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A Case Study: Factors Affecting On Milk Production Of Contract Farmers' Of The Swiss Cheese Company Private Limited In Nuwara-Eliya District

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ABSTRACT

This study investigated the factors affecting on milk production of the contract dairy cattle farmers' of Swiss Cheese Company Pvt. Ltd. in Nuwara-eliya district. A field survey was carried out using 50 farmers in Queensberry, Bogahawatta, Maskeliya, Kellewatta and Rozella villages. A pre-tested structured questionnaire was used.

The investigated farmers were virtually landless and farming is done in extremely small (118 ± 8.7 m^2) block of land, in most cases owned by commercial tea plantations. Herd size was found to be 2.26 ± 0.18 with low number of lactating cows (1.0 ± 0.12). Although, almost all cattle farmers practice stall feeding (96%), majority of them (68%) depend entirely on naturally grown low quality, mix weeds. The roughage and concentrate offered were 47.8 ± 4.35 and 1.1 ± 0.09 kg/cow/d, respectively. Although, the temperate cross bred dairy cows managed were at their 4 ± 0.4th parity, the milk production was found to be considerably low (6.7 ± 0.78 L/cow and 9.2 ± 1.14 L/herd). Age at first calving was 34 ± 0.2 and the calving interval was 14 ± 0.2 in months. Cost benefit analysis showed that the B/C ratio (per herd) was 2.36 ± 0.359, thus the farmers gain profits from cattle keeping.

The regression analysis reviled that calving interval, percentage lactating cows, expenditure on concentrate, AI, veterinary service and the amount of roughage offered are the factors that significantly ($P<0.05$) affect on herd milk production. Farmers' knowledge in cattle keeping was found to be significantly low possibly due to low level of formal education.

According to perception of farmers', lack of capital for improve housing facilities, unavailability of forage source, low milk productivity of cattle and low farm-gate milk price were identified as constraints in cattle farming in the studied area. Herd milk production from contract farmers could be improved by introduction of better feeding (i.e. concentrate and roughage) strategies.

Key words: Cattle, Milk production, Feeding, Calving interval, Expenditure

INTRODUCTION

Milk can provide a well balanced diet for new born calf, kid or human baby. Maduwe (2002) reported that, surplus milk brings regular income to rural families increases the GDP and contributes to national economy. Ranaweera (2006) reported that, Sri Lanka is largely self-sufficient in most animal products apart from dairy although the consumption of dairy products has increased dramatically. Swiss Cheese Company Co. Pvt. Ltd. claimed the 3rd leading dairy producer of the Island. Contribution of the small-scale dairy farmers is significant to the dairy industry of the country (Ranaweera, 2006). As a value added product producer and one of the leading dairy producer in Sri Lanka is Swiss Cheese Company (Kotmale) commenced the operation in a very small scale with a 40 L of milk can in Bogahawatta village, 24 km from Nawalapitiya towards Thalawakele in 1978. Presently the Kotmale processes over 13,000 liters of cow milk per day. During the period of 3 months before February 2010 the company reported a milk shortage of 430 liters/day (Bogahawatta milk reception record book, 2010). There is unpublished evidence that the contract farmers are moving away from dairying to other sectors contributing the heavy milk shortage. Therefore, sustainability of small-scale dairy sector became a hot topic of current debates which demanded closer investigation. The present study was designed to investigate the factors affecting on milk production of contract farmers' of Swiss Cheese Company in Nuwara-Eliya district. The potentials and constraints of the formers were investigated. Null hypothesis of the report is "There is no relationship between total milk production and X", where X = (X1= X2 = X3 = X4)

Objectives

1. To identify the factors affecting on milk production of contract farmers' of Swiss Cheese Company Pvt. Ltd. Farmers in Nuwara-eliya district.
2. To identify the major constraints of the contract farmers.

MATERIALS AND METHODS

Methodology

The study was conducted in five dairy villages, namely Queensberry lower division, Kellewatte, Maskeliya, Rozella and Bogahawatta in Nuwara-eliya district, Sri Lanka (Figure 3.1). The dairy

farmers in these estates mainly supply milk to Swiss Cheese Company at Bogahawatta. The data was collected from 1st of May to 30th May 2010. Fifty small scale dairy farmers were randomly selected from stratified 5 dairy villages supplying milk to Swiss Cheese Company. The number of farmers used from Queensberry lower division, Bogahawatta, Maskeliya, Rozella and Kellewatta were 14, 11, 11, 12 and 02 respectively. A pre-tested structured questionnaire was used to collect the data and a multiple regression analysis was used to estimate the model. The model used can be depicted as,

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5$$

Where; Y: Herd milk production (L/m), X_1: Lactating/Herd size (%), X_2: Total expenditure (Rs/herd/m), X_3: Roughage offered (kg/herd/m), X_4: Calving interval (m)

Figure 1.1: Study area (Nuwara-eliya district) and sampling sites.

(Source: Ministry of Agriculture. Sri Lanka 2010)

1.1 One-Proportion test

To compare the farmers knowledge on cattle keeping, shed condition, ventilation in the shed, floor condition of the shed, satisfaction of veterinary service, AI service, LDO/LDI service and extension services; 1-proportion test was used with significant value of α = 0.05 and the test

proportion of 20%. Farmer's responses were ranked from 1 to 5, where 1, 2, 3, 4 and 5 as strongly agree, agree, neither agree nor disagree, disagree and strongly disagree respectively. To analyze this, rank 1 and 2 were defined as agree (event 1) and rank 3, 4 and 5 were defined as disagree (event 2).

Descriptive Statistics

Descriptive statistical analyses were checked before interpreting the results. Mean, Standard mean error (SE Mean), Percentage (Percent), Cumulative percentage (Cumpct) were included in this analysis. Also "Tally individual variables" also run to define the percentages and frequencies of individuals.

RESULT AND DISCUSSION

The performance of cows in terms of low milk yields, late age at first calving and long calving intervals were observed and attributed to low levels of nutrition and management. Quantitative and qualitative feeds were limiting in the study area. Natural pastures and mix with weeds, crop residues were the primary feed resources. The high cost of commercial concentrates resulted in inconsistent and inadequate concentrate supplementation for increased milk yield.

Socio-demographic

Most of the investigated farmers were Hindus (96%) while rest is Catholics. Most of the villagers (32.5) were 16-30 years of age, where 17% were unproductive workers (0-15 years). Among these 31-60 years age group were involved in cattle farming, which accounts for 45% shown in graph 4.1.

Involvement in cattle farming

Family size in the study area was 5± 0.3 which influenced the need for increased milk production for home consumption as well as for the market. Bartlett (1980) reported that family size has been asserted as the most important determinant of labour investment for small holder. Most of them 30% were primary educator. Nyangito (1986) reported the adoption of new and improved technologies in agriculture was positively related to education.

The involvement in cattle farming (forage search and offer feed, cleaning the shed and animals, and milking) of households were 145.2±8.24 h/m. People with 31 to 60 years were involved more in cattle farming.

System of management

Hindus manage animal in closed shed with little or no allowance for grazing, thus these can be the reasons for higher number of farmers (96%) practiced in-house system.

Land size

The investigated farmers were virtually landless and farming is done in extremely small (118±8.7 m^2) block of land, in most cases owned by commercial tea plantation. Most 62% farmers were not growing forage. Sheds were significantly ($p < 0.05$) not in a good condition of floor and ventilation. Mahipala et.al. (2003) reported that, poor housing contributes the formation of undesirable gases effects on health and production of cattle.

Farmer's knowledge and attitudes towards cattle farming

Overall knowledge of the farmers on cattle farming was significantly ($p<0.05$) poor. Most of the farmers (86%) agreed with the night feeding but disagreed with concentrate and forage offered influenced the milk production. Most of the farmers (56%) disagreed with feeding during dry period and the duration of dry period. Most of the farmers (52%) disagreed with Colostrum feeding for calves for first 3 days.

Regression Equation

$$Y = -167.480 + 2.118\, X_1 + 0.032\, X_2 + 0.028\, X_3 + 16.011\, X_4$$

Herd size and composition

European cross bred dairy cattle were the dominant with the study area. Herd size was found to be 2.3±0.18 with low number of lactating cows (1.0 ± 0.12) shown in table 4.1.

Percentage of lactating cow in the study area was 41.7±4.89. Having milking cows above 80% in a herd indicated the high genetic potential of cattle and acceptable standard of management (Mahipala et. al., 2003). Milking cows and dry cows were the most important category in terms of milk production. Heifer calves 23.9±5.26, suckling calves 15.1±3.07, bull 2.6±1.36 were

considered as unproductive and lactating and dry cows accounts for 58.4±9.62 % of the herd. Thus percentage of lactating cow /herd size indicates in poor milk production from the herd. Suckling calves has an effect on reproductive performance of a cow. Most (98%) of the farmers were adopted milk feeding after milking from the cattle. Amount of milk drunk by the calves were not known. The proportion of the herd producing milk compared with unproductive stock (calves, heifers, and bulls) has an effect on total herd productivity. Farmers answered that, they reluctant to sell the bulls, female calves for meat purpose, which limited the amount of feed offered per cow.

Table 1. 1: Herd composition (Mean ± SE)

	Number of cattle		Cattle units (CU)*	
	#	%	#	%
Lactating cows	1.0 ± 0.12	41.7 ± 4.89	1.0 ± 0.12	46.2 ± 5.10
Dry cows	0.3 ± 0.08	16.7 ± 4.73	0.3 ± 0.08	17.1 ± 4.76
Heifer calves	0.4 ± 0.09	23.9 ± 5.26	0.3 ± 0.07	23.1 ± 5.25
Suckling calves	0.4 ± 0.09	15.1 ± 3.07	0.2 ± 0.04	10.1 ± 2.10
Bulls	0.1 ± 0.04	2.6 ± 1.36	0.1 ± 0.06	3.5 ± 1.77
Herd size	**2.3±0.18**	**100**	**2.0 ± 0.17**	**100**

*: Lactating or Dry cow = 1 CU; Heifer calves = 0.75 CU; Suckling calves = 0.50 CU; Bull = 1.5 CU.

Income and Expenditure

Table 1.2: Monthly expenditure and income

	Per cow	Per herd
Expenditure(Rs)		
- Concentrate and mineral supplement	2117 ± 307.0	4580 ± 539.0
- Veterinary	39 ± 7.8	152 ± 120.0
- Insemination	95 ± 20.7	73 ± 11.0
- Total	2251 ± 321.0	4805 ± 546.0
Income (Rs)		
- Morning	2978 ± 403.0	3563 ± 406.0

- Evening	1861 ± 240.0	2254 ± 250.0
- Total	4839 ± 635.0	5817 ± 647.0
Benefit/Cost	2.36 ± 0.359	1.34 ± 0.184

Eighty four percent of the farmers were practicing two times milking in unsystematic sequences. Milk production was found to be 6.7 (±0.78) (l/cow/d), 9.2 (±1.14) (l/h/d) shown in table 4.3). Crossbred cows produced 10.3 (l/cow/d) in Kotagala, and 8 (l/cow/d) in Hawa-eliya (Nuwara-eliya district) (Mahipala et. al., 2003). Comparatively daily average milk production from contract farmers was slightly low. Swiss Cheese Company Private Limited collected the milk at a rate of 28.10 (±0.597) (Rs/l) (varied with fat and SNF). The total income per cow was 4839 (±635.0) Rs lower than herd income (5817 ± 647.0 Rs) shown in table 4.3.

Cost benefit analysis showed that the B/C ratio (per herd) was 1.34±0.184 lower than (per cow) 2.36±0.359, thus the farmers gain profits from cattle keeping shown in table 4.2. Expenditure on concentrate, AI, veterinary service significantly (p-value < 0.005) affected the milk production.

Feeding

Ninety six percent of them practiced stall feeding 47.8 ±4.35 kg/cow/d. majority of them (68%) depend entirely on naturally grown low quality, mix weeds. Feeding of natural vegetation

Table 1.3: Feeding and production

	Per cow	Per herd
Feeding(per day)		
- Roughage feeding (kg)	47.8± 4.35	80.0 ± 2.95
- Concentrate supplement (kg)	1.1 ± 0.09	2.0 ± 0.12
- Mineral supplement (g)	9.1 ± 0.84	20.6 ± 2.64
Milk production (L/d)		
- Morning	4.0 ± 0.47	5.5 ± 0.66
- Evening	2.7 ± 0.31	3.8 ± 0.49
- Total	6.7 ± 0.78	9.2 ± 1.14

especially grasses which is low in digestibility, crude protein and digestible organic mater results low productivity, especially amongst improved cattle (Ibrahim et. al., 1999). Therefore source of forage offered to the cattle should fulfill the nutrition requirement to get the sufficient yield. Combination of coconut poonac, cattle feed feeding was practiced by only 40%. The increasing prices for concentrate was also limited the amount of concentrate offered 1.1±0.09 kg/cow/d, 2.0±0.12 kg/h/d shown in table 4.3. This amount of feed offered was not enough to get the optimum production in case of improved dairy cattle. Cattle should be fed with 10 %, 3% of their body weight in fresh matter and dry matter basis respectively. Seventy four percentages of the farmers fed mineral (9.1±0.84) g/cow/d, shown in table 4.3.

Individual cow productivity

a. Age at first calving

Heifers become age at first calving at the age between 24–30 months (Ibrahim, 2000). these improved performance indices may be the expression of inherent production potential, result of better nutrition or both. Age at first calving in the study area was 34±0.2 m, while maximum and minimum age at first calving was 39 and 31 m respectively.

Prolonged age at first calving may due to inadequate nutrition and poor management. This is due to high cost of concentrates which increased the expenditure. Cows in good body condition at calving produce higher milk yield during the following lactation than in cows in thin body condition at calving.

Table 1.4 : Individual cow productivity

Factors	Mean± SE	Maximum
Age at first calving (Month)	34 ± 0.2	39
Present lactation number	04 ± 0.4	13
Dry period(Month)	03 ± 0.1	03
Calving interval(Months)	14 ± 0.2	16
Lactation length(Months)	08 ± 0.3	14
No of AI carried out for present or previous calf / foetus	02 ± 0.1	05

b. Parity

Milk production maximized in the 4th and 5th lactation which 30% higher than first lactation. This is due to increasing development and size of the udder, and the increasing body size. The present lactation number found in the study area was 4±0.4 m, while maximum and minimum parity of the cattle found in the herd was 13 and 1 respectively. Although, the temperate cross bred dairy cows managed were at their 4±0.4th parity, the milk production was found to be considerably low due to poor management practices, mastitis and other diseases such as ticks and injuries in the farm and damages in the udder.

c. Dry period and calving interval

Dry period longer than 60 days in length does not result in a significant increase in milk production. The study area showed the dry period of 3 m. Longer dry periods decrease the average annual production of the cow by extending the calving interval beyond the normal 13-14 month interval and causing a decrease in the lifetime production of the dairy cow. Most significant (p-value < 0.05) factor affecting on milk production in the study area was calving interval 14±0.2 shown in table 4.4.

Disease

Helminthiasis (for example round worms), ticks and injuries were the prevalent health problems in the study area. Medicines were available to the households through local veterinary extension assistants, but most of the households did not vaccinate cattle due to lack of money.

Extension services

Although Veterinary doctor, AI technician, EO visited the farms, overall satisfaction of Veterinary doctor, Extension officer were significantly (p-value < 0.05) not satisfied but AI technician was significantly satisfied.

Talawakele and Hatton veterinary division officers and doctors were included in this study area during last 3 months veterinary doctor, AI technician and extension officer visited the farm was 0.70±0.115 times/ farm,1.54±0.160 times/farm, 0.14±0.064 times/farm respectively. Doctor

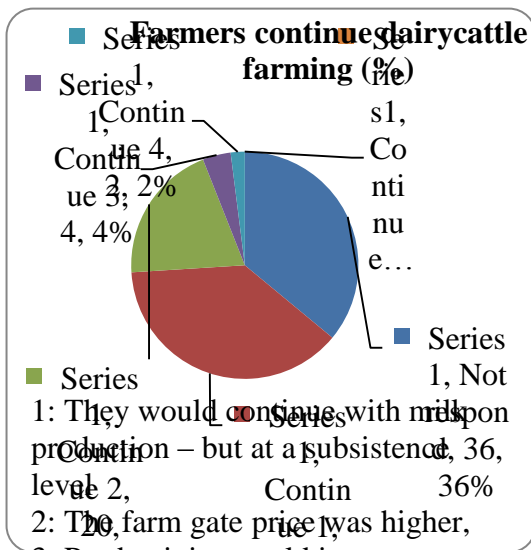visited for the purpose of 30% pregnancy diagnosis, 20 % to check the disease and treating the cattle.
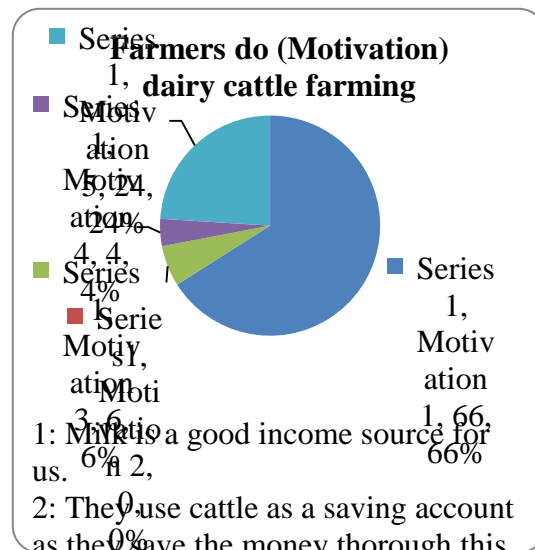
Farmers perception

Farmers doing cattle farming, because it is a income source for them, saved the money, no any jobs to do therefore they tried to do farming for earnings. They continuing cattle farming, because continue with milk production but at a subsistence level, Productivity would improve when invest in their farm, the farmers felt comfortable with their scope of current operations. They liked to expand the cattle farming because, to earn more profit by increase their herd size and get more milk production.

Constraints in cattle farming

According to perception of farmers', lack of capital for improve housing facilities, unavailability of forage source, low milk productivity of cattle and low farm-gate milk price were identified as
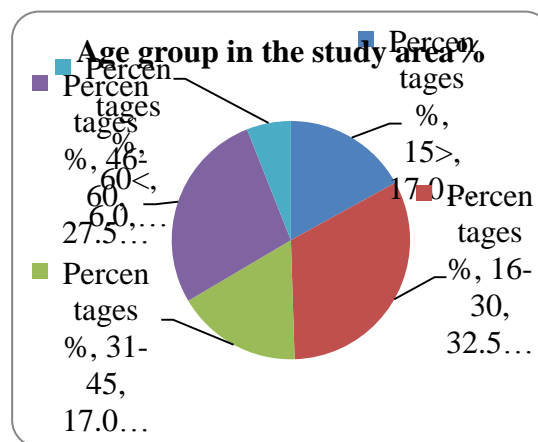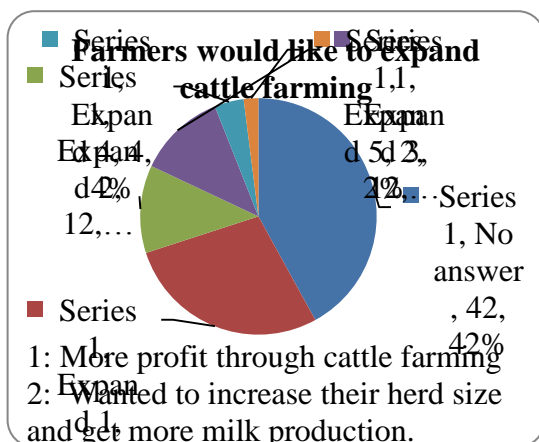

constraints in cattle farming in the studied area.

Graph 1.1: Continue in cattle farming   **Graph 1.2: Motivation in cattle farming**

Graph 1.3: Farmers expand in cattle farming   Graph 1.4: Age group (%)

CONCLUSION

The regression analysis reviled that calving interval, percentage lactating cows, expenditure on concentrate, AI, veterinary service and the amount of roughage offered are the factors that significantly (P<0.05) affect on herd milk production. Farmers' knowledge in cattle keeping was found to be significantly low possibly due to low level of formal education.

Herd milk production from contract farmers could be improved by introduction of better feeding (i.e. concentrate and roughage) strategies.

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