ANALYSIS OF MARKETING OPTIONS OF DUCK EGG PRODUCERS IN LAGUNA

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ABSTRACT

Access to market information is primarily limited among the duck egg producers, especially in rural areas. This study was conducted to analyze the different options of duck egg producers in marketing their produce in Laguna. The marketing options of the duck egg producers consist of the choices they make in terms of the product form, market outlet, marketing arrangements with buyers, and marketing services to be performed in selling a product. The differences in marketing options among the five clusters of producers showed that the Seekers earned the highest net income of ₱4.96 per egg. The Chi-square test and effect sizes showed that the price received by the producers is the most influential factor affecting their chosen product form to sell. The Agriculture and Fisheries Market Information System (AFMIS) appears to be crucial in improving the access to market information for duck egg producers. Realizing that integrating value-adding services into the production would offer a higher profit, the Basic producers may form a cooperative to perform sorting and processing and to hire/own a vehicle. In the end, forming a cooperative will be able to increase their bargaining power both in purchasing inputs and selling their output.

Keywords: marketing of duck eggs, marketing arrangement, price, product form

INTRODUCTION

Backyard raisers, who have less than 100 heads of ducks, account for 70 percent of the ducks in the country (PSA, 2015). Farmers prefer venturing into raising ducks for egg production because ducks have the capacity to survive under diverse climatic and nutritional conditions. It is also inexpensive to produce, relative to raising chickens, as they do not require elaborate housing facilities or huge spaces for rearing (De la Cruz, 2007). Its product, duck eggs, are customarily eaten as salted egg, *balut,* and *penoy*, or as an ingredient in most Filipino delicacies such as *puto-pao* and *bibingka* (Atienza *et al.*, 2015).

Although technologies were developed to address the poor and inconsistent production performance through the development of signature Philippine duck breed by the Bureau of Animal Industry, raisers are still constrained by the poor marketing system. Unlike the chicken sector, for which vertical integration with large scale, technologically advanced, geographically concentrated production units exist, the duck sector still apparently relies on traditional and much less efficient production and marketing methods run by geographically

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and technologically more diverse smallholders (Chang and Dagaas, 2004). A major problem besetting the duck industry is the limited access to market information among the producers. In this scenario, producers barely get the benefits of their hard work by not getting the price they deserve. Duck egg producers, especially those in remote areas, depend on the price dictated by their buyers (Fabillan, 1985; Martinez, 1991; Cuenca, 2003). Poor and inadequate transportation is a huge constraint that undermines the producers' capacity not only in purchasing inputs but also in entering markets that offer a higher price or the best deals as this results in high transactions costs.

If they are equipped with knowledge of the different marketing options available to them, duck producers can come up with more informed and effective choices for greater bargaining power. This will secure them the best possible price for their produce, leading to a higher income and a better distribution of income among producers and traders.

This study analyzed the different options of duck egg producers in marketing their produce in Laguna. Specifically, the producer's market outlet, marketing arrangements, marketing services performed, marketing costs, and prices received by product form were identified; the profitability of each alternative marketing option as well as the factors associated with the duck egg producers' choice of marketing option were determined; and recommendations were given regarding the marketing strategies that will facilitate the improvement and promotion of the industry.

MATERIALS AND METHODS

The study used primary data obtained from personal interviews of all 40 duck egg producers in Pila, Sta. Cruz, Bay, Victoria and Los Baños in 2016. Duck raisers are still found in these municipalities. Laguna still remains one of the top duck producers in CALABARZON and also has a significantly high per capita consumption in the region (PSA, 2015).

A hierarchical cluster analysis was performed to identify clusters of duck egg producers based on their marketing options. Five clusters were selected as the optimal number of groups to represent different marketing options of the producers through the Calinski-Harabasz and Duda/Hart indices. The five clusters were labelled as Basics, Open Basics, Loyal Basics, Seekers, and Seekers 2.0 on the basis of their choice of marketing options (Figure 1). ANOVA was used to determine if the marketing options are significantly different in each cluster.[1]

The cost and returns analysis was then used to weigh the financial effect of changes that would result from implementing a specific alternative marketing option. Meanwhile, a Chi-square test was used to measure the degree of dependency of the farmers' choice of marketing option on the different factors affecting it (i.e., age group, years in business, educational attainment, volume handled, distance from market outlet, social capital, information access, price received). Since the Chi-square statistic only indicates the existence of a relationship, the effect size was also examined to determine the strength of the relationship.

[1]The five clusters significantly differed from each other across all marketing options except mode of payment since $F(4,35) = 2.69$, $P < 0.05$.

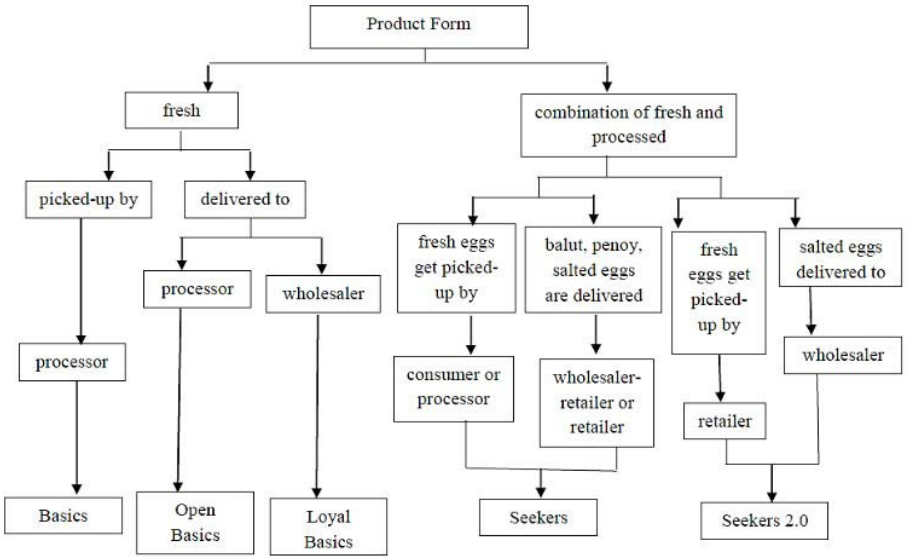

Figure 1. Flowchart for classifying duck egg producers based on choice of marketing options.

The marketing option chosen by a duck egg raiser start from the product form sold. Producers may opt to sell fresh eggs or incorporate processing in their production and sell a combination of both fresh and processed eggs. The eggs are processed into different types based on the thickness of its shell, which is determined through tapping the egg with fingers. Only thick-shelled eggs can undergo *balut* making, which involves incubation to develop embryos. After which, the eggs go through candling to separate the infertile and fertile eggs. Infertile eggs are sold as *penoy* and are also boiled like *balut* but sold at a lower price. Thin-shelled eggs with no cracks are made into salted eggs. The process involves immersing the eggs into a soil-salt mixture, washing and boiling, and coating with red-dye. *Basag* or eggs with fissures are sold as fresh eggs. Next, the producer chooses from various market outlets where he will sell his produce. The market outlets could be the consumer, processor, wholesaler, wholesaler-retailer, and retailer. Each outlet differs in marketing arrangements. These include the mode of sale (picked-up or delivered) and mode of payment (cash or credit). Finally, the producer has the choice of whether or not he will provide additional marketing services such as processing the eggs and transportation.

RESULTS AND DISCUSSION

Based on the hierarchical cluster analysis, five clusters were identified: Basics, Open Basics, Loyal Basics, Seekers, and Seekers 2.0 on the basis of their choice of marketing options.

The Basics make the largest cluster and comprised 65 percent of the total respondents. Basic producers are reasonably comfortable with selling only fresh eggs and have it picked-up at their farm by processors. Most of the producers in this cluster (92.3%) selected cash as their buyer's mode of payment (Table 1). In terms of socio-demographic profile, producers in this cluster primarily have ages 55 years and older (69.2%). Also, most of them have been in duck egg production for more than 11 years and had finished elementary. This combination

of characteristics implies that most of the farmers in this cluster are reluctant to change as their practices are deeply held.

The producers are situated ≤ 20 km away (0.3 km on the average) from their market and do not own a vehicle. Most Basics have built social capital with their buyer. Ten years is the average number of years of trading between the producers and the buyers. The producers reported that they preferred their outlet because of its regularity or permanence in picking-up the produce. This illustrates that these producers have an ingrained relationship with their buyer, which is also part of the reason why this type of producers appears to be reluctant in changing their practices. Most producers handled ≤ 500 (26.9%) and 501-1000 (34.6%) eggs a day. The Basics predominantly do not have access to market price information, where their buyers dictate the price. As they only produce fresh eggs, the average price they receive per egg per day is ₱6.38 (Table 2).

This Open Basics cluster is a variety of the Basics, who sell fresh duck eggs to processors. The only difference is their mode of sale. Open Basics deliver the eggs to processors. Their openness to exploring what is out there is apparent, as illustrated in Table 1. In terms of socio-demographic profile, the producers in this cluster are primarily 35-44

Table 1. Marketing options of 40 respondents by cluster in Laguna.

Marketing options	Basics (n=26)	Open basics (n=5)	Loyal basics (n=2)	Seekers (n=6)	Seekers 2.0 (n=1)	F value	P value
			In percent				
Product form							
Fresh	100.0	100.0	100.0	0.0	0.0	40.58	0.00*
Fresh and processed	0.0	0.0	0.0	100.0	100.0		
Market outlet							
Consumer	0.0	0.0	0.0	27.0	0.0		
Processor	100.0	100.0	0.0	33.0	0.0	59.34	0.00*
Wholesaler	0.0	0.0	100.0	0.0	100.0		
Wholesaler-Retailer	0.0	0.0	0.0	30.0	0.0		
Retailer	0.0	0.0	0.0	10.0	100.0		
Marketing arrangement							
Mode of sale							
Picked-up	100.0	0.0	0.0	33.0	0.0	40.58	0.00*
Delivered	0.0	100.0	100.0	66.0	100.0		
Mode of payment							
Cash	92.3	100.0	100.0	91.7	100.0	0.31	0.86^{NS}
Credit	7.7	0.0	0.0	8.3	0.0		
Marketing services							
Yes	0.0	80.0	0.0	100.0	100.0	36.35	0.00*
No	100.0	20.0	100.0	0.0	0.0		

* Significant at P<0.05
^{NS} Not significant

(40%) and 55 years and older (40%). Majority (60%) have been in duck egg production for more than 11 years and finished high school. The producers are located ≤ 20 km (3.4 km on the average) away from their market and do not own a vehicle. Majority have established social capital with their buyer, with an average of five years of trading with each other. The reason provided by these producers is similar to the Basics: regularity or permanence in picking-up. It indicates that they find their previous relationships with their buyer satisfactory

Table 2. Socio-demographic characteristics of 40 respondents by cluster.

Characteristics	Basics (n=26)	Open basics (n=5)	Loyal basics (n=2)	Seekers (n=6)	Seekers 2.0 (n=1)	F value	P value
In percent							
Age							
25-34	7.7	0.0	0.0	0.0	0.0		
35-44	3.9	40.0	0.0	16.7	0.0	0.95	0.45 NS
45-54	19.2	20.0	0.0	66.7	100.0		
≥55	69.2	40.0	100.0	16.7	0.0		
Years in business							
1-5	23.1	20.0	0.0	16.7	0.0		
6-10	7.7	20.0	0.0	16.7	0.0	0.29	0.88 NS
≥ 11	69.2	60.0	100.0	66.7	100.0		
Educational Attainment							
Elementary	50.0	0.0	50.0	0.0	0.0		
High School	26.9	60.0	50.0	33.3	0.0	2.59	0.05 NS
Vocational	0.0	20.0	0.0	0.0	0.0		
College	19.2	20.0	0.0	66.7	100.0		
Ph. D.	3.9	0.0	0.0	0.0	0.0		
Distance from Market							
≤ 20 km	100.0	100.0	100.0	50.0	0.0	12.25	0.00*
≥ 21 km	0.0	0.0	0.0	50.0	100.0		
Ownership of Vehicle							
Yes	0.0	0.0	50.0	50.0	100.0	10.39	0.00*
No	100.0	100.0	50.0	50.0	0.0		
Social Capital							
Yes	76.9	60.0	100.0	66.7	100.0	0.43	0.79 NS
No	23.1	40.0	0.0	33.3	0.0		
Volume Sold							
≤ 500	26.9	20.0	50.0	0.0	0.0		
501-1000	34.6	20.0	50.0	16.7	0.0	2.88	0.04NS
1000 - 1500	11.5	40.0	0.0	16.7	0.0		
1501- 2000	11.5	20.0	0.0	0.0	0.0		
> 2000	15.4	0.0	0.0	66.7	100.0		

Table 2 cont'd

Characteristics	Basics (n=26)	Open basics (n=5)	Loyal basics (n=2)	Seekers (n=6)	Seekers 2.0 (n=1)	F value	P value
Access to price information							
Yes	23.1	0.0	0.0	66.7	100.0	2.98	0.03*
No	76.9	100.0	100.0	33.3	0.0		
Price received							
Fresh egg							
₱5.50-6.10	34.6	0.0	20.0	33.3	100.0	40.58	0.00*
₱6.11-6.60	30.8	0.0	40.0	16.7	0.0		
₱6.61-7.80	34.6	100.0	40.0	50.0	0.0		
Average price received	**6.38**	**6.41**	**6.70**	**6.39**	**5.50**		
Balut							
₱8.50-8.65	0.0	0.0	0.0	50.0	0.0		
Average price received	**0.00**	**0.00**	**0.00**	**8.60**	**0.00**		
Penoy							
₱6.00-6.25	0.0	0.0	0.0	50.0	0.0		
Average price received	**0.00**	**0.00**	**0.00**	**6.16**	**0.00**		
Salted egg							
₱8.00-8.25	0.0	0.0	0.0	83.3	100.0		
Average price received	**0.00**	**0.00**	**0.00**	**8.20**	**8.25**		

* Significant at $P<0.05$;
^{NS}Not significant

and place their trust in their buyer. Most producers handled 1000-1500 eggs a day and do not have access to market information, where their buyers dictate the price. Being a Basic prototype, who produce only fresh eggs, the average price they receive per egg per day is ₱6.41 (Table 2).

The Loyal Basics are the second smallest cluster of producers. Like the Open Basics, the mode of sale is the only different option from the Basics. Producers in this cluster deliver the eggs to wholesalers as seen in Table 1. How these producers earned the loyal label is recognized in their socio-demographic characteristics. Producers in this cluster comprised primarily of ages 55 years and older. They have been in duck egg production for more than 11 years. One finished elementary while the other, high school. The producers are located ≤ 20 km away from their market. One owns a vehicle while the other does not. These producers have built social capital with their buyer. Having spent 20 years of trading on the average, it is apparent that the relationship with their buyer is ingrained. Additionally, loyal producers have the wholesalers as their source of feeds. One can see how this cluster of producers value security and traditions. These producers handled 500 and 700 eggs a day, respectively and do not have access to market information, where their buyers dictate the price. The average price they receive per egg per day is ₱6.70 (Table 2).

There are producers labeled "seekers" because almost every marketing option is considered as shown in Table 1. Seekers are sponges for knowledge and integrate value-

Table 3. Average volume of fresh and processed eggs produced by a Seeker in Laguna.

Product form	Volume (pc)	Percent
Fresh egg	713	22.27
Balut	1,612	50.34
Penoy	103	3.22
Salted egg	774	24.17
TOTAL	3,202	100.00

adding services in their production. The bulk of their produce is processed into salted egg, *balut* or *penoy* (Table 3). They also offer fresh eggs but only of a small fraction of their total produce, which they consider as rejects for processing or eggs that are small. Fresh eggs were mostly sold to processors for leche flan, etc., while processed eggs were mostly sold to wholesaler-retailers. Commonly, fresh eggs were picked-up and their processed eggs were delivered to their market. Most of them (91.7%) choose cash as their mode of payment. Demographically, Seekers are mostly in the age bracket 45-54, been in the duck egg production for more than 11 years and finished college. Producers in this cluster clearly are more educated than the previous clusters. This implies that education plays a substantial role in marketing the produce. Half of the Seekers are ≤ 20 km from their market while the other half are ≥ 21 km. The same proportion can be observed in terms of ownership of vehicle. Most Seekers have built social capital with their buyer. On the average, they have been trading with each other for seven years. The reason for the producers' preference of outlet is the profitability they attain from it. Having a competitive market, they find the importance of their buyer to their sales and ensure a lasting business relationship. Most of the producers handled ≥ 2000 eggs a day. The Seekers primarily have access to market price information. Since they produce fresh and processed eggs, accumulating the prices of an egg in every product form amounted to ₱9.00 and above. The average price they receive per day is ₱ 6.39 for fresh egg, ₱8.60 for *balut,* ₱6.17 for *penoy*, and ₱8.20 for salted egg (Table 2).

Similar to the Seekers, Seeker 2.0 is the type of producer who performs value-adding services, such as processing and transportation. This producer had to be placed in a separate cluster due to its differences in terms of market outlet. The fresh duck eggs were picked-up by retailers while processed eggs were delivered to wholesalers (Table 1). In terms of socio-demographic profile, this producer is 45 years of age, been in duck egg production for 12 years, and finished college. His location is ≥ 21 km away from his market and owns a vehicle. There is presence of social capital between the producer and buyer. They have been trading with each other for six years. The reason for the producer's preference of outlet is similar to the Seekers, which is the profitability they attain from their outlet. This producer sells 4000 eggs per day. The producer has market price information access and receives the information through word of mouth from his co-farmers. In a day, this producer receives ₱5.50 per fresh egg and ₱8.25 for salted egg (Table 2).

The cost and returns analysis was used to determine the most profitable choice among the marketing options derived in the cluster analysis (Table 4). Egg sales, culled breeder sales, given away, and eggs consumed at home made up the total revenue. A duck breeder is normally productive for 18 months. Afterwards, producers cull their ducks and sell it to fried *itik* business owners, with the price varying from ₱60-100.

Table 4. Revenue and costs per piece of duck egg of the five clusters for 18 months.

Item	Basics (n = 26)	Open basics (n = 5)	Loyal basics (n = 2)	Seekers (n = 6)	Seekers 2.0 (n = 1)
Cash Revenue			₱/piece		
Egg sales (fresh)	6.380	6.410	6.460	1.420	0.720
Egg sales (processed)	0.000	0.000	0.000	6.620	7.140
Culled breeder sales	0.300	0.230	0.310	0.260	0.290
Total Cash Revenue	6.680	6.640	6.770	8.300	8.150
Non-Cash Revenue					
Given away	0.000	0.000	0.000	0.080	0.000
Home consumption	0.090	0.000	0.240	0.200	0.020
Total Non-Cash Revenue	0.090	0.000	0.240	0.280	0.020
TOTAL REVENUE	6.770	6.640	7.010	8.580	8.170
Cash Costs					
Cost of breeder	0.410	0.370	0.540	0.380	0.570
Feeding Costs	3.740	4.010	1.900	2.850	4.760
Processing	0.000	0.000	0.000	0.100	0.320
Gasoline	0.000	0.020	0.090	0.010	0.070
Hired Transportation	0.000	0.130	0.000	0.010	0.000
Hired Labor	0.120	0.310	0.000	0.160	0.350
Electricity	0.050	0.050	0.020	0.100	0.010
Water	0.040	0.050	0.030	0.020	0.010
Farm supplies	0.010	0.010	0.020	0.001	0.000
Total Cash Costs	4.370	4.950	2.600	3.601	6.090
Non-Cash Costs					
Unpaid family labor	0.010	0.000	0.000	0.000	0.000
Building depreciation	0.030	0.020	0.010	0.020	0.050
Equipment depreciation	0.000	0.000	0.000	0.001	0.006
Total Non-Cash Cost	0.040	0.020	0.010	0.021	0.056
TOTAL COSTS	4.410	4.970	2.610	3.622	6.146
NET INCOME	2.360	1.670	4.400	4.959	2.024

Each component was computed by multiplying the number of eggs to its corresponding selling price. The total revenue derived for the Basics was ₱6.77 per egg, ₱6.64 for Open Basics, ₱7.01 for Loyal Basics, ₱8.58 for the Seekers, and ₱8.17 for Seekers 2.0.

On the other hand, costs are made up of cash costs and non-cash costs. Cash costs were composed of cost of breeder duck, feeding costs, processing costs, gasoline, hired transportation, electricity, water, and farm supplies. Non-cash costs contained unpaid family labor, depreciation costs of building (conventional and hanging type) and equipment (i.e. incubators, vehicles, water pumps, shovels, pails, and trays). The straight-line method was

used to compute the depreciation cost. Interestingly, the feeding costs differed significantly between the clusters. Most of the Basics and Open Basics have varied feeds, including chick boosters, starters, *darak,* palay, *pulot*, and shrimp, which made them incur greater costs compared to the usual feeds and snails combination that the other clusters use. The Basics incurred ₱4.41 total costs per egg, Open Basics incurred ₱4.97, Loyal Basics had ₱2.61, Seekers had ₱3.62, and Seekers 2.0 incurred ₱6.14.

The net income is the farmer's total earnings or profit, which is calculated by subtracting the total costs from the total revenue. The Basics profited ₱2.36 net income per egg, Open Basics had ₱1.67, Loyal Basics had ₱4.40, Seekers had ₱4.96, and Seekers 2.0 had ₱2.02 (Table 4).

The partial budget analysis, however, will show that changing their marketing options may help them achieve their profit goal. Moving from Basics to Open Basics, that is delivering their fresh duck eggs to the processors will generate a loss of ₱0.17 per egg for these producers. However, shifting delivering duck eggs to the wholesalers gained additional sales to the producers, ₱0.08 per egg, and cost amounting to ₱0.09 per egg or a gain of ₱0.11 per egg. This means that the marketing options of the Loyal Basics are more profitable than the Basics.

If the Basic producer now takes a chance on integrating marketing functions such as processing his duck eggs, delivering the processed eggs to the market, while fresh eggs remain at the farm for pick-up. The outcome of the shift will be additional sales of ₱1.66 per egg. The shift also demands additional cost of processing, transportation, hired labor, and equipment depreciation of ₱0.16 per egg. A change from Basics to Seekers yields a ₱1.50 net change in profit. This entails the producer to allocate a portion of its produce for processing, with a waiting period of 17 days for salted egg and 18 days for *balut*. The question is, what will be the optimal proportion of producing the combination of eggs where the producer maximizes the profit gained? The Seekers' average allocation of eggs for processing is 80 percent of their produce, with total available eggs per day, ranging from 580 - 5400. Majority of the Basics produce ≥ 500 eggs a day. The average aggregated processing cost for the span of 18 months is ₱161,025.00.

The factors including producer's age group, years in business, educational attainment, distance from market, ownership of vehicle, social capital, volume sold, access to price information, and price received influenced the chosen marketing option. The result of the Chi-square test showed that age group, access to market information, distance from market, ownership of vehicle, volume handled, and the price received for their produce influenced the producers' choice of product form. Among these, the price producers receive had the largest effect size, which means that it is the most influential in the choice of product (Table 5).

Choice of market outlet is mainly associated with distance from the market, ownership of vehicle, information access, and price received. The most influential among these was distance from the market. If the producers can sell at a closer market, then it would be better.

There were no significant factors that exhibited an association with the farmer's choice of mode of sale or mode of payment. Educational attainment, distance from the market ownership of vehicle, and price received influenced the producer's choice of providing marketing services. Among these, the price received had the largest effect size, denoting a substantial relationship between the price received and choice of providing marketing services.

In conclusion, considering the effect sizes, the price received by the producers is the most influential factor affecting their chosen product form to sell: fresh duck eggs or both

Table 5. Results obtained from Chi-Square test of independence and effect sizes for the factors affecting duck egg producers' choice of marketing options.

Product	Product form			Market outlet			Mode of sale			Mode of payment			Marketing services		
	χ_c^2	χ_t^2	Effect size ω^2	χ_c^2	χ_t^2	Effect size ω^2	χ_c^2	χ_t^2	Effect size ω^2	χ_c^2	χ_t^2	Effect size ω^2	χ_c^2	χ_t^2	Effect size ω^2
Age group	9.29	7.82[a]	0.02	9.81	16.92		3.89	7.82		0.57	7.82		7.52	7.82	
Years in business	0.30	5.99		5.22	12.59		0.30	5.99		2.42	5.99		0.75	5.99	
Educational attainment	9.39	9.49		5.09	21.03		8.09	9.49		8.55	9.49		9.73	9.49[a]	0.13
Distance from market	20.95	3.84[a]	0.51	29.21	7.82[a]	0.71	0.94	3.84		1.96	3.84		8.25	3.84[a]	0.19
Ownership of vehicle	15.46	3.84[a]	0.37	26.55	7.82[a]	0.64	0.02	3.84		1.29	3.84		10.61	3.84[a]	0.25
Social capital	0.00	3.84		1.67	7.82		1.00	3.84		1.23	3.84		0.73	3.84	
Volume handled	12.49	9.49[a]	0.20	12.87	21.03		3.25	9.49		6.77	9.49		3.61	9.49	
Access to price information	8.21	3.84[a]	0.18	9.05	7.82[a]	0.16	3.22	3.84		1.23	3.84		0.73	3.84	
Price received	40.00	5.99[a]	0.87	35.32	12.59[a]	0.50	1.80	5.99		3.31	3.84		15.76	5.99[a]	0.33

[a] Significant at the 5% level

fresh and processed duck eggs. The profitability of a marketing option starts with the choice of product form. This, however, is undermined in the situation of limited access to price information. It is recommended that the Department of Agriculture, with its Agriculture and Fisheries Market Information System (AFMIS), improve its effort in reaching out to duck egg producers by including prices for duck eggs for reference. Realizing that integrating value-adding services into the production would offer a higher profit, the Basic producers may form a cooperative so hiring of vehicle and sorting and processing can be done. The limited availability of capital was a prevailing condition among the Basics, compared to the Seekers, which may also be the reason they cannot invest in processing. In the end, forming a cooperative will be able to increase their bargaining power both in purchasing inputs and selling their output and in accessing credit facilities.

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