages for grinding and pelleting, enabling more farmers to produce their own feed using locally available ingredients (Bulkini, 2023).

Strategies to lower feed cost

Unlike many countries that capitalize on lower prices by importing bulk feed ingredients (e.g., Brazil and USA), PNG lags in this area. A potential solution lies in simplifying import regulations and fostering competition for feed imports. This could allow producers to access more cost-effective complete feed from neighboring countries. Decreasing feed price imports could immediately reduce pressure on medium and small-scale producers, potentially increasing poultry production and aligning with the government's objective of boosting domestic livestock production and achieving self-sufficiency.

While cost-effective local feed resources are widely utilized in many countries, PNG's poultry producers remain largely unaware of this option. Our interviews revealed a heavy reliance on commercially purchased complete feed, with only a few former extension officers incorporating local ingredients like coconut meat, moringa leaves, and cassava flour. To bridge this knowledge gap and encourage adoption,

research institutions can play a critical role. For example, the University of Goroka is currently conducting trials on using elephant (Napier) grass as feed. Additionally, the research can be expanded to include other fermented local agricultural (by)products, such as sweet potato vines, coconut meat, banana stalks, and cassava leaves, which have been studied and successfully employed in nearby Southeast Asian countries. Disseminating research findings through comprehensive information campaigns, guideline formulation and dissemination, and training programs can equip producers with the knowledge and skills to incorporate local feed alternatives into their poultry diets.

CONCLUSIONS

Poultry plays a vital role in PNG's food security and nutrition outcomes, offering a critical source of animal protein to both urban and rural inhabitants. Despite immense potential for domestic production, the sector faces numerous challenges. By applying the growth diagnostic framework, we have pinpointed key bottlenecks hindering the growth of poultry producers of various sizes. Our analysis suggests that cluster development and targeted interventions to address these missing links hold the key to unlocking rapid growth and a more robust poultry value chain in PNG. Furthermore, at the macro policy level, streamlining regulations for importing key feed ingredients can provide a significant boost to domestic feed production.

At more local levels, targeted support is essential to incentivize and support small and medium size producers to increase output. This paper has identified a variety of constraints that are not uncommon to other countries in the region. In doing so, we have provided examples of how other countries have overcome these challenges, including leveraging existing medium-scale poultry enterprises to offer slaughtering and storage services, facilitating import access for necessary equipment for poultry production both online and offline, and expanding research into fermented local agricultural (by)products and dissimilating to incorporate local feed alternatives into poultry diets.

ABOUT THE AUTHORS

Peixun Fang is a Senior Research Analyst in the Foresight and Policy Modeling Unit of International Food Policy Research Institute.

Harry Gimiseve is a research consultant for the International Food Policy Research Institute in PNG.

Rishabh Mukherjee is a Research Analyst in the Development Strategies and Governance Unit of the International Food Policy Research Institute.

Emily Schmidt is a Senior Research Fellow in the Development Strategies and Governance Unit of the International Food Policy Research Institute.

Xiaobo Zhang is a Senior Research Fellow in Development Strategies and Governance Unit of the International Food Policy Research Institute, and Chair Professor of Economics at Peking University, based in both Beijing and Washington, DC.

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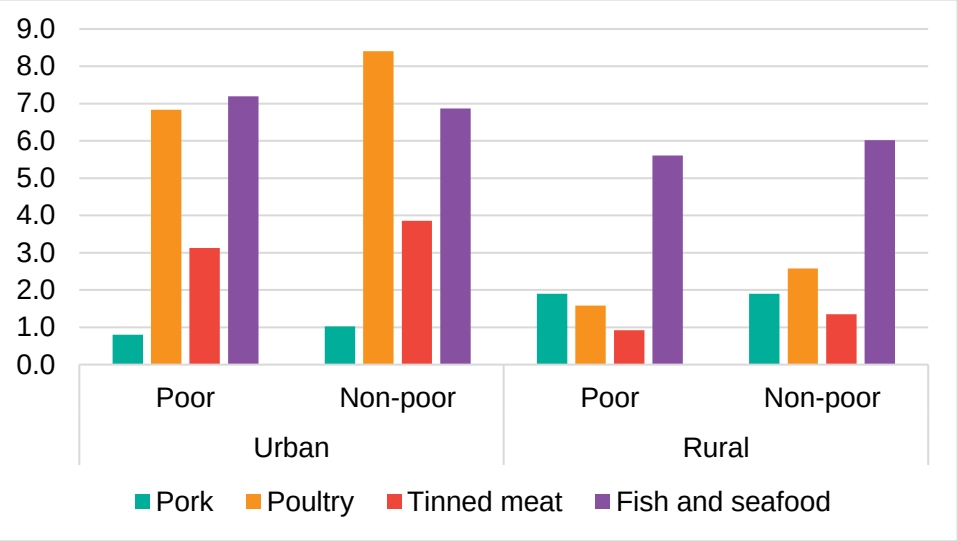
APPENDIX

A1. Additional figures

Figure A: Expenditure share of the main animal sourced food in total food consumption in PNG



Source: Authors' calculations from the PNG HIES 2009/10 survey.

Note: The shares are calculated as the average of the surveyed households. The poor households are defined as the bottom 40 percent of the consumption expenditure distribution and the non-poor are the top 60 percent.

A2. Detailed interview transcripts

[Respondents' names have been replaced with fictitious names to preserve anonymity.]

Interview 1: Small-scale feed producer – Max

Location: Jiwaka Province

Introduction and Basic Information

Max, an agricultural extension officer based in the Jiwaka province, strongly advocates for utilizing local ingredients in the production of affordable poultry feed. After graduating from a reputable college in Papua New Guinea, Max further honed his expertise during a six-month livestock and feed technology training in Australia, followed by a four-month training on rice milling technology in China. These international ventures proved to be enlightening experiences, providing Max with valuable insights into feed knowledge and equipment for livestock farming.

Inputs

Max is presently engaged in an innovative venture on self-formulated feed for village chickens. The ingredients include maize/corn, soybean, cassava, sweet potatoes, sorghum, and fish fingerlings. The experiment has yielded success, evidenced by his chickens attaining comparable weights to those fed with commercial stock feed. Max envisions the potential to market his formula to the nearby poultry farmers in the future. In the near future, he plans to use his homemade feed to raise his broilers and layers so that his broilers and eggs can be cheaper than the others in the market.

The costliest aspect for him would lie in procuring protein ingredients. Although he currently relies on fingerlings from his personal fish pond, the quantity may prove insufficient for large-scale production. Max recognizes the potential for increased soybean cultivation among nearby farmers to meet the demand for plant-sourced protein. Interestingly, he is unaware of alternative protein sources, such as the experimental use of elephant (Napier) grass at the University of Goroka and in the Highlands region. Despite these considerations, Max estimates that his homemade feed is more cost-effective than the commercial stock feed in the market.

In order to elevate the scale of his feed production, Max recognizes the need for machinery upgrades. Currently reliant on a manual mincer, he envisions incorporating a pellet machine to enhance efficiency. Additionally, the labor-intensive hand mixing of ingredients necessitates the acquisition of a mixer, replacing the current manual process. Recognizing the inefficiency of sun-drying, which is susceptible to weather conditions, Max aims to integrate a drier into his production process.

Drawing from insights gained during his international trips, Max not only acquired knowledge about the specific machinery suitable for his needs but also learned effective strategies for sourcing these machines from international suppliers online. This strategic move towards mechanization represents a pivotal step in optimizing his feed production, ensuring consistency, and mitigating the challenges associated with manual processes and weather-dependent drying methods.

Collaboration

Max is enthusiastic about disseminating knowledge regarding livestock rearing, diseases, and feeding practices among nearby farmers. Recognizing a widespread gap in understanding within the farming

community, he has come to the realization that additional training is not only beneficial but also essential to address the existing knowledge deficit among poultry farmers.

Challenges

Max's primary obstacle at the moment revolves around accessing the necessary machinery to scale up production. His approach to overcoming this challenge involves exploring online platforms to procure the required machinery from international sources.

Interview 2: Poultry Feed Producer/Trainer & Poultry Farmer – Gary

Location: Morobe Province

Introduction & Basic Information

Gary is an independent poultry feed producer. Despite having only completed middle school education, he is highly motivated to create alternatives for commercial feed. In 2005, he received training through an Independent Fellowship scheme (Japan) that sponsored him. Before this, he worked as a teacher at a church school for 20 years, where he provided training on nutrition.

The idea of producing his own poultry meal came to him in 2021. To promote his findings and encourage the adoption of the new poultry feed, he published a training guide. This guide instructs farmers on how to make their poultry feed using locally sourced ingredients. He charges 20-50 Kina per person for training. Since 2004, he has trained 6000-7000 farmers. Since he began producing his feed, approximately 2000 farmers have started to follow his methods. He has provided training all over PNG, especially in rural areas of Morobe province, West New Britain, East New Britain, and Bougainville.

Own Poultry Farm

He owns a personal poultry farm where he exclusively feeds the local feed that he produces. Each day, he utilizes 10 kg to nourish 10 village chickens. The highest weight he has achieved for a 7-month layer is 3.5 kgs. To create his local feed, he cultivates cassava on his farm and occasionally purchases it from the market. His primary objective is to educate fellow farmers, and as a result, he refrains from commercially selling his chickens. Instead, he employs the 10 chickens for experiments, testing his feed on them.

Apart from village chickens, he occasionally purchases a box of DOCs from Tablebirds or Chemica. If the day-old chickens become sick, he uses moringa leaves soaked in water, a technique he learned from Japanese trainers during his fellowship. This remedy is administered when the chickens experience diarrhea. In the initial stages, out of 52 chickens, only 4 died—two in the first week and another two in the second week. However, after the third batch, he has experienced no mortality.

To maintain warmth for the DOCs, he utilizes kerosene lamps and solar bulbs. Rainwater serves as the water source to feed the chickens. He obtains sawdust from the timber mill, spending 4 Kina per bag. Transportation costs for acquiring sawdust are nonexistent since the sawdust provider is near his house. As an alternative to sawdust, he also utilizes sun-dried banana leaves to prepare the chicken bed.

Cleaning the chicken house every 5 days involves changing the leaves and cleaning the litter. The waste is repurposed as manure for his garden. When he sells his chickens, it takes approximately 3 weeks to sell the entire stock.

Local Feed

To produce a 10 kg bag, he incurs a cost of 30 Kina. The primary protein source is fish bones obtained from the fish mill. The coconut industry cooperation supplies him with their waste, which he utilizes to create the local feed. He initiates feeding starters to his chickens for the first 2 weeks, after which he blends finisher and local feed for the subsequent two weeks. He employs the starter produced by GFI and finisher by Tablebirds. Although he has sold his local feed for 45-50 Kina per box, it's important to note that selling the feed is not his primary motivation.

Challenges

For him to expand training, he requires additional funds. He employs a meat mincer to palletize the local feed. His fellow farmers, who are his students, have frequently complained about the availability and cost of the meat mincer. As a poultry farmer, he highlights the challenge of increasing feed prices.

Future Goals

He wants to have his own farm or a training center where he disseminates his knowledge to other poultry farmers. He wants to expand knowledge not just for poultry but other livestock too.

Interview 3: Small-scale feed producer – Alex

Location: Eastern Highland Province

Introduction and Basic Information

Alex is a crop farmer and also enthusiastic about poultry and fish farming. He got a 6-month scholarship in Rabaul Business Studies Institute (in partnership with University of Natural Resources & Environment) to learn about chicken and fish farming, as well as making chicken and fish feed. After the program, Alex delved into feed formulation trials, resulting in the development of six distinct feed types utilizing locally accessible ingredients. He plans to produce them on a commercial basis in the coming year.

Inputs

The main ingredients he used for his feed formulation trials include cassava, sorghum, elephant grass, Highlands pitpit, fish meal, and rice bran, among which only fish meal was purchased from input shops, and the others are mostly from his own garden.

Rice is increasingly being cultivated in Goroka and the highlands, so Alex can source rice bran at the DAL office in Goroka where they mill rice for small growers. Alex was suggested by the Natural Resources Division of the Eastern Highlands Provincial Administration to use elephant grass in his feed formulation,

Looking ahead to commercial production, Alex envisions sourcing ingredients from local farmers. Collaborative agreements with out-growers have been established, ensuring a consistent supply of key components, including sorghum, cassava, elephant grass, Highlands pitpit, and soya bean. Seeking a robust support system, Alex has reached out to his extended family, clan, and tribal network.

In addition to the feed ingredients, the other important inputs that Alex has invested include machinery, (3-phase) electricity and chicken sheds. Alex's commitment is evident in the substantial investment of over 44 thousand Kina in these critical resources. His acquisitions, including 2 pelletizers, 1 hammer mill, 1 ingredient mixer, and 1 incubator, were predominantly sourced from Project Support Services in Lae, with the information gained through the National Fisheries Office in Goroka. The inclusion of a solar dryer house for feed drying further highlights Alex's dedication to innovative and sustainable practices. The source of the funding is mainly from his own crop farming.

Marketing

Alex estimated that the price of his feed can be about 15 to 20 percent lower than the commercial stock feed. He plans to mainly serve the local nearby poultry farmers in the beginning.

Training

Apart from the 6-month scholarship at the Rabaul Business Studies Institute, Alex has actively sought additional training in poultry farming. Notably, he participated in a two-week training program in Goroka, generously funded by the local MP. During this program, participants were instructed on the intricacies of producing local stock feed.

During these sessions, Alex gained valuable insights into the advantages of pelletizing feed. Convinced of its merits, he recognizes that pelleting serves as a transformative process, compacting all the ingredients into granules. This not only enhances the feed's quality but also facilitates easy packaging and marketability. Alex's commitment to ongoing education underscores his dedication to adopting best practices and optimizing his poultry and fish farming endeavors.

Challenges

Alex has identified finance as the primary hurdle in scaling up his production. While possessing nearly all the necessary machinery and having honed his feed formulation, he remains challenged by the financial aspects of expansion. Despite this obstacle, his confidence remains unwavering, grounded in the wealth of experience accumulated through years of dedicated trial and research. Alex's resilience in the face of financial challenges reflects his commitment to advancing his poultry and fish feed enterprise.

Interview 4: Poultry farmer – Don

Location: Morobe Province

Introduction and Basic Information

Don, a former out-grower and contract farmer for Tablebirds, began his journey back in 2008, starting with a traditional sago chicken house. In 2020, he made significant upgrades to his chicken operation,

covering his chicken shed with an iron roof and installing a power supply in the area. The construction of the new house cost him a total of 70,000 Kina. Unfortunately, that same year, the out-grower program was terminated, resulting in substantial financial losses. To fund the construction of the chicken shed, Don had taken a substantial loan of 40,000 Kina from the bank, a debt he's still working to repay three years after the program's closure.

When he initially began as an out-grower, he managed 600 birds. After establishing the new house, he completed four cycles, raising 2,000 birds in each cycle. Now that the program has ceased, he manages his own poultry farm, raising eight boxes (about 400 birds) of chickens in staggered intervals. He acquires four boxes every three weeks, followed by another four boxes in the subsequent three weeks. Despite having enormous space for more chickens, his production remains limited due to cash flow constraints, outstanding liabilities that affect his working capital expenses, and the limited number of chickens he could market.

Input and Production

He uses GFI feed as a food source for his chickens. For 1 box of DOCs, he acquires 3 bags of starters and 3 bags of finisher. Sometimes, he mixes cassava flour with his feed to save on the cost of purchasing excess feed. Other times, he incorporates lendro and cassava leaves into the feed. He spends 133 Kina on each starter and finisher, buying 8 bags for one cycle. The PMV charges 20 Kina for transporting 8 bags and 10 Kina for a round trip. In total, he spends 30 Kina on the transportation of stock feed from the store to his farm.

He uses pure water to feed his chickens and has an automatic water system that he installed when building the chicken shed.

For his 400 birds, he constructed a chicken house on a platform using wires because he believed that his chickens were getting sick from the soil. However, by doing that, he didn't see any reduction in the mortality rate.

In his chicken house, he has designated a small area for brooding where he places his DOCs for two weeks. To keep them warm, he uses two kerosene lamps and an electric bulb. However, this is not sufficient for 200 birds. Blackouts are common in his area, and if there is a blackout, it takes about 1 week for the power to be restored.

Don went to school till Grade 8.

Chicken Sales

He primarily sells chickens at the Lae main market and within the local community. Approximately 70% of his stock is sold at the market. It takes him 1 week to sell 200 chickens. He uses string bags to transport the chickens, taking 3 bags for each market visit. The cost of transporting each bag is 5 kina, one-way bus fare is another 5 kina, and the gate fee is 10 kina. Therefore, the total cost of selling 30 chickens in the market is 35 Kina.

He sells the chickens at the market for 35 Kina, and the lowest price he can set is 25 Kina.

He spends 2500 Kina for 150 birds, covering various expenses such as the cost of feed, transportation, DOCs, and more. Out of the 150 birds, 10-15 die, and he typically sells around 130 birds, resulting in a profit of 2000 Kina per cycle. If the mortality rate is high, he manages to earn a profit of 1500 Kina.

Chicken Rearing

Recently, he noticed that out of 400 birds, 150 of them died. This has been occurring recently, and he is still trying to determine the cause of death and possible solutions to reduce the high mortality. The deaths typically happen in the 4th or 5th week of the cycle, and he suspects that diarrhea might be the cause. He obtained medicine from Chemica, which has helped him reduce the mortality rate to some extent, at a cost of 60 Kina. It's the first time he has experienced such a high mortality rate, and so far, he hasn't sought assistance to address the issue. As a potential solution, he is trying to slow down his production. Instead of getting 8 boxes, he now gets 4 boxes of DOCs, and he mentions that out of 200 birds, only 30 died. However, the timing of mortality remains consistent, occurring more often at the maturity stage.

He also faces challenges with predators, especially cats. When the chickens are young, he sleeps near the brooding area for the first two weeks to protect the chicks from cats or snakes. This strategy was recommended by Tablebirds, which he continues to follow.

Additionally, after cleaning the chicken house, he uses the manure for his vegetable garden.

Training

He received all his poultry-related training from Tablebirds' agricultural extension workers, who used to visit his farm and assist him with day-to-day activities. Over the years, he has acquired knowledge about chicken feed, maintaining the right temperature for DOCs, and the essential activities required for raising chickens.

Challenges

High mortality and transportation issues to the market pose significant challenges for Don. There are instances where the PMV fails to pick him up, preventing him from reaching the market to sell his chickens.

While he is open to the idea of renting out his chicken shed or converting it into a hostel for visitors, his current financial situation doesn't allow for these options. The burden of repaying his loan is mounting, putting him under substantial pressure.

Interview 5: Poultry Farmer – Frank

Location: Gabensis, Morobe Province

Introduction and Basic Information

Frank started on his poultry-raising journey in 2019 with just one box of DOCs. Through the years, he has progressively expanded his poultry production and now manages two boxes of DOCs in one cycle. Before becoming a full-time poultry farmer, Frank worked as an extension officer for Tablebirds, contributing to their out-grower program and got paid 900 kina for two weeks. His responsibilities primarily involved training out-growers who raised chickens and supplied them to Tablebirds. Given his background, Frank possesses a distinct knowledge advantage and is well-versed in the technical aspects of chicken rearing. He holds a college degree from the University of Technology in Lae.

The out-grower program was terminated because of feed and chicken loss. Tablebirds used to supply DOCs, stock feed, and other essentials to out-growers. However, due to farmer inefficiency and increasing costs, Tablebirds discontinued the out-grower program in 2020. Due to the job loss, Frank made the decision to launch his own poultry business.

Input and Production

Frank raises his chicks in an outdoor chicken house located adjacent to his residence, providing space for up to 100 birds. He relies on the community water supply to provide water for his chickens. Frank sources his DOCs from Chemica, with each box of DOCs typically costing him 250 Kina. However, during the Christmas season, the price rises to 300 Kina per box. The journey to the Chemica store from his farmgate takes approximately 40 minutes, and he pays a one-way bus fare of 5 Kina for his commute. He usually waits for 20-30 minutes along the road to catch the bus or PMV.

For chicken bedding, he uses sawdust, which he acquires for free from local individuals involved in timber cutting.

As for chicken feed, he primarily utilizes starter and finisher, with costs amounting to 133 Kina and 129 Kina per bag, respectively. He typically visits the Chemica store twice a month to purchase the feed bags. When buying feed bags in bulk, he enlists the assistance of carriers to load the bags onto the bus, paying them 2 Kina per person for their help. To feed two boxes of DOCs, he requires 4 bags of starters and 4 bags of finisher.

Additionally, Frank sometimes supplements the feed with grated coconut. However, he doesn't use cassava as he neither grows it in his garden nor specially buys it from the market for mixing it with the feed. He began mixing coconut with the feed in 2019 and acquired the knowledge of mixing alternatives like cassava flour and coconut waste with the feed at the NARI agricultural show.

Sale

For selling his chickens, Frank relies primarily on his community and neighbors. He places a sign in front of his house to signify his intention to sell his chickens. In cases where he encounters difficulty selling his stock within his community, he transports the unsold chickens to the Lae market. Typically, it takes him 2 weeks to sell 100 chickens, but with access to a vehicle, he can accomplish the sales in just 1 week.

When he ventures to sell his chickens at the Lae market, Frank hires a PMV for transportation. He utilizes string bags in which he can conveniently carry 6-8 birds at a time. The overall transport expenses encompass the cost of the PMV fare and the string bags. Specifically, transporting each string bag costs him 6 Kina, and his bus fare amounts to 5 Kina.

When he wants to consume his own chicken then he pays for himself separating the business with the personal consumption.

For each cycle, his revenue is 3000 Kina, his total cost of raising 100 chickens is 1800 Kina which gives him a profit of 1200 kina. Each year he does 5 cycles.

He sells each chicken for 40 Kina and the sale price has increased over the years. A year ago, he sold his chicken for 30 Kina. Due to rising feed cost, the farmers are also increasing the price at which they are selling.

He usually sells his chicken on a cash and carry basis, however he sometimes sells them on credit only to those who he trusts.

Chicken Rearing

He observes a 5% mortality rate among his 100 chickens, primarily due to heat stress. When he notices a chicken is ill, he separates it from the others for treatment. He usually buys medicines for this purpose, but at times he relies on home remedies. The medicines he procures come from Chemica, and they are specifically recommended for starter birds.

To keep the DOCs warm, he uses kerosene lamps and solar lamps in the brooding area, as his house lacks access to electricity. Every two weeks, he cleans the chicken house and uses the litter as manure in his vegetable garden.

Training and Association

He received training during his employment days at Tablebird. He is well versed in taking care of chickens. He is not a part of any poultry association and neither has a common whatsapp group that connects all poultry farmers. Nearby farmers come and ask him questions regarding poultry raising. Currently he helps 5 farmers in his community.

Biggest Challenge

He is concerned about the mortality rate and expresses the availability and accessibility of medicines as a challenge.

Expansion

He wants to expand production and may plan to rent his neighbors chicken shed provided he has a good sales contract and money to initiate the business.

Interview 6: Poultry Farmer – Mason

Location: Morobe Province

Introduction & Basic Information

Mason is a poultry farmer who embarked on the journey of raising broilers in February 2023. Before venturing into poultry farming, he resided in Goroka and operated a roadside market. Following his relocation to Nadzab, his wife's family residence, he decided to start his poultry farm. As a newcomer in the poultry farming business, he initially purchases only one box of DOCs from a nearby Chemica store. Remarkably, it takes him just two weeks to sell the entire stock, providing him with a rapid turnover.

Input and Production

Recognizing the burgeoning demand for chicken in his community, he decided to establish his own poultry farm. He sought invaluable advice and guidance from a nearby neighbor named Frank, who had previously worked as an agricultural extension worker with Tablebirds. With Frank's assistance, he kickstarted his poultry venture, and it took him two weeks to construct his chicken house. He cleverly used

the leftover materials from the construction of his new house in Nadzab for the chicken house construction, significantly reducing the costs. The roof, for instance, amounted to approximately 100 Kina. To maintain a warm environment for the DOCs in the chicken house, he acquired a yellow canvas from Chemica. When he receives his DOCs, he lays down the yellow canvas, effectively blocking the wind and ensuring their comfort.

For the first two weeks of their lives, the DOCs are housed in a designated brooding area, and by the third week, they are transferred to a larger section of the chicken house. To keep the chickens warm, he relies on kerosene lamps.

The procurement of DOCs costs him 250 Kina per box. He exhibits a preference for Tablebirds' DOCs over Zenag's, although due to high demand, Tablebirds are not always available. In such instances, he opts for Zenag.

When it comes to feeding his chicks, he favors Flame, a product produced by GFI, which he conveniently purchases from Chemica. He hops on PMV and goes to the town to buy the packets of Flame. To feed a single box of chickens for one cycle, he utilizes five bags of feed: two bags of starter and three bags of finisher. Starters are priced at 133 Kina per bag, while finishers cost him 127 Kina per bag, with each bag weighing 40 kilograms. For the bedding in the chicken house, he procures sawdust from a nearby timber mill at no cost.

Sale

He initiates the sale of his chickens at the beginning of the 6th week, primarily targeting residents within his community. To ensure the local population is well-informed about his offerings, he displays a prominent notice board featuring the sale prices for each chicken. Typically, it takes him around two weeks to successfully vend his entire stock. Initially, his chickens were priced between 30-35 Kina, but owing to the escalating demand, he has adjusted his pricing to a competitive 40 Kina per chicken. He generally adheres to cash-and-carry transactions, extending credit terms only to individuals he trusts. Remarkably, if he personally consumes the chickens he produces, he compensates himself, underscoring his diligent accounting practices.

While his primary sales occur within the local community, he is prepared to transport his chickens to the central market in Nadzab if he perceives a limited demand locally. Consequently, irregular demand presents one of the challenges he grapples with. The cost associated with chicken transportation is an additional expense, necessitating the prompt sale of his chickens to maintain their quality without incurring extra feeding costs.

In the span of one cycle, he can accrue earnings in the range of 2000-2500 Kina through chicken sales, translating to a net profit of approximately 1800 Kina (Need cross-check). Over the course of a year, he can execute 5-6 production cycles.

Chicken Rearing

When asked about the mortality rate, he indicated that out of 50 birds, only two typically die. In cases where he observes illness among the chickens, he segregates the affected ones from the rest of the flock and provides them with separate care. At times, he acquires medication from Chemica, which he administers by mixing it with their drinking water, resulting in the successful recovery of the afflicted birds. Chemica's staff has offered guidance on the proper use of these medications. The cost of this medication amounts to 22 Kina for a 250 ml supply. Additionally, Frank has supplied him with vitamins, which he

disperses by mixing them into the chickens' drinking water. Frank also assists him in establishing feeding schedules and optimizing lighting conditions. For instance, during the first week, he only switches off the light for a one-hour period, gradually extending this to two hours during the second week, and finally four hours during the fourth week of the chickens' growth. In terms of feeding, he provides his chickens with three meals a day. On extremely hot days, he adjusts the feeding frequency to mitigate heat stress among the chickens. As a home remedy, he incorporates sun-dried leandro leaves into the poultry feed, promoting increased chicken weight.

He has gathered knowledge of these home remedies and received training from Frank. His wife, who previously worked for Tablebirds, possesses experience in poultry farming. She actively contributes to Mason's poultry farm, applying the knowledge she acquired during her tenure at Tablebirds. Her training included activities such as egg collection, egg tray arrangement, chicken feeding, and house cleaning. It was her encouragement that motivated her husband to embark on poultry farming.

Mason diligently maintains the chicken house, conducting weekly cleaning. The manure collected from the chicken house is repurposed as fertilizer for their vegetable garden. In the initial two weeks following the arrival of DOCs, he sleeps in the chicken house to protect the flock from potential threats such as snakes or cats.

Challenges

He mentions rising cost of feed and irregularity in demand by customers as his main challenges in raising and selling chickens respectively.

Interview 7: Poultry farmer – Donald

Location: Morobe Province

Introduction & Basic Information

Like many poultry farmers in his region, Donald started his poultry farming journey as an outgrower with Tablebirds in 2011. He used to raise poultry for Tablebirds, doing 4-5 cycles per year, starting with 400 birds in each cycle. After the outgrower contract ended, he ventured into poultry farming on his own. Currently, he procures 2 boxes of DOCs per cycle. When he was an outgrower, he used to receive 4000 Kina for each cycle, which was considerably more than what he currently earns as a poultry seller. He now makes a profit of 1000-1500 Kina for 2 boxes of chicks.

Starting from last year, he adopted a schedule of raising 2 boxes of chicks in a 3-week interval. Before becoming an outgrower, he worked as a shedman for Tablebirds, which provided him with the necessary training in chicken farming. Originally from East Sepik, he migrated to Lae in 1997 and purchased land there to build his house and the chicken shed.

Input and Production

He procures boxes of DOCs from the Tablebirds outlet, located 9 miles away from their home. They buy the DOCs for 230 Kina per box at the outlet, which is 20 Kina less than the price retail stores offer. The family spends 10 Kina for the round trip to visit the outlet.

He houses his chickens in a chicken shed that he built when he was an outgrower. He constructed the house using his own savings and did not take out a loan. The total cost of building the house in 2018-2019 was 70,000 Kina. Before 2018, he used to raise his chickens in a traditional sago leaf roof house. Since he is not using the full capacity of the chicken shed, he is looking for tenants who can rent the space. A medium-scale poultry business nearby has expressed interest in either renting their chicken shed or potentially collaborating to have them as an out-grower.

He prefers to buy GFI Flame feed. For 100 birds, he uses 7 bags of starter for the first 5 weeks and 1 bag of finisher for the last week. He believes that the essential nutrients to increase the size of the birds are found in the starter, while the finisher helps add meat to the chickens and maintains their condition. He reached this conclusion through his own trials and experiments aimed at optimizing feed use. To purchase the feed, he spends 5 Kina for a one-way trip and travels for 30-40 minutes. They do not mix any other ingredients with the commercial feed because they are concerned that it might harm the birds.

When his chickens are ready for sale, they typically weigh between 2-2.5 Kgs.

To prepare the chicken bed, he uses sawdust obtained from the local timber shopping area. He purchases one bag for 4 Kina and prefers to buy the sawdust bags in bulk, for which he hires a PMV. He spends 40 Kina for one load of 60 bags.

Their water source is a nearby well.

Chicken Rearing

To keep his chickens warm, he uses three kerosene lamps for 100 birds. During the first two weeks, either he or his wife sleeps inside the chicken shed to protect the birds from potential prey attacks and to maintain a warm temperature. Additionally, they have three dogs to scare away thieves and other animals like snakes or cats. These dogs are fed with dead chickens.

When he and his wife observe that their birds are sick, they identify and treat them separately. He has experienced a high rate of mortality in the last 2 months, which is why he changed his raising interval from 3 to 4 weeks. This change has reduced the mortality rate to less than 5%. During his time as an aggregator, his birds had a mortality rate of 8%, which was 1% above the company's cutoff limit. The main causes of chicken death are heat stress and diarrhea.

He does not hire outside labor to work on his farm because he fears they might steal the feed or the birds. It is mainly him and his wife who take care of the chicken house.

Sell

He sells the chicken for 30-35 Kina, and has even gone as low as 25 Kina to sell them. He is not concerned about the volatility of prices, as he is comfortable with what he earns from chicken sales. This suggests that the farmer is financially stable and may have other sources of income on which he relies. When we asked him about this, we learned that he owns a second-hand 15-seater bus, which he rents out with a driver to provide transportation services in and around Lae. He purchased the bus for 50,000 Kina.

He mainly sells the chicken at the Nadzab market, and it takes him 6 days to finish selling 100 birds. He uses a wheelbarrow to transport the chickens to the main market, which takes him 15-20 minutes. He takes 15 chickens per day. Usually, he sells the chickens on a cash-and-carry basis, but he seldom

sells them on credit, only to those he trusts. It takes him the whole day to sell 15 chickens, and he incurs a 5 Kina gate fee to set up his stall.

One of the selling challenges he mentioned is facing high competition. However, his chickens sometimes have an advantage over others because they weigh more, indicating their quality. Out of the 100 birds, 75% are sold in the market, 15% are locally bought, and 10% are consumed by Donald's family.

Collaboration among other farmers

There are approximately 20 poultry farmers in his community. When asked about collaboration with them, the farmer mentioned that he shares information about the source of DOCs and feed, for example, he told them about the outlet. Sometimes, they all discuss topics related to raising chickens. However, this collaboration became less extensive after the out-grower program was suspended. Aside from this, they don't exchange other critical information, sales strategies, or share the cost of transporting feed. The farmers in the community view each other as competitors and operate individually.

It's worth noting that the farmer and his wife do share information about poultry raising with their relatives and friends in their hometown village. They want to educate them so that they can learn how to efficiently raise poultry and prosper.

Challenges

According to them, the cost to raise chicken is quite high.

Interview 8: Poultry farmer (medium scale) – Terry

Location: Morobe Province

Background and the nature of business

In 2009, Terry made a significant life move from Port Moresby to Nadzab, Lae. With a college degree in food technology, he initially ventured into the fish sector. However, a keen observation of the thriving demand for chicken in PNG prompted him to make a strategic decision.

Recognizing the potential in the poultry industry, Terry acquired a 2.5-hectare piece of land in 2011 to establish his own poultry business. He started as an out-grower for TableBirds, pioneering the introduction of poultry farming in the village. Terry's bold step inspired 25 other chicken farmers who also became out-growers in the area. He has become an experienced poultry farmer by learning from the TableBirds extension officer and learning by doing. Yet, fueled by entrepreneurial spirit and a desire for independence, he transitioned from being an out-grower for five years to managing his own poultry business. Terry took charge of the entire process, from slaughtering to marketing, marking a significant milestone in his journey as a poultry entrepreneur.

Equipment, Infrastructure, Input and Production

Land and house

Obtaining a land title proved to be a big challenge for Terry, hindering his ability to leverage the property as collateral for loans from PNG banks. However, he managed to construct various essential structures on his land, including a residence, a chicken shed, a slaughterhouse, a storage facility, and an office.

Initially, Terry managed a flock of around 5000 chickens in his original chicken shed, a structure measuring 16 by 9 meters, featuring a traditional sago leaf roof. In a transformative move last year, he dismantled the old shed and successfully erected a modern replacement. The new chicken shed spans 30 by 9 meters and boasts a durable metal roof. Notably, this contemporary facility stands taller and incorporates strategically placed fans to optimize airflow. This innovative design aims to enhance conditions within the shed, contributing to a healthier environment and ultimately reducing chicken mortality.

Equipment

Terry invested 60,000 Kina to connect his land to the main road's 3-phase power, but persistent power outages disrupted his consistent use of electricity from the grid. To address this challenge, he acquired a smaller generator; however, it proved insufficient to power his cold storage. This dilemma led to occasional difficulties in maintaining frozen chicken, resulting in Terry making significant losses, prompting him to donate the chickens to a local hospital.

In a bid to expand his business and mitigate power-related issues, Terry made a strategic decision to enhance his cold storage capacity. He purchased a much larger cold storage unit with an 18-ton capacity, supplementing the existing 3-ton cold storage. The combined capacity of Terry's cold storage facilities now stands at 21 tons. Additionally, he owns a blast freezer. Notably, all the compressors for these cold storage units are of German origin, sourced through an international online platform that facilitates direct communication with various sellers.

Recognizing the cost-effectiveness of international purchases, Terry acquired a powerful U.S.-branded generator from the same online platform at less than one-third of the price available locally. This platform serves as a comprehensive source for Terry's business needs, including slaughter equipment, packages, and labels. The streamlined process, from order placement to product receipt, typically spans two months for Terry. The platform's local agent aids in customs clearance and transports the products to a Lae-based warehouse, from where Terry can conveniently pick up his orders using a truck.

The professionalism and efficiency of this service have significantly simplified Terry's international equipment procurement. The packages for the chickens incorporate insulation, ensuring freshness for customers residing in distant locations. This design, pioneered by Terry, has been adopted by major poultry enterprises in PNG, reflecting the positive impact of his innovative approach to meeting business requirements.

Inputs

Terry efficiently sources DOCs directly from TableBirds' hatchery, benefiting from favorable terms due to the substantial scale of his purchases. His feed supply is typically procured through the Chemica input store, utilizing his personal car or truck for transportation.

Terry raises approximately 5000 chickens over a cycle of 5 to 6 weeks, followed by a two-week gap before initiating the next cycle. The scale of his poultry operation presents a significant challenge in the form of high feed costs.

In a strategic move to address this challenge, Terry engaged in discussions with an Indonesian feed business interested in exporting to PNG. However, the venture awaits approval from the NAQIA. Terry and the Indonesian business are actively collaborating to secure the necessary permit. If successful, Terry stands to benefit from importing feed at a potentially more affordable rate of about 1.6 Kina per kilogram (pending verification).

Meanwhile, as an interim solution, Terry has explored an alternative by considering feed imports from a Malaysian feed business. This particular business has already obtained the required permit from NAQIA, providing Terry with a viable option at a rate of 2.9 Kina per kilogram (pending verification). The pursuit of diverse sourcing options demonstrates Terry's proactive approach to managing feed costs and ensuring the sustainability of his poultry business.

Marketing

Upon transitioning from being an out-grower, Terry took charge of marketing for his poultry business. Leveraging the power of social media, he utilizes a dedicated Facebook page to efficiently connect and communicate with customers, streamlining the process of supplying chicken.

Terry's poultry business caters to a diverse clientele, with Big Rooster, assorted catering services, and boarding schools constituting its primary customer base. Through his proactive marketing efforts and direct engagement on social media, Terry has established an effective channel for meeting the needs of these key customers, ensuring a steady and responsive supply of poultry products.

Labor and Collaboration

Terry envisions creating employment opportunities for 35 workers from nearby families. Terry opts for a one-worker-per-family approach, aiming to positively impact a broader community. Compensation for managers is set at 5 Kina per hour, while other workers receive 3.5 Kina per hour.

TableBirds discontinued its out-grower scheme approximately two years ago. This led to a pool of experienced out-growers who, despite possessing the capabilities for medium-scale poultry farming, are currently managing smaller flocks, typically around 100 chickens. Recognizing the untapped potential, Terry plans to collaborate with these nearby chicken farmers who were previously part of the out-grower program.

Terry plans to just follow the out-grower program: provide DOCs and feed to these out-growers and buy back the mature chickens, slaughtering the chickens in his dedicated facility, and subsequently offering the processed poultry to his customer base. This collaborative model can allow Terry to potentially extend his supply to larger businesses like supermarkets, enhancing his market presence.

Through this partnership, Terry not only can revitalize the production capabilities of these experienced out-growers but also provides an avenue for them to leverage their poultry knowledge and experience. Additionally, it enables them to utilize the substantial investments they made in idle large chicken sheds. In essence, Terry's approach fosters a mutually beneficial relationship, revitalizing the local poultry community and optimizing the existing infrastructure for sustainable and collective success.

Finance

While worked in a fish-related project in Fiji a few years back, Terry learned about a noteworthy opportunity: the New Zealand government was offering grant funding to small and medium enterprises (SMEs) for business startups. Terry applied by providing comprehensive details about his poultry business. The application process was smooth, and he was awarded a grant amounting to 30,000 Kina shortly after the grant managers visited his poultry farm.

In a recent development, Terry discovered that he qualifies for another grant focused on working capital. This newfound opportunity arises from the fact that Terry's business boasts a workforce of more than 30 employees. The potential sum of 70,000 Kina from this grant holds the promise of propelling Terry's business to new heights, allowing for an expansion of scale and fostering collaborations with additional nearby out-growers. This potential grant not only can enhance Terry's operational capacity but also opens doors for further collaboration and growth within the poultry farming community.

Challenges

Persistent power outages have emerged as a significant impediment to the continuity of Terry's poultry business. The substantial losses incurred due to these outages compelled Terry to temporarily suspend his operations until the installation of a new generator, ensuring a consistent and reliable power supply.

Another challenge confronting Terry's business expansion efforts is the elevated cost of feed. Addressing this challenge requires collaborative efforts from government agencies, including the NAQIA. Facilitating the import of feed from additional countries, such as Indonesia, holds the potential to alleviate the burden on medium-scale businesses like Terry's. This strategic move would not only enhance the affordability of feed but also contribute to the overall growth and sustainability of poultry farming enterprises in the region.

Interview 9: Poultry Farmer – Regina

Location: Morobe Province

Introduction and Basic Information

We interviewed Regina while she was selling her chicken at the Nadzab poultry market. Regina lives just 5 minutes away from the market, where she raises her chickens. She began selling chickens last year and primarily learned her poultry-raising skills from her relatives. She operates her own poultry farm, and every time she visits the market, she brings 20 birds to sell. Her main intention in selling chicken is to earn quick cash to pay her children's school fees.

Input and Production

As a small-scale poultry farmer, she raises 2 boxes of chickens. She purchases both the feed and the boxes of DOCs provided by Tablebirds, which she procures from either Chemica or Farmset. For 100 birds, she gets 5 bags of starter and 4 bags of finisher, both costing around 120-130 kina each. She does not use any other feed and does not mix other ingredients like cassava, coconut, or lendro leaves

with the Tablebirds feed. Additionally, she does not experiment with the water she provides for the birds and ensures it is pure.

She uses sawdust to prepare the chicken bed, spending 3 kina per bag. She purchases about 50-60 bags for one cycle. She uses 2 seats in the PMV to transport the bags from the timber yard to her house, for which she pays a total of 2 kina.

Chicken Rearing

She takes care of the DOCs by lighting the firewood to ensure they are kept warm in the initial weeks. In addition to firewood, she uses solar bulbs to provide more warmth to the DOCs in the brooding area. The mortality rate of her chickens depends on how she takes care of them. She was not aware of the exact number of deaths, but she mentioned that it ranges between 2 and 10. If the birds die in the initial weeks, it is due to cold temperatures, and if they die during the fifth or sixth week, it is because of heat stress.

If she finds her chickens to be sick, she separates them, but she does not provide any medicines to them.

Chicken Sales

Most of her chickens are sold at the Nadzab market. She places the chickens in a string bag and takes the PMV from her house to the market area to sell her stock. The bus charges 1 Kina per person and 5 Kina per bag as a gate fee. She takes 1 week to sell 100 birds. At the market, she spends the whole day selling the 20 chickens. She sells one chicken for 30 Kina but has gone as low as 25 Kina to sell the stock, which usually happens at the end of the day. Her ideal sale day is when she sells her stock in bulk to one buyer, but that is rare.

Challenges

When asked about the challenges, she does not mention any. She is satisfied with her earnings since she considers the poultry business as a quick way to make money.

Interview 10: Poultry Out-grower – Jerry

Location: Morobe Province

Introduction & Basic Information

We conducted interviews with the employees of an outgrower currently affiliated with Tablebird. This poultry business is owned by Jerry but is registered under the name of his wife, Lily. Jerry works as an auditor at a private firm in Lae and holds a college degree from the University of Technology Lae.

The outgrower program with Tablebird was terminated in 2020, resulting in financial hardships for many outgrowers. However, Jerry's outgrower poultry shed remains active and continues to supply chickens to Tablebird. Their contract was extended because Tablebird was satisfied with the production supply and quality. They were one of the very few remaining outgrowers meeting all key performance indicators.

The business was established in 2018 with 12,000 chickens, and over the years, the number of chicken sheds has increased from 1 to 5. Initially, the owner was more involved in the labor aspects of the business. Additionally, they had 8 workers, which has now increased to 11. These workers are Jerry's relatives and immediate family members. Their responsibilities include collecting deceased birds, feeding the chickens, managing the brooding area, raising the birds, and treating them for diseases.

Both Jerry and Lily were new to the poultry business and had no prior experience. They, along with their workers, received training from Tablebird's agricultural extension workers who used to visit them daily, spending 1-2 hours providing guidance. After 2-3 cycles of raising poultry, the family members gained confidence in poultry farming, although extension officers still visit them periodically.

Input and Production

Since the outgrower supplies mature chickens to Tablebird, the company provides them with Tablebird DOCs and stock feed. Each shed contains 12,000 birds for which they use 120 bags of starter, 400 bags of grower, and 300 bags of finisher for a 5-week cycle. They strictly adhere to using only Tablebird poultry feed. With proper feeding, the birds reach a maximum weight of 1.7-2 kgs at the end of the cycle.

To prepare the chicken bedding, they use sawdust, which they obtain from nearby timber mills. It costs them 3 Kina for one bag of 50 kgs. They use around 300 bags of sawdust for each shed. Since they have 5 chicken sheds, they spend a total of 4,500 Kina on sawdust (3 x 300 x 5). Additionally, they hire a PMV to transport the sawdust bags. Each trip to load 1 bag costs them 5 Kina, so they spend 7,500 Kina to load 1,500 bags. The total cost adds to 12,000 Kina (4,500 + 7,500).

They primarily use groundwater as their water source and employ a water pump to extract water. For one cycle, they spend 250 Kina on water supply and an additional 200 Kina for maintenance.

As heat stress is a common cause of bird mortality, they use electric fans when the temperature rises. They have 11 containers of 20 liters of diesel, which costs them 880 Kina for 2 chicken sheds. For 5 containers, it costs around 1,760 Kina. They use a genset due to frequent power blackouts in the area.

Chicken Rearing

The employees mentioned that their bird mortality rate stays under 7%. Most deaths occur either in the first two weeks or during the last week. They provide medicines provided by Tablebird to those that are affected. Common causes of death include diarrhea and heat stress. The medicines are provided for free, and appropriate training is given by the extension officers explaining the usage and dosage of each medicine. No vitamins are provided to the workers.

Each shed contains two fire drums that they ignite using wood pieces. The two drums are effective in keeping the area warm and comfortable for the DOCs. To block the wind, the workers lower the canvas. During the first week, there is always someone awake from 6 am to 6 pm taking care of the chickens.

They have 15 dogs that help prevent attacks from predators. The dogs are fed dead chickens. It was noted that dogs do not attack live chickens because they do not prefer the taste of live blood.

After cleaning the chicken shed every two weeks, they either use the manure in their vegetable garden or dispose of it. The public is not exposed to the chicken shed due to its quarantine status, and as a result, they are unaware of its potential as a source of manure. Excess manure produced is hence wasted.

Sale

Since they have a formal contract with Tablebirds, all the chickens are supplied to the company. They do not sell the chickens through other means or to other customers, and they do not use them for self-consumption. Tablebirds pays the outgrower after every 2 cycles, and it takes 2 weeks for the payment to be processed.

Renumeration to the workers

The owner pays 200-300 Kina to each worker after every cycle. Each worker earns around 1000 Kina for the whole year. When asked if this amount is sufficient for them to survive in Lae, they mentioned that the owner also covers their accommodation and provides support in times of difficulty or financial stress. They consider Jerry as their family leader. The workers migrated from Hagen to settle in Lae and contribute to the family business. Although they all have land in Hagen, they still migrated to Lae to avoid tribal conflicts in their village and gain security under their brother, Jerry. They are satisfied with a lower wage as long as they have security and protection.

To earn additional income, some members sell handmade products like bilums, but this is rare. Primary schooling expenses are paid by individual workers. However, if their child decides to continue higher education, Jerry and Lily take care of that.

Challenges

The workers did not complain or mention any big challenges. Since it is a family business, they consider it very serious and leave no room for mistakes.

Interview 11: Poultry Farmer – William

Location: Morobe Province

Introduction and Basic Information

William, a former outgrower with Tablebirds, initiated his poultry venture with them back in 2009. In 2009, there were only two outgrowers in his community, including him. He got to know about this opportunity via an extension officer. Despite discontinuing poultry operations in 2020 following the cessation of the outgrower contract, he has been patiently anticipating Tablebirds to reinstate the program. In the interim, William hasn't been solely dependent on poultry for income. Managing over 10 cattle, he upholds a family business initiated by his father in the 1960s. The family sells cattle and cattle milk exclusively for monetary gain, refraining from personal consumption. In the absence of a designated cattle market, William waits

for potential buyers. On average, he sells 2-3 cattle annually, fetching a price range of 3000-5000 Kina per head.

In addition to his cattle enterprise, William is a landowner with property spanning up to 3000 hectares. Most of this land is rented, generating monthly rental income from ten tenants. Despite the prolonged consistency in rental rates, William accumulates 100 Kina per month from each tenant, resulting in an annual income of 12,000 Kina. With diversified income streams, the closure of the outgrower program has not significantly impacted William's financial stability.

Input & Production

In adherence to the contract, each outgrower is required to expand their production space, prompting him to construct a shed for chicken farming. He invested 17,000 Kina from his personal savings for its construction in the fiscal year 2018-19. Prior to this, he had a traditional sago house. Presently, he contemplates renting the shed. However, if it remains unrented and Tablebirds discontinues the outgrower program, he contemplates dismantling the shed.

In his traditional chicken house, he commenced with 5000 chickens, lacking prior poultry experience. His agricultural extension officer served as his guide in learning the ropes of poultry farming. Transitioning to the new shed, he could accommodate 4000 chickens.

Chicken Rearing

As a Tablebirds outgrower, they were required to maintain a mortality rate of less than 7%. He consistently met this threshold and generally remained within that range. There were only a few occasions when his mortality rate reached around 10%. Even after transitioning the chickens to the new shed, his mortality rate remained unchanged. He expanded his production with the aim of increasing his earnings while adhering to the company's policies.

Earning

Each cycle, he used to earn between 5000-6000 Kina when he met key performance indicators, and he used to raise 5-6 cycles in a year. While he has the intention to raise chickens for selling in the market, his involvement in other side businesses and additional sources of income keeps him quite busy. Nonetheless, with his current income, he is able to adequately support his family.

Interview 12: Poultry Farmer - Diana

Location: Morobe Province

Introduction and Basic Information

Diana, a poultry farmer, acquired her poultry-raising skills from her mother who did poultry farming for 20 years. Diana purchases two boxes of DOCs and raises them for a single cycle that lasts for 6 weeks, completing approximately five cycles within a year.

Input

As soon as the DOCs arrive and are placed in the brooding area, she positions kerosene lamps around them to provide warmth. Sometimes she also uses light bulbs to give them additional warmth; however, if there is a blackout, kerosene is preferred.

She feeds her chicks with starter and finisher, both sourced from the Flame brand by GFI. A bag of starter, weighing 40 kgs, costs her 120 Kina, while a bag of finisher, also weighing 40 kgs, is priced at 135 Kina. Typically, for 2 boxes of chickens, she utilizes 4 bags of starter and 3 bags of finisher.

In addition to commercial feed, she occasionally incorporates other items such as ripe bananas, grated cassava, and scraped coconut into the chickens' diet. This practice, passed down by her mother, involves experimenting with various ingredients to optimize the birds' nutrition.

Diana procures her DOCs from Zenag, as she had previously experimented with Tablebirds' chicks and was dissatisfied due to their high mortality rate. She now pays 250 Kina for one box of chickens, which includes 50 chicks. Notably, this price has increased from approximately 200 Kina two years ago.

She purchases the feed and the DOCs on a cash-and-carry basis from Zenag. Initially, Zenag required her to use a card for payment, but this instruction has changed, and they have relaxed their guidelines regarding payment.

In addition to providing feed, she ensures the chickens have access to water. She receives a water supply and pays 1.5 Kina for every ton of water. The water is changed every 5-7 days.

She also sources sawdust from nearby timber cutting areas to create bedding for the chickens, which costs her 6 Kina per bag of sawdust. For each cycle, she uses approximately 15 bags of sawdust and recycles it for one week

Transporting Feed

She generally takes the bus to buy the commercial feed. She pays 1 Kina per person and the bus fare is 1 kina.

To use alternatives as feed, she spends 30 Kina for 1 cycle for all ingredients. She does not plant this crop on her main land.

While buying the sawdust, she hires a vehicles. The vehicle charges hik 20 Kina as bus fee and 150 Kina for storing chicken.

Chicken Rearing

When inquired about the mortality rates, she explains that out of 100 chickens, only 10 of them die. She goes on to note that the lack of vaccination and inadequate care are factors that contribute to the mortality rate among the chickens. Farmers in her community do not have access to veterinary services, nor do they possess knowledge of medicines suitable for chicken health. In the event that a chicken falls ill, the only measure they take is to isolate the sick chicks from the healthy ones. If surrounding poultry farmers face some disease issue, they rarely seek help or advice from nearby poultry farmers. Competition among farmers does not allow them to share their chicken rearing strategies.

She and her household members clean the chicken house once a week, which takes them approximately 1 hour for a thorough cleaning. They utilize chicken manure as compost for their village garden or occasionally provide it to other farmers at no cost.

In addition, during the initial stages of the cycle, the chicks are vulnerable to weather conditions and potential prey attacks. As a result, household members check on the chicken farming venture 5-6 times a day to ensure the well-being of the chicks.

Earnings and Expenses

Her total expenses for raising the chickens, including the purchase price of the DOCs and the cost of feed, amount to 1400 Kina. The total revenue she receives from the sale of 2 boxes is 4160 Kina. Out of every 100 chickens, approximately 4-5 chickens are consumed for personal use. It's worth noting that if any chickens die, it typically occurs during the first week.

Chicken Sales

The household primarily advertises the sale of chickens by placing a notice in front of their residence, informing neighbors and local community members of the available poultry. In addition to this method, they also market their chickens at a local marketplace. At the market, it takes him 2-3 hours to sell the chicken stock for that particular day. She sells 70% via home orders and 30% at the market. To sell 100 chickens, she needs 2-2.5 weeks. When they reach the 8th week, they buy 2 more boxes of chickens.

They typically price their chickens at 35-40 Kina, although, in recent years, the selling price has risen due to the increased costs associated with feed. Some sellers in the area now ask for 45-50 Kina for their chickens.

The most recent sale of chickens took place around 6 months ago. This extended gap in sales was partially caused by numerous credit-based transactions, where buyers delayed their payments. Unfortunately, this delay in receiving payments constrained her ability to continue poultry farming. Many of her buyers, including relatives, did not settle their debts immediately.

Training

She has not received formal training in poultry farming, and she is not a member of a poultry farmers' association. Nevertheless, they are part of a poultry WhatsApp group through which they share information with other members.

Challenges

Firstly, she is deeply concerned about her outstanding income from her debtors, particularly her relatives who do not make immediate payments. Secondly, she pointed out that the cost of feed is high, which in turn affects the overall input costs, making the cost of DOCs high.

Market Upgrade

Depending on the finance, she wants to raise more chicken.

Interview 13: Poultry farmer – Terry

Location: Eastern Highlands Province

Background and the nature of business

Mr. Terry fulfills his role as a dedicated government official, concurrently overseeing a recently established guest house managed by his family. Beyond their primary endeavors, the Terry family has also immersed themselves in the realm of poultry farming, a venture initiated a decade ago. This foray into poultry farming was facilitated by amiable neighbors generously imparting their seasoned expertise in the intricacies of this agricultural pursuit.

Production

Mr. Terry's family totally raise 2 batches of chickens (about 100) in the current living house, with 1 batch younger and the other batch older. They also raise another 2 batches of chicken in the village house.

They pay 250 Kina for each batch of chicken (52). About 40 to 45 chickens can survive (about 85% mortality rate). They pay 138 Kina/bag for the Flame (Goodman Fielder International) feed. They use 3 bags of starters and 3 bags of finishers in per batch of chicken per cycle (6 weeks). The total cost is about 1090 Kina/batch.

Marketing

They sell all chickens to nearby neighbors at 35 Kina/chicken. The total revenue per batch is 1500 Kina, with the profit being about 400 Kina. They feed their own family with 1 chicken per week or fortnight.

Interview 14: Poultry farmer - Seth

Location: Eastern Highlands Province

Basic information about the poultry farm

Approximately two years ago, he embarked on the journey of poultry farming. Prior to this venture, he was deeply involved in agriculture, cultivating vegetables and coffee that found their way to the bustling market in town. Presently, he assumes the role of a farm assistant, collaborating with Mr. Harison, a distinguished research scientist and plot manager at the University of Goroka. Guided by Mr. Harison's expertise, he delved into the intricacies of poultry farming, ultimately establishing his own flourishing enterprise. The decision to diversify his income streams motivated his foray into this new field.

Focusing exclusively on broiler chickens, he has chosen not to delve into the realm of other poultry, such as layers for egg production. In the course of our conversation, it came to light that the proceeds from his chicken sales serve a crucial purpose – covering the school fees for his children. Although contemplating an expansion into an egg-laying business has crossed his mind, the requisite capital remains a hurdle he currently lacks the capacity to overcome.

Input purchase/ volume

He follows a standard 6-week cycle in which he acquires two boxes of DOCs. Each box typically contains around 52 chicks, with a couple of extra chicks included to account for any that may perish prematurely. Every four weeks, he welcomes a fresh batch of DOCs. After the initial three weeks, the chickens are relocated from the chick brooder to a raised chicken coops in the same room. The chicken house is then restocked with a new batch of DOCs, and the cycle begins anew.

The chicken house is cleaned after every 3 days. The feces is cleared out and is used as manure for his home garden. He learnt that frequent cleanup is necessary to maintain hygienic environment for the chicken. Excessive ammonia buildup can worsen chicken's health that can make them sick.

He pays 240 Kina for 1 box of DOCs.

Feed Supplier

He sources his feed from local input shops such as Farmset and Chemica, both situated in town. One pressing challenge he faces in his poultry business is the rising cost of feed. Currently, he pays 140 Kina for a 40 kg bag of feed. To provide more specific figures, the starter feed now costs around 145 Kina per bag, while the finisher feed is priced at 138 Kina per bag. Consequently, he's actively exploring alternative feed options for his chickens.

In a 6-week cycle, he typically consumes 2.5 bags of starter feed and 2 bags of finisher feed. As a cost-effective alternative, he blends cassava flour with the finisher feed, mixing approximately 15-25 kgs of cassava flour into the mix. He produces this cassava flour from the cassava he cultivates in his own garden, which he then grinds into a fine flour. In cases when his own garden's cassava production is insufficient, he purchases approximately three heaps of cassava, with an average cost of around 2 Kina per heap.

He has never bought feed on credit and always pays upfront cash. He has never coordinated with other poultry farmers for group orders.

Cost of Transporting Feed

He lacks a specific arrangement with a designated transporter to facilitate the delivery of his feed from the supplier to his farm. Instead, he relies on the PMV bus, traveling to the town to purchase the feed himself. The transportation cost amounts to 4 Kina per bag (comprising 2 Kina per bag for transportation and an additional 2 Kina for the bus fare). The bus drops him off, along with his bag of feed, at the nearest main road. He enlists the help of his children to retrieve the feed bag from the road and transport it to his farm, for which he pays 5 Kina per person per bag. Consequently, the total transportation cost for him comes to 9 Kina per bag.

He normally pre-orders chicken feed in advance. The pre-order is placed 2-3 days in advance.

Chicken Rearing

Mr. Seth serves as the primary caretaker for the chickens. However, when he is away for work, his wife takes over the responsibility. Upon their children's return from school, they assume the task of cleaning the chicken house and removing the feces.

To ensure the chickens' health, he adheres to all standardized health management practices recommended by his mentor, Mr. Harrison. Although he doesn't vaccinate his chickens, he employs other remedies to maintain their well-being. For instance, he prepares a mixture of garlic and grated ginger in boiling water, which he provides to the chickens. This practice has proven effective in keeping the chickens healthy and promoting weight gain. He mentioned that out of 2 batches of DOCs, only 3-4 typically do not survive. Most of the death happened in the first a few days. Moreover, he has not encountered any cases of diarrhea or other illnesses among his chickens.

Chicken Sales

Both the husband and wife share the responsibility of selling their chickens. They offer live chickens for sale to customers and also sell cooked chicken. Their most common customers are neighbors and local schools, all conveniently located nearby. Since the customers are in close proximity, they typically come to their house to pick up their orders. In cases where delivery is required, the husband personally delivers the chickens, and the customer covers the transportation cost.

To promote their sales, they often advertise by posting notices with contact information on the school notice board. During high-demand periods, such as weddings and graduation functions, they can sell an entire batch of chickens within a week. Typically, it takes about three weeks to sell the entire batch. For chickens that are still available and are in their ninth week, they switch from feeding finisher feed to providing food like sweet potatoes and cassava. Additionally, to facilitate quick sales, the wife slaughters the chickens, cuts them into 40 pieces, cooks the meat, and sells each piece for 1 Kina, an option favored by consumers.

They sell their mature live chickens at 40 Kina.

Training/Information

Although there are training and workshops arranged for poultry growers, he does not frequently attend them. He attained all his knowledge and training by observing others and learning from his mentor/boss. He is not a part of any poultry farmer association. However, he has a whatsapp number and a part of whatsapp group to attain critical information about the poultry business.

Challenges

Following are the challenges mentioned by him:

i) Rising feed cost and volatility in feed prices
ii) Lack of continuous power supply / electricity shortage : Due to power outage, he needs to use alternatives like usage of solar lamps, kerosene lamps and burning wood to maintain warm temperatures for the chicken house

Market Upgrade

He plans to expand his business by adding more chicken house, however it would take time for him to achieve his goal. He does not plan to borrow money and rather rely on his own savings for expansion. Land is not an issue for him, however he would need to purchase cement and other material to build concrete floor and roof.

Interview 15: Poultry farmer - Ben

Location: Morobe Province

Introduction and Background Information

Ben serves as a secretary at the Lutheran Development Service and Yangpela Didiman, a collective of agricultural extension workers. The organization is committed to offering training to farmers across various fields, including poultry farming. During our visit to learn more about their training initiatives, we had the opportunity to engage with Bonnie, who occasionally raises chickens.

Production

Ben manages his poultry farm independently, raising 2 boxes of chickens intermittently, primarily for generating quick cash. He sells the chicken manure to the Didiman organization, using the earnings to purchase feed. During each cycle, he accumulates 2-3 bags of manure, selling each 50 kg bag for 50-80 Kina. Routine cleaning of the poultry house takes place every 4 weeks.

His cycle involves overseeing 50 birds, for which Benprefers Tablebirds for acquiring DOCs (DOC). He exclusively relies on GFI feed, utilizing both starter and finisher without incorporating any local ingredients. He administers starter for the initial 4 weeks and switches to finisher for the remaining 2 weeks, consuming approximately 4-5 feed bags per cycle. While he favors GFI feed, he is adaptable to any available stock feed. Transporting feed from the market to his farm costs him 3 kina per bag, amounting to 6 Kina for 4-5 bags.

Ben and his wife jointly manage the poultry farm

Chicken Rearing

To ensure the DOCs stay warm, he covers the brooding area and employs bulb lights, opting not to use a kerosene lamp. For the chicken bed, he utilizes sawdust, dried grass, and wire.

Sales

He sells the chickens within his community, juggling this alongside the other job. It typically takes him 2 weeks to sell his stock. He places a notice in front of his house to inform his neighbors about the sale. Checking prices with other sellers, he ensures that his prices align with the market rates. Additionally, local farmers exchange disease control information among themselves.

Challenges

He highlighted two primary challenges: recovering payments from credit sales and high mortality rates. From a batch of 50 birds, 6 usually don't survive. If he sees his birds are sick, he does not do anything to cure them.

Additionally, he faces theft problems concerning both chickens and feed. When he can't obtain boxes of DOCs from retail stores, he ends up purchasing them from black market sources, incurring extra expenses.

Interview 16: Poultry farmer – Edward

Location: Port Moresby

They live in a settlement area in Gerega, about a 30-minute drive to the marketplace. They just started their poultry farming this year after observing many neighbors raise chickens.

For each cycle, they raise 300 chickens. There are 8 cycles per year. The DOCs are bought from Farmset and Chemica. For each box of chicken, 7 bags of feed are needed. They mix starter and grower for

the first five weeks and finisher for the last week. They also mix purchased feed with rice, but not others. They add liquid vitamins per the advice of Farmset to water in the first couple of weeks. The death rate is 3-4 per box (6-8%).

The saw dust is bought from nearby lumber mills. For each cycle, 3 bags of 50kg are needed. The price is k3 per bag. The manure is mainly used for own garden and the remaining is dumped to the nearby river.

After 6 weeks of growth, they take 25 chickens every day to the market by driving their own vehicle. If the chickens are unsold by the end of the day, they will bring them back. The price is k40 per chicken.

The biggest challenge is water. Their settlement lack water. For every two days, they come to town to buy 20 containers of water at k2 each container with a total cost of k40. The monthly cost is as high as k600. They have their own vehicle. If taking the fuel cost into account, the cost is even higher. High feed cost is another big concern. Each bag of feed costs k150. For 7 bags, the total feed cost is over k1000.

They told us there are many family poultry farms in their settlement and other nearby areas.

Interview 17: Poultry business input retailer - Daisy

Location: Jiwaka Province

Background and the nature of business

Daisy possesses extensive expertise in agriculture and is employed at a research institution. Both she and her cousin have received a solid college education in the field of agriculture. Since 2013, Daisy, along with her family, has been operating an input shop in Jiwaka. The shop specializes in selling a diverse range of products, including poultry, livestock, and fish feeds, DOCs (DOCs), poultry farming equipment, and medicines.

The DOCs are sourced from CLTC, while the other products are procured from the primary input stores in Mt. Hagen. To acquire these inputs, Daisy organizes the logistics, hiring trucks to transport the goods from Mt. Hagen to her shop in Jiwaka. In addition, she has invested in machinery for her store, purchasing it from Brian Bell.

Collaboration

During Daisy's tenure at her input shop, where her extensive knowledge in agriculture and livestock was a valuable asset, she and her cousin offered diverse support and guidance to poultry and livestock farmers in the vicinity. Their assistance covered various aspects, including raising DOCs, feeding practices, and managing poultry diseases. Notably, some new poultry farmers sought Daisy's expertise and even paid her to oversee the care of their DOCs during the initial days.

In an effort to further support the local farming community, Daisy allows regular clients of her input shop to access in-kind credit. This arrangement permitted farmers to obtain necessary inputs without an immediate cash outlay, with the flexibility to repay the amount within 2 to 4 weeks.

Beyond her input shop endeavors, Daisy demonstrated a commitment to community development. She assisted a women farmer group and ventured into the flour milling business. Through this initiative, she

imparted knowledge to women farmers on cost-effective feed production by incorporating locally produced ingredients such as cassava and sweet potato flour. Although the current machinery's capacity is limited, both Daisy and FPDA have plans to mobilize local women farmers for international site visits to explore advanced machinery produced by reputable manufacturers in other countries. This proactive step aims to enhance the capabilities of the local farming community and elevate their agricultural practices.

Interview 18: Poultry large-scale business – Christian Leaders' Training College (CLTC)

Location: Jiwaka Province

Background and the nature of business

Before its acquisition by TableBirds several years ago, Christian Leaders' Training College (CLTC) boasted the position as the third-largest poultry supplier of DOCs (DOCs), eggs, and chicken meat in Papua New Guinea. Following this, Signature Poultry assumed ownership in 2019. However, financial challenges arose in 2020, prompting CLTC to reassume complete control over the poultry business. Under the new entity name, Farm Fresh, CLTC is now undergoing a swift recovery in its operations, owing much of its success to the assistance provided by poultry specialists who are missionary volunteers from New Zealand.

Production

CLTC's primary focus lies in supplying about 400 boxes of broiler DOCs (52 DOCs/box) per week to prominent input shops, namely Farmset and Chemica, situated in the Highland Provinces near Mt. Hagen. Additionally, they provide eggs to supermarkets in the vicinity, with a substantial output of 50 thousand eggs per week. Notably, they extend their reach to Bougainville by air, delivering broiler DOCs at a premium. A smaller quantity of layer DOCs (1200/week) is also part of their current offerings, with only one-fifth of their full capacity recovered thus far. Plans are underway to import more grandparent breeders from New Zealand in the coming months to augment production, albeit hindered by funding constraints.

CLTC sources its feed from key input shops, Farmset and Chemica, but envisions establishing its own feed mills with the support of New Zealand donors. This initiative includes the acquisition of necessary equipment and machinery. The benevolence of New Zealand donors extends further, covering the procurement of vaccines for layer DOCs and antibiotics for the well-being of sick birds.

To mitigate the impact of electricity outages, CLTC employs gas heaters to maintain optimal warmth in the brooder houses, ensuring the well-being of the DOCs. Additionally, a unique touch is added to the chicken's drinking water through the incorporation of fermented lemongrass. Despite managing a large flock, CLTC diligently maintains a low mortality rate for both broilers and layers.

Marketing

The primary clients of CLTC are the input shops for the DOCs and the supermarkets for the eggs, and primarily in the Highlands area.

Transportation

CLTC uses its own trucks to deliver DOCs to its clients weekly.

Labor use

CLTC poultry business hires 20 workers, including 5 females.

Important take-away

- The poultry specialists who are missionary volunteers from New Zealand provide key guidance in the poultry farming in CLTC. CLTC also learned from the past lesson and have realized the importance of knowledge provided by the specialists, so the local specialists are learning from the foreign specialists carefully this time.
- Compared with the two main poultry enterprises in Lae, CLTC enjoys proximity to its clients in the Highlands, so cost of transporting DOCs and eggs to the Highland market is relatively low. However, CLTC relies on the stock feed which is transported from the feed mills in Lae.

Interview 19: Poultry large-scale business – Zenag

Location: Morobe Province

Zenag has proudly delivered top-tier Chicken and Egg products to PNG for over 75 years. Their unwavering dedication to quality, coupled with innovative farming methods and rigorous biosecurity measures, ensures the delivery of the finest products to their customers. We recently interviewed Zenag to gain insights into their operations and explore potential challenges.

Challenges

Their primary challenge lies in logistics, notably market access. Presently, they're only dispatching one-third of their birds due to limited access to commercial airlines compared to the previous year. The issue is compounded by farmers' reluctance to cover additional air freight charges. Despite having the capability to supply birds to the islands, they face hindrances because buyers are averse to paying the supplementary air freight costs, which ultimately increase the chicken's sale price. The absence of a dedicated cargo airline further exacerbates this situation.

Farmers often voice concerns about the supply of DOCs (DOC), but Zenag's challenge doesn't lie in producing or supplying DOC. Presently, they possess significant capacity for DOC production, to the extent that they're killing breeders as early as 15 weeks. However, this practice is costly and causes losses for the company.

Zenag believe that the reduced demand for DOC primarily stems from issues related to stock feed and its associated high costs. In PNG, GFI is the biggest supplier of stock feed to poultry farmers. Due to absence of grain industry in the country, all ingredients related to grains need to be imported which significantly increases the cost of the feed.

Apart from live chickens, Zenag also produces table eggs and processed chicken. However, post-COVID, there's been a surge in shipping rates, amplifying the transportation and logistics costs for Zenag. The company faces challenges with international waters, particularly at the Lae port, which handles about 70% of imports. Zenag think that the port of the ICTSI company’s strong market power contributes to the escalated costs of feed.

Looking at Zenag's DOC market, about half of DOCs are directed to SMEs. Zenag's DOCs are mainly distributed through Chemica or Farmset retail stores. Zenag also sells their products to local distributors who often buys less than 100 cartons per week which they then sell to fellow poultry farmers in their area. Zenag's distribution primarily operates from Lae. In the highlands, SME distributors manage the DOC distribution by arranging their own PMVs to collect supplies from Lae. It is easy for Zenag to transport their finished products to any place which is accessible by road. Using air transport poses challenges.

In POM, Zenag has set up a small hatchery to meet the demands locally and save on the transportation cost from Lae to POM. However, they still find it easier to ship products to POM than the islands. However, due to the increased cost of stock feed, their DOC sales to POM have halved since the beginning of the year. Despite believing they could supply more, the plummeting demand remains a challenge. Observing the poultry sector's growth over the years, it's evident that it has thrived due to the ease of starting a poultry business, offering farmers a quick return on investment.

Feed

Zenag doesn't produce its own feed and does not plan to do that.

Earlier this year, GFI faced mismanagement issue during the transition from the old mill to the new one, leading to a disruption in stock feed supply. Zenag relies on GFI feed for their own chickens. The shortage of stock feed in the market damaged farmers' trust in the supply chain, causing anxiety among them.

September and October are critical business months for Zenag. However, the sales of DOCs (DOC) were down by 40%, not due to production issues but because of low demand among farmers caused by the unavailability of stock feed. This marks a 40% decline compared to the same period last year. In June, the situation worsened as low stock feed supply led to reduced demand for DOCs, resulting in low DOC production at Zenag.

Zenag receives orders from Chemica and adjusts egg production, accordingly, managing their egg bank. If the egg inventory becomes high, they kill breeders as aging fertile eggs results in production loss and diminished chick quality. Therefore, Zenag is selective in choosing distributors as they heavily rely on order prediction from them. Stock shortages at stores might be attributed to forecasting team errors or overly conservative order placements. Zenag can meet increased DOC demands if stores decide to enhance their order quantities.

Poultry Ban

The Poultry Industry Association has been advocating for enhanced biosecurity measures. They highlight the low vaccination rates for emerging cattle diseases in PNG and push for the adoption of robust biosecurity protocols. Their aim is to ensure a higher level of disease control within the country.

According to their perspective, produce from New Zealand poses fewer issues due to its commendable disease control status. Most imports come from New Zealand, whereas Australia's disease control status is less transparent. They argue that PNG's disease status aligns closely with that of New Zealand's.

Their stance strongly supports policy implementation, addressing concerns over corruption in PNG. Notably, the NAQIA lacks a functional board, prompting the need for system formalization to enforce accountability. These concerns have been raised with the government.

Moreover, they anticipate potential benefits from an Australian ban, foreseeing increased domestic production and expanded employment opportunities. For instance, Zenag directly employs 1600 individuals and has added 400 new jobs in 2023, demonstrating their ongoing investment in production capacity.

Egg Sales

Zenag is a key provider of table eggs in PNG. As per Zenag, 70% of the cost of table-eggs constitutes of cost of stock feed. The challenges stemming from COVID and the Ukrainian conflict have driven up logistic and grain costs, ultimately increasing feed cost and the overall cost of egg production. Despite these cost escalations, their logistics processes for eggs and chickens have remained unchanged for a year. To ensure meticulous cost tracking, they maintain separate accounting records for chicken and egg production.

Their focus on transportation efficiency led them to conduct extensive research on egg transportation methods, aiming to minimize damage during transit. Their efforts paid off, with Zenag achieving a damage rate of less than 2% while transporting eggs from their farms to Hagen and POM, a result that involved considerable work and research.

Notably, there was a temporary egg shortage in POM, not due to Zenag's production capacity, but rather logistical hurdles. Their chickens consistently lay eggs; however, during a week when transportation faced challenges (such as ship breakdowns), they encountered difficulties delivering their stock of 30 containers of eggs and chickens to POM.

Outgrowers

They refrain from implementing an outgrower program to maintain control over their production process. According to their perspective, Tablebirds faced significant financial losses due to various problems, including theft of birds and feed. Around 10% of Zenag's workforce is dedicated to security measures aimed at preventing theft. Substantial investments have been made in enhancing security, including the installation of electric fencing and surveillance equipment, consequently adding to the overall production cost.

Collaboration

Apart from the Poultry Industry Association (PIA) and investing in SME sector training, they do not engage in collaborations with Tablebirds. Occasionally, they may share feed with competitors on an ad hoc basis. However, they typically perceive other partners in the industry as competitors.

In terms of collaboration, they partner with the next level poultry producers within the supply chain. For instance, when a smaller company intends to establish parent farmers for layers, they consult with larger commercial entities regarding their production plans for the next 6 months. Zenag aligns their own production to accommodate these orders, ensuring they can meet the requirements of these partners.

Prediction

The company employs a full-time planner dedicated to forecasting egg and chicken supplies. Presently, their predictions have gone awry due to an unforeseen shortage of stock feed, prompting an earlier disposal of breeders by 10 weeks, introducing a level of risk into their operations.

Their approach involves engaging with customers to gather demand forecasts and scrutinizing the past 12 months of growth trends. They also closely monitor economic trends for potential opportunities. Par-

ticularly in the distribution of DOC, entities like Chemica hold significant importance. They regard Chemica not only as a customer but as a strategic partner, relying on their insights to plan production effectively. According to their observations, Chemica displays a more proactive stance in ordering compared to Farmset. Moreover, they perceive Chemica as a more substantial supplier of DOCs than Farmset.

Land Availability

Acquiring additional land in PNG poses a considerable challenge due to limited accessible space. While there's abundant land in the country, much of it is categorized as customary land, inaccessible to the public. Land entitlement remains a costly and cumbersome issue, driving up associated rental charges significantly.

At present, their operations encompass one farm near Lae, along with a small hatchery and depot in POM. However, this setup poses a substantial biosecurity risk. Hence, there's a pressing need to secure more space and advocate for stringent biosecurity protocols to mitigate these risks.

Interview 20: Poultry input shops – Farmset

Location: Morobe Province

Introduction & Basic Information

Farmset, an agricultural retail giant with a 40-year history, has played a significant role in the agribusiness sector. Originally concentrating on selling chemicals, fertilizer, machinery, and parts, they diversified their operations four years ago to include the production of their own poultry feed. This strategic move aimed to support local farmers and position them as competitors to industry giants like GFI and Tablebirds.

In the past month alone, Farmset showcased its commitment to feed production by manufacturing an impressive 750 tons of poultry feed in its mills. This marked a substantial increase from their typical monthly production, which ranged from 400 to 600 tons over the last four years. Notably, this surge in production was attributed to Farmset's decision to exclusively sell their poultry feed, discontinuing the sale of GFI's feed due to unfavorable rebate terms.

As a retail store, Farmset offers a diverse range of poultry feeds, including their proprietary blend and GFI's products. Despite the recent shift in the sales strategy, their consistent focus on quality and innovation has positioned them as a prominent player in the market. It's worth mentioning that Farmset's best-selling feed remains the pig feed, emphasizing the diverse product offerings contributing to their success in the industry.

NARI has been a constant partner for Farmset. They collaborate with NARI to conduct clinical trials and experiments. The main motivation to start poultry feed production was to support local farmers, recognizing the significance of poultry business for many growers and local communities. Most of them raise chickens for income or to pay school fees. However, these individuals often face challenges due to the high cost of feed, affecting their overall production costs. With this vision, Farmset aims to assist them by providing affordable and high-quality poultry feed. While commercial or bulk orders are rare, local farmers typically purchase 5-6 bags of Farmset poultry feed.

In addition to poultry feed, Farmset also supplies day-old chickens (DOCs). They source DOCs from Zenag and Tablebirds. Every Monday, Farmset sells boxes of DOCs and poultry feed to local farmers.

Challenges

Each week, they place an order of 50-100 cartons of DOCs (DOCs) and aim to increase it to 300-400 to meet their consumers' demand. However, they expressed that Zenag provides them with a limited supply of DOCs (pending verification). Due to this limitation, they distribute the boxes to buyers on a first-come, first-serve basis. Fortunately, they do not face any challenges in providing feed to their customers, as the feed supply is consistent. This is especially true since they produce their own feed, eliminating any concerns about supply shortages. To manage their DOCs inventory effectively, they place monthly orders in advance with both Tablebirds and Zenag. These orders are based on the forecasts provided by Farmset's forecast and planning team. Lately, they have identified the period from Sep-Nov sees the highest demand for chickens.

Farmset is currently in an ongoing process of searching for resellers to assist them in selling their feed. While they have branches spread across the country, the distribution of their poultry feed is currently limited. Consumers can acquire the feed either from Farmset shops or through a limited number of resellers in remote areas. The promotion and distribution of poultry feed pose challenges, but Farmset is actively working to expand its reach.

Resellers receive training from Farmset on how to effectively sell the feed. Moreover, they gain knowledge on poultry raising, which they subsequently share with local farmers in their respective areas. Farmset considers this training crucial to prevent growers from blaming them for feed-related issues, such as mortality. The training emphasizes the frequency of feeding and aims to increase awareness about Farmset's products.

Currently, Farmset relies on a consultant who is not based in PNG for the formula of poultry feed. In the event of a shortage of poultry feed ingredients, they have to reach out to the consultant for advice on the formula and the precise quantity of the received ingredients. This process incurs additional costs and time.

To address this, Farmset has taken steps to hire an expert who is expected to join the team by the end of the year or early next year and would be based in PNG. This move aims to streamline the communication process and reduce the dependency on external resources.

Running out of raw materials is another big challenge for them. As said, if the raw material supply is low then they have to reformulate the formula.

Poultry Feed

While Farmset produces its own poultry feed, over 50% of the ingredients are sourced from Australia, with a heavy reliance on the country for wheat and soybean supply. Approximately 12 containers of wheat are shipped monthly from Australia to PNG. Conversely, other ingredients such as broken biscuits, fish mill, copra, and palm oil are locally sourced from companies in Lae and Medang, including Lae Biscuits, Fish Mill, Copra mill, and New Britain Palm Oil.

The stock feed factory is located in Lae, and to promote Farmset feed among consumers, they frequently take buyers to their factory to demonstrate the feed production process. Farmset manufactures both starter and finisher feeds, but does not produce any grower feed.

Around two years ago, the cost of both starter and finisher feeds individually ranged between 80-90 kina for a 40 kg bag. However, this cost has increased to 122-125 kina. If a farmer requires a quantity less than 40 kgs, they bring their own bag, and Farmset provides the requested quantity accordingly.

They sell all livestock feed including feed for egg layers for which they have observed an increase in demand.

Their feed cost is 5-6 Kina lower than GFI's.

Competition and Collaboration

Their main competitors in the poultry feed market are GFI and Tablebirds, with Farmset currently ranking as number 2 and aiming to surpass GFI's market share.

Farmset shares certain raw materials, particularly feed acids like calcium and added flavors for egg layers, with GFI when they face shortages. In return, Farmset also receives ingredients from GFI. Additionally, they have exchanged production processes with GFI but have not disclosed their formula.

Regarding Tablebirds, Farmset acquires DOC from them. However, Tablebirds proposed that Farmset sell their feed as well. As Farmset prefers to supply their own feed, they declined this request. This led to the cancellation of the deal involving DOCs and feed between Farmset and Tablebirds due to the persistent request from Tablebirds' CEO.

Chemica, another retail shop, is a competitor of Farmset. Chemica is considering selling Farmset feed under their own branding and packaging. Due to supply constraints, neither GFI nor Farmset was initially able to provide feed to Chemica. However, with Chemica's interest, Farmset will need to expand its production capacity and possibly operate in shifts to meet the increased demand.

Farmset is well-equipped to increase production, boasting a 22-hectare corn farm in Nadzab, Lae, of which only 10 hectares are currently in use.

Training

As mentioned earlier, Farmset's resellers undergo extensive training to ensure they provide accurate information to buyers. Their sales team, acting as extension workers, visit local farmers to educate them about the benefits of using Farmset feed. Moreover, they offer financial guidance, highlighting the cost-saving aspects of Farmset's feed.

On the packaging, comprehensive information is provided, complemented by explanatory diagrams to assist consumers in understanding the product's details.

Currently, their mill operations employ 27 staff members, including four technical professionals from the Philippines. Farmset prioritizes training their local staff, aiming for self-sufficiency and reducing reliance on international consultants.

Farmset takes pride in the quality of its packaging, consistently meeting customer expectations without any complaints. They collaborate with a Chinese consultant to customize and prepare bags tailored to their specific requirements and needs.

Other Pointers

Farmset didn't receive any external funding and notably, during the COVID period, they were among the few companies that didn't resort to employee layoffs. Presently, there's a higher demand for Farmset feed in the Highlands compared to the coastal areas.

Interview 21: Poultry input shops – Chemica

Location: Morobe Province

Introduction & Basic Information

Chemica is a comprehensive agricultural retail store offering a wide array of supplies, from agricultural chemicals, insecticides, pesticides, and herbicides to farmer tools, packaging bags, and fertilizers (NPK). They are recognized as primary suppliers of poultry feed and DOCs, boasting an extensive distribution network. They sell the product on a cash and carry basis and they only sell on credit to those who buy at bulk from the warehouse. These are generally company/corporate contracts.

Poultry

Their primary stock feed supply comes from GFI, although previously they used to distribute Tablebirds feed until internal reasons led to discontinuation. For DOCs, they source approximately 500 boxes weekly from Zenag. Despite the current supply, Chemica believes it adequately meets customer demand. Notably, the highest demand for DOCs spans from September to November, yet they maintain consistent prices unless Zenag adjusts their box prices.

Day-old chicken boxes are exclusively available for purchase at Chemica on Mondays and Wednesdays. Farmers eagerly queue up as early as 5 am, securing the boxes on a first-come, first-serve basis. According to Norman, the entire stock typically sells out within an hour due to high demand.

Due to a low monthly cash flow, Chemica has adjusted their orders accordingly. Zenag handles the transportation of DOC boxes from their warehouse to Chemica's office. Additionally, Chemica stocks medications for chicken diarrhea, providing guidance to customers on proper administration of their chickens.

Chemica’s branch in Lae witnesses a high demand for poultry feed and day old chickens as most buyers are involved in poultry business. On the other hand, other branches in Highlands have a high demand for vegetable seed and insecticides.

The distribution center in Lae is responsible for transporting the supplies of seeds, insecticides, fertilizers and farm tools to other branches of Chemica in the country. They did not express any challenges in procuring and supplying orders to different branches of Chemica.

In totality, there are 7 Chemica branches in the country.

Challenges

One of Chemica's major challenges is frequently running out of stock, leading to complaints from their clients as it disrupts their farming activities. Currently, they solely rely on GFI for their stock feed supply,

which they sell in their stores. Any delays or issues in ordering in advance lead to significant challenges, leaving them without stock feed for their buyers.

The store manager mentioned Chemica's consideration of producing their own stock feed, possibly through a partnership with Trukai. However, this plan is still in progress, and nothing has been finalized yet. Last month, GFI couldn't meet their feed supply demands due to management changes, but this is viewed as a short-term problem.

Regarding collaborations with Farmset, Chemica considers them as competitors. Occasionally, when they struggle to sell DOCs, they need to feed the chickens to maintain their health, eventually selling them at a reduced rate. They use either Farmset or GFI feed available to them, without direct collaboration. The store manager acknowledges that Farmset's stock feed is priced lower than GFI's, but farmers tend to prefer GFI, believing it offers better quality.

Interview 22: Agricultural extension worker – Tablebirds

Location: Morobe Province

We engaged with agricultural extension workers employed by Tablebirds, who were previously involved in training outgrowers during the initiation of the outgrower program. Our focus was to gather information about the stock feed produced by Tablebirds. They shared insights, indicating that a majority of the feed ingredients are imported from Australia, with wheat being the primary sourced ingredient.

Tablebirds still maintain some outgrowers who receive independent training. These outgrowers receive boxes of DOCs and feed from Tablebirds.

In terms of ingredients, Tablebirds utilizes a combination of imported and local components, with 80% being imported. This reliance on imports contributes to the relatively high cost of feed. Locally sourced items include palm oil and poultry mill, while wheat and soybean are imported. Attempts to cultivate sorghum in their fields were unsuccessful.

For distribution, Tablebirds relies on Chemica, with more than 75% of their stock feed being sold through Chemica stores. They discourage the mixing of local ingredients, such as cassava flour, with commercial feed.

Regarding the utilization of stock feed, Tablebirds allocates 75% for their own farm, prioritizing their chicken production. The remaining 25% is sold in the market, with surplus stock feed being made available for sale after meeting their farm requirements.

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1201 Eye Street, NW, Washington, DC 20005 USA | T. +1-202-862-5600 | F. +1-202-862-5606 | Email: ifpri@cgiar.org | www.ifpri.org | www.ifpri.info