

# ECONOMIC ANALYSIS OF BUY-BACK SYSTEM OF POULTRY

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## ABSTRACT

A study was carried out to analyze the socio economic status of broiler farmers engaged in buy-back system, relative magnitudes of various costs and revenue associated with individual contract farmers and to investigate effectiveness of buy-back operation systems. A set of 100 broiler farmers engaged in a medium scale buy-back operation (integrated) system was selected randomly. Interviewing of the farmers using a pre-tested questionnaire and recording information by regular farm visits were employed for data collection. Information on socio economic aspects of the farmer, batch size, market weight and age of animals, management practices, costs of various inputs and revenue from selling birds, and effectiveness of buy-back system as perceived by the farmer were gathered from all farmers. Depreciation cost of buildings and equipment was found by considering the magnitude of initial investment and total duration of use of the item. Labour cost was assumed as Rs. 400.00 per 8-hour day. Analysis of variance procedure was used to determine the effect of various factors such as educational level, full or part time engagement on profit. Linear regression analysis was performed to determine the relationship between scale of operation and profit per kg of live weight. A quadratic regression model was used to determine optimum age for slaughter.

The broiler batches were sold at ages between 36 and 45 days. The average live weight at slaughter was 2.07 kg/bird. Major components of the total cost of production were feed cost (69.3%) and cost for day-old chicks (22.6%). Average cost when expressed per kg of live weight was Rs 191.58. As the contract buyer paid Rs. 200 per kg of live weight, the farmers made an average profit of Rs. 8.41/kg of live weight. When labour cost was excluded (assuming family labour only) average profit increased up to Rs. 11.90/kg of live weight. Profit/kg of live weight increased significantly ( $P < 0.05$ ) with the expansion of scale of operation. Optimum age at slaughter for the system was 42-43 days. Reduction of price of day-old chicks and feed and expansion of scale of operation could effectively improve the profit margin and sustainability of the industry.

**Key Words:** Buy-back farming, Economic Analysis, Poultry farming

## INTRODUCTION

The global production of poultry meat has been growing faster compared to any other meat in both developing and developed countries. This growth pattern can be expected to continue due to the inherent efficiency in feed conversion and the lower production costs associated with intensive poultry production. Such production efficiency is particularly beneficial to developing countries, which tend to have limited agriculture resources but grow rapidly (Taha, 2003). In the world broiler market feed costs make up about 70% of the total cost of intensive poultry production system. The availability of cheap feeds is one of the most important factors for industry development (Chang, 2007).

Prabakaran (2003) has pointed out that per capita poultry meat and egg consumption in Sri Lanka is the highest among the South Asian countries due to greater acceptance of poultry meat in recent years and due to incentives given to broiler production in the country. In Sri Lanka the poultry industry has developed into a commercial industry from the back-yard type over the past three decades. Mostly intensive rearing system under deep litter system has been adapted with approximately 75000 farmer families engaged in poultry product. More than 200,000 families are directly or indirectly involving with industry. Mainly due to active participation of the private sector, poultry industry has shown a phenomenal growth, most prominently in the broiler sector (Abeyratne, 2007).

About 70% of the contribution to livestock industry comes from chicken meat and eggs. Compared with other meat products chicken meat and eggs are relatively cheap and the most consumed animal protein sources in the average Sri Lankan diets. With the current purchasing levels of consumers, the industry is capable of producing all local requirements of chicken meat and eggs. Current per capita availability of chicken meat and eggs were 4.8 kg and 57 eggs respectively ((MLRCD, 2010). Two decades ago there was only one chicken company in Sri Lanka. With the rising demand for poultry and poultry products many processing companies entered in to the industry such as locally owned and semi government companies. At present poultry production sector is mainly in the hands of private sector. Contract farming is a prominent feature in large scale private companies (Iddamalgoda et al., 1998).

Buy-back system is one type of contract farming mostly practiced in the broiler industry of Sri Lanka. This operation provides several services for contract farmers such as supplying of day-old chicks, feeds, extension and veterinary services. Integrated broiler farms are sometimes provided with loans to construct poultry houses. Integrate broiler farms supply day-old chicks and buy them back after reaching 35 to 42days of age. Within that period field officers visit the farms and monitor the performance. However small scale farmers gradually lose their market with the expression of buy – back system. As the buy-back system provides employment opportunity, it helps the development of intensive poultry farming and contributes to the economy of the country.

## **The objectives**

- To analyze the incremental cost aspects of contract farmers involved in a Buy-Back system operated by a medium scale private company.

## **MATERIALS AND METHODS**

### **Location of the study**

This study was conducted on a random sample of 100 broiler farmers who have signed a contract with a medium scale buy-back operation in Madawala, Kandy (Fazil, 2009). The farmers were distributed as 49 farmers from Anuradhapura district, 31 farmers from Matale district, 19 from Kandy district and 1 farmer from Badulla district. As they were attached to the same buy-back operation the basic management methods were very much similar among them including poultry feeds and vaccination schedules. They all reared the same commercial broiler strain (Hubbard ISA) provided to them by the contract buyer at a fixed price.

### **Data collection**

The data were collected by a pre-tested questionnaire included the information about the household and socio economic information of farm family, scale of operation, general farm management practices, costs involved with various production stages, mortality rate, capital cost for the building construction and purchasing equipment, problems encountered and income from selling birds.

### **Analysis of data**

The data were entered in spreadsheets (MS EXCEL) and transferred to statistical Analysis system software (SAS 9.1.3) for analysis.

## **RESULTS AND DISCUSSION**

### **Socio economic analysis of the farmers**

Results of the questionnaire survey of the sample of 100 broiler farmers were summarized and tabulated according to various socio economic factors. There were no missing observations in the data set. Socio economic information is summarized under ethnic group, religion, civil status, education level and primary occupation.

### **Ethnicity and Religion**

Lack of involvement of Tamil community in poultry was also evident in the survey. Majority of the poultry farmers surveyed were Buddhists while the small percentage of Christians were also Sinhalese. These results indicate that the religious barrier is not prominent when it comes to broiler industry when compared with raising cattle or swine for meat.

## Educational level and Occupation

The civil status of the buy-back farmers showed that about 96% of them were married and 4% of them were single. Mostly the labour force involved in the poultry farm was family labour, an advantage of having a large family. Only about 10 percent of the farms used hired labour for their poultry operations. The survey showed that only about 2/3<sup>rd</sup> of the farmers were engaged full time in their poultry operation. About 14% of the poultry farmers were primarily involved in crop farming keeping the broiler unit as an additional income source. About 20 percent of the entrepreneurs were engaged in more secure Government jobs or other business.

Table 4.1 shows that fulltime farmers tend to have slightly larger batches of birds than part time farmers though the two means were not significantly different ( $P>0.05$ ) due to higher error variation. However, the profit from the farm was clearly higher with the fulltime farmers than the part timers ( $P<0.05$ ).

**Table 4.1. Scale of farming and profit according to the main occupation<sup>1</sup>.**

Poultry farming	Scale of farming (Mean No. of birds)	Mean Profit (Rs)
Full time	1390.15 <sup>a</sup>	35084.15 <sup>a</sup>
Part time	1083.33 <sup>a</sup>	17708.25 <sup>b</sup>

<sup>1</sup>Means within columns with different superscripts are significantly different ( $P<0.05$ ).

## 4.2. Properties and assets

### Land area allocated for poultry

The total land area owned by the farmers varied between 0.25 Ac and 10Ac with the mean being 1.92Ac. Allocation of land area for poultry unit was found to vary between 600 ft<sup>2</sup> and 6500 ft<sup>2</sup> with an average of 1689.50 ft<sup>2</sup>. The buy-back company requires that the farmer has a minimum of 600 ft<sup>2</sup> of land allocation to grow at least 500 broilers. Some fulltime farmers had no other land allocated for crop husbandry or other animals. Thus the allocation of land area for agriculture varied from zero to 9 Ac with a mean of 1.12Ac. Most of the farmers in Anuradhapura and Matale districts were found to have and allocated for crop farming either paddy or home garden.

### Water source

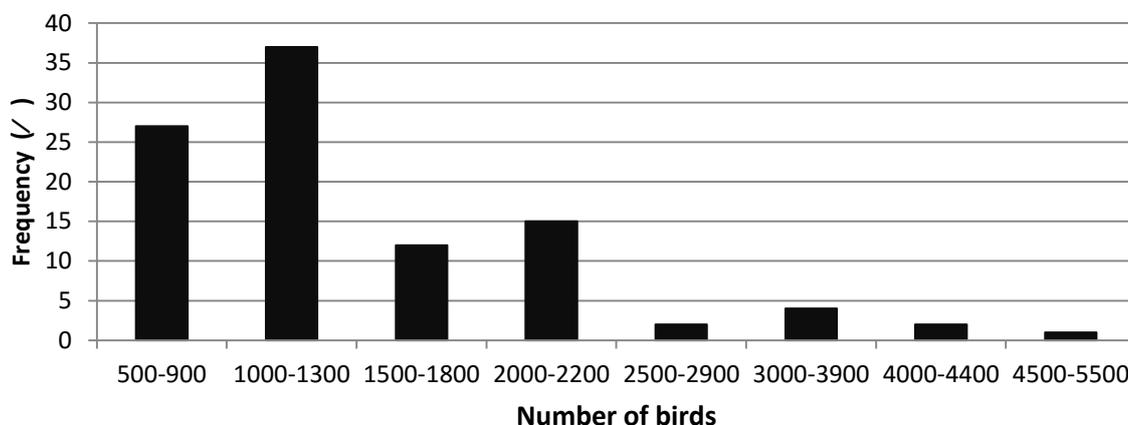
Out of the selected farmers, 63% of them were found to have regular pipe water while the rest had to resort to wells as water supply is necessary for a poultry operation. Only one farmer was found to use both pipe water as well as an own well.

## General farming information

### Scale of operation

Figure 4.6 shows that the scale of operation among farmers ranged from 500 birds to 5500 birds per farmer with an average of 1357.50 birds per farmer. The farmers who

want to make a contract with the present buy-back company require to have the ability to grow a minimum of 500 birds.



**Figure 4.1. Distribution of scale of operation among farmers.**

### **Farming experience**

Most of the farmers have experience of rearing 3-9 batches of broilers. About 10% of the farmers were found to be well experienced having reared more than 30 batches of broilers. The mean number of batches was 12.42 batches, with cycles per year. The present buy-back company requires the farmers to have experience of rearing at least three batches of broilers. It was found that the number of farmers signed contracts with the present company increased during the last three years. One of the important services provided by the buy-back company to the farmers is frequent visits to the farms by the field officers of the company to provide extension service as well as to monitor that the farmers maintain required management standards.

### **Bio-security measures**

Implementation of proper bio-security measures in live animal rearing is crucial for sustainability of the enterprise and health of workers and consumers. The buy-back company was found to use a check list to ensure proper implementation of bio-security activities.

Foot baths are essential to avoid spreading of diseases from one farm to another by field officers and visitors. Although the buy-back company advises the farmers constantly to maintain foot baths in all poultry sheds, over 60 percent of the farmers had no foot baths constructed in their farms. About 4 percent were found to have foot baths but not used regularly.

### **Housing**

The poultry houses were constructed on the advice of the buy-back company. However there were differences with respect to roofing materials, and wall and floor types. Majority of the farmers (54 %) preferred to use aluminum sheets as a roofing material.

The aluminum sheets can be used for more than 30 batches/cycles. However the initial cost for aluminum sheets is high. Use of cadjan leaves could bring down the initial cost but the longevity is low (6 batches/ cycles). The survey results showed that 75 % of the farmers used bricks to construct the walls of poultry units while the rest used clay as a cheaper alternative. In fact the choice of building materials was found to be based on affordability of the initial cost. Construction of floor of the poultry unit is very important under deep litter system. All farmers have adopted deep litter system instead of battery cages. Deep litter requires proper insulation and durable floors. About 64 % of the farmers opted to choose cement floors while the rest had selected clay floors as an inexpensive alternative.

### **Mortality**

The mortality percentage up to age of slaughter varied among farms from 1.2 % to a maximum of 14.56 %. The average mortality among the farms was 3.87 %. Even though the diseases occurrence was low many farms had deaths due inability to handle the fluctuation of heat in the units successfully.

### **Feed conversion ratio**

As feed is the greatest contributor to the cost of broiler enterprise, feed conversion efficiency is of great importance. Any unit with poor management conditions will reduce growth of birds and thereby lower the feed conversion efficiency. The survey results showed that feed conversion ratio among farms varied from 1.31 to 2.42 with a mean of 1.85. A ratio less than 2.00 is fairly acceptable and attention must be paid to improve housing and management of the farms that registered values above 2.00.

### **Analysis of costs and benefits**

Table 4.4. shows the mean ( $\pm$ standard deviation), minimum and maximum values of various items and associated costs, income and profit on overall and per bird basis. cost details with related to all the inputs, output and the profit. The buy-back company has provided inputs at a fixed price. Farmers received day-old chicks for a price of Rs 85 per chick. However, when the actual percentage of mortality was considered, the chick price per marketable bird varied from Rs 86.08 to Rs101.89. With respect to feeds, the starter ration was provided at Rs. 3815 per 50kg bag, and finisher ration at Rs 3645 per 50kg bag. Labour cost for the production was calculated based on the no. of hours a person spent on a batch. The average labour charges were considered as Rs. 400 per 8 hour working day. This value was based on the labour availability in the area around the farms. However, this may be somewhat low when compared to labour charges in general.

Depreciation cost was calculated by dividing the initial capital expenditure spend on the item by the number of batches it was used in general. Subsequently the value was divided by the batch size to calculate depreciation cost per bird basis. Table 4.4 shows that the mean profit per bird basis was Rs 19.75. When the above value was divided

by the live weight of marketable bird, the profit was Rs 8.42 per kg of live chicken. If the labour cost was excluded, assuming only family labour is used, the profit margin would increase up to Rs. 11.90 per kg of live weight. Due to diseases and other losses some farmers showed negative profits. This is quite usual when the mean profit margin is closer to zero.

**Table 4.4. Means, Minima and maxima of itemized costs and benefits of the poultry farmers surveyed.**

<b>Item</b>	<b>Mean± SD</b>	<b>Minimum</b>	<b>Maximum</b>
Starting batch size	1,348.27 ± 856.42	500.00	5,500.00
Chick cost per bird (Rs)	88.97 ± 2.60	86.08	101.89
Starter cost per bird (Rs)	127.40 ± 9.5	98.32	148.83
Finisher cost per bird (Rs)	140.35 ± 17.39	79.92	187.89
Rice polish cost per bird (Rs)	6.12 ± 5.73	0.00	25.25
Medicine cost per bird (Rs)	7.93 ± 2.92	1.73	16.21
Electricity cost per bird (Rs)	2.62 ± 0.63	1.38	5.54
Transport cost per bird (Rs)	4.38 ± 1.75	0.82	18.95
Litter cost per bird (Rs)	1.27 ± 0.72	0.00	2.80
Labour cost per bird (Rs)	7.16 ± 2.47	3.64	14.08
Depreciation cost per bird (Rs)	6.55 ± 3.25	2.05	14.50
Average weight per bird (kg)	2.07 ± 0.17	1.52	2.41
Total income (Rs)	533,400.00 ± 344,672.00	182,000.00	2,351,000.00
Income per bird (Rs)	413.83 ± 33.54	304.93	481.15
Cost per bird (Rs)	394.08 ± 21.35	336.23	460.88
Profit per bird (Rs)	19.75 ± 34.71	-64.91	109.08

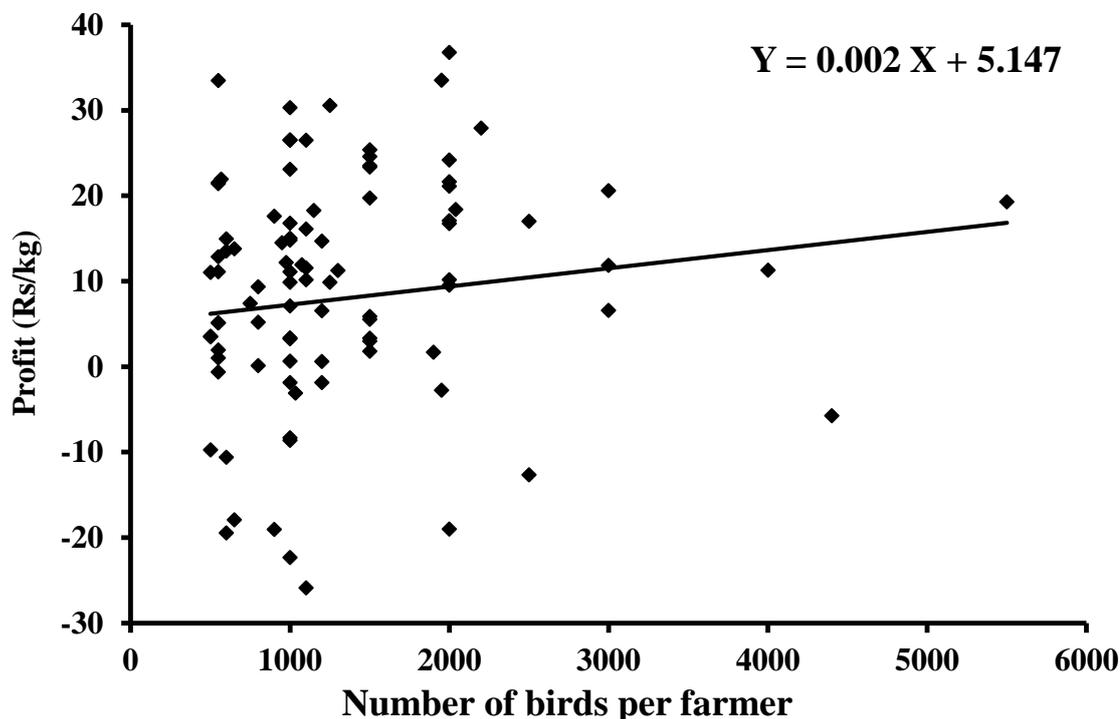
#### **4.12.1. Relative contribution of inputs to total cost**

Relative contribution of each input item to the total cost of production is important to understand how the production cost can be minimized. The percentage contribution of each input to the total cost was calculated for the sample of farms and given in Table 4.5. Price of the day-old chick was contributing to cost of production average of 22.64 % with a minimum of 19.85 % and the maximum of 26.95 % contribute for the total cost of production. This value is very high compared to many neighbouring countries where the range is around 10-15 per cent (Anon., 1996). Recent disease outbreaks and lack of day-old chicks in the market had inflated the day-old chick prices. Although the buy-back company provided the chicks at a fixed price, the price should be brought down further to make the final profit margin higher.

#### **4.12.2. Relationship between profit and scale of operation**

A linear regression analysis was performed between profit per kg of live weight of a bird and the total number of birds reared in the farm at a time (scale of operation). The positive relationship obtained (Figure 4.12) was significant ( $P < 0.05$ ). This finding follows the theory that the average cost of production decreases and profit increases with the expansion of scale of operation. The scatter plot also shows that some farmers

obtain twice more than the mean profit margin through efficient management procedures.



**Figure 4.12. Profit per kg of live weight according to the scale of operation.**

#### **4.12.3. Relationship of profit and age of selling**

The significant results of the quadratic regression analysis ( $P < 0.05$ ) performed between profit per kg of live weight of batches versus the age at which the batches are sold are in Figure 4.13. The first derivative of the prediction formula showed that the profit per kg of live weight increased from 35 days onwards reaching a maximum at 42-43 days of age. This indicates that the optimum age for slaughter under these operating conditions is somewhat later than the commonly used range of 37-38 days.

#### **4.13. Problems and risks encountered in the broiler farming**

The survey included information related to problems faced by the contract farmers with respect to operational activities of the buy-back system. Table 4.6 shows the degree of the problem and how each farmer classified the problem as he encountered.

It is interesting to note that not a single farmer has mentioned that occurrence of diseases, cost of feed, or high price of day old chicks as a major problem (Table 4.6). High capital requirement for initial investment however has been a problem for many farmers. The above responses show that the buy-back process is operating satisfactorily as far as farmers are concerned.

#### **4.14. Beneficial effects of the buy-back system**

The results regarding the preference of farmers with respect to the services obtained from the buy-back company. About 40 per cent of the farmers felt the technical services provided by the company are the most valuable for their operation. About 69 per cent of the farmers valued the extension service obtained as a help in carrying out the broiler operation. Many farmers seem to struggle with the infrastructure development as it requires initial capital and investments. About 60 per cent of the farmers were not satisfied with the support provided by the buy-back company in this regard. In fact buy-back companies would like to support and join farmers who have initial capital, land and other resources (Fazil, 2009). Many farmers who like to start poultry or expand the activity require financial assistance such as easy paying loan schemes, loans without guarantors, etc. Many buy-back companies do not have a system to promote such interested poor farmers.

## **CONCLUSIONS**

According to this study, the socioeconomic status of the buy-back farmers is such that many of them have completed secondary education, have their own land and some vehicle and conduct broiler farming as a fulltime operation. Most farms maintain less than 2000 birds at a time with fairly satisfactory management conditions and low disease incidences. Percentage contribution of cost for day old chicks to the total cost of production (23%) is much higher when compared with that of poultry operations in many countries of the world. Feed was another major contributor to the total cost of production (69%). The profit margin per kg of live weight of broilers was found to be Rs. 8.42 and Rs. 11.90 with hired or family labour, respectively. In overall, the farmers were generally satisfied with the services provided by the buy-back company such as extension, technical support and marketing. However they seem to prefer more support from the company on infrastructure development where lack of capital is a major constraint. Reduction of day-old chick price and feed cost and expansion of scale of operation were found to be the effective ways to increase the narrow profit margin prevailing at present and thereby to ensure sustainability of broiler industry in Sri Lanka.

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