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Feeding Management towards Productivity of Small Scale Dairy Farming in Bangladesh

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Keywords

Feeding, management, traits, dairy farming.

Abstract

The study was conducted to assess the productive and reproductive performances of small scale dairy farming in some selected areas of Pabna and Sirajganj district. The focus of the present study was to determine the feeding management practices of small scale dairy farming. Accordingly, a total of 65 crossbred cows, 40 were under improved feeding management practices and 25 were under traditional feeding management practices. The cows were 3 to 6 years old, 250 -320 kg body weight, 1-6 parity and 1.5 -2.5 body condition score (BCS). Data were collected for both improved and traditional feeding management practices. The parameters studied were dam body weight, body condition score , Lactation length, total milk yield, average milk yield,peak milk production,days required to reach peak,days open, service per conception, hours to release placenta, calf birth weight, weaning age of calf, weaning weight of calf and average daily growth (ADG). Theaverage milk yield,total milk yield,peak milk production, days required to reach peak,average days open, service per conception, hours to release placenta, calf birth weight, weaning age of calf, weaning weight of calf and average daily growth (ADG) in both feeding management practices were9.9±0.3 and5.3±0.5 litre/ day, 3253.7±107and1826.2±192.4 litre/ lactation, 14.1±0.3 and 8.4±0.6 litre/ day, 63.0±2.9 and 88.0±5.2 day, 3.0±0.1and 2.1±0.2,76.3±3.3 & 180.8±5.9 day, 1.5±0.1 and 3.6±0.3, 1.8±0.3 and 11.9±0.5 hour, 28.4±0.5 and18.4±1.0kg, 94.4±2.5 and 205.7±4.5 day, 70.7±1.4 and 79.6±2.5 kg and 455.7±9.6 & 298.0±17.3 gm/day respectively. All mentioned parameters differ significantly between improved and traditional feeding groups ($p<0.01$ significant while dam body weight, lactation length and gestation period was insignificant. Birth complicacies were found higher (44%) in traditional feeding management practices and lower (2.5%) in improved feeding management practices group. It has been concluded that adoption of good feeding management practices will significantly improve the productive and reproductive performances of dairy cows which ultimately will be an excellent tool for maximizing farm`s profitability and long-term sustainability of dairy sector in Bangladesh.

Introduction

The estimated number of milking cows in Bangladesh is about 10 million (Livestock Banglapedia) among a total cattle population of 23.79 million (Bangladesh Livestock Economy-2015-16), that are in the hands of small scale farmers and being reared under traditional management systems. The milk production of local cows by traditional feeding system of Bangladesh is unlikely to exceed 1.5 litre of milk per day per cow and for crossbred it would be 5-8 litres per day per cow. These stocks then require better nutrition through balanced concentrate diet and better quality green fodder in year round (Khan *et al.,* 2009).

Milk production is 7.28 million metric tons against the demand is 14.70 million metric ton, per day per head demand of milk is 250 ml and availability is 125 ml with the deficit of 124 ml per capita. GDP growth rate of livestock production is 3.2 percent (Bangladesh Livestock Economy-2015-16). The estimated human population in the country is 1.7 billion. The human and animal populations are very much affected by nutritional problems due to lack of high nutritional food value. Therefore, to solve this problem, people need a better supply of animal protein of higher nutritive food value which can be best derived from improved animal production. In this regard, among livestock products, more milk production can play an important role for improving nutrition of rural and urban people.

In greater Pabna district and other adjacent area are affected by seasonal floods, which can lasts for four months each year in which the house and cattle shed may go under water. During this period, only feed source for cattle is rice straw and concentrate ingredients such as wheat bran, crushed maize, lentil bran and mustard oil cake; these feed ingredients tend to be of poor quality. In local markets, available processed feeds are marketed by different companies.

Farmers generally mix water into their concentrate feed which is usually offered twice a day. This provides a very limited water intake much below according to their daily requirements. The roughage sources are mainly rice straw, Napier grass, Jumbo forage sorghum, whole black gram and kheshari. Farmers provide this green fodder, usually unchopped, in bamboo made feed troughs which are very unhygienic. Therefore, there are high wastages of green fodder and rice straw leading to increased production costs and decreased milk yields.

The feeds of cattle and buffalo are mainly agricultural by-products, such as crop residues, rice straw, tree leaf etc. They are grazing on natural pastures of non-arable land. During the day, they are allowed to graze on communal grazing land, natural pasture, homestead forest and fallow land. Occasionally, cows with calves are kept tethered just outside the house.

In terms of reproductive performance, in study area, repeat breeding is common. Postpartum period is prolonged. In Bangladesh, virtually all cows have been suffering from malnutrition due to poor quality feed ingredients and nutritionally imbalanced diets (Ghosh *et al.,* 1993) and (Jalil *et al.*,1995).

High milk production and imbalanced ration feeding is one of the most important causes of reproductive disorders in crossbred cows (Shamsuddin *et al*., 1988). Most of the farmers fed their cows carbohydrates rich feeds with inadequate nutrition during pregnancy. There are problems in formulating appropriate livestock feeding strategies for crossbred and indigenous dairy cattle. Therefore, documenting the livestock feed resources and feeding systems of the area is crucial to designing appropriate interventions to enhance productivity dairy cows in this area.

In the study area, dairy farmers purchase feed ingredient by credit from shop keepers who often promote poor quality feed at high prices, resulting low milk production, increasing repeat breeding and health care costs. On the other hand, middlemen or local agents had fixed the milk price during milk selling; which is less than market prices, because farmers take advanced money or loan from those middlemen or local agents. Due to payment of high amounts of loan they have to sell their valuable cows. Therefore; farmers are losing and dairy cattle herd sizes are decreasing day by day.

Feed resources and their nutritional values are important for improving milk production and reproductive efficiency as well as enhance food security in the study area. Therefore; the result of this study will help to individual or institution working as a dairy worker in Bangladesh, as well as dairy policy makers. In addition, the study will enrich our base of knowledge in the area and will serve as a springboard for the future research and development work. With this end in view, the studies were undertaken for following objectives;

-Effect of feeding management on productivity of small scale dairy farming in greater Pabna district.

-To compare productive and reproductive performance between improved feeding management practices vs. traditional feeding management practices.

Materials and Methods

Selection of the study area

The study was conducted from July 2015 to June 2016at the selective areas in Pabna and Sirajganj district which is north western part of Bangladesh. Most of the people in these area are engaged with crop production and dairy farming and the study area are known as the milk pocket of Bangladesh.

Selection of experimental cows

Total 65crossbred dairy cows (Local x Friesian) were selected from 65 small holder farmers in g Pabna and Sirajgang district. Among 65 crossbred cows 40 were under improved feeding management and 25 were under traditional feeding management practices. The cows were 3 to 6 years old, 250 -320 kg body weight, 1-6 parity and 1.5 -2.5 body condition score (BCS).

Parameters studied

Dam body weight : Body weight means live weight which can measure by using sheiffer's formula

Body weight= L x (G2)/ (300x2.2) = kg

Body condition score (BCS): Body condition scoring (BCS) is a useful management tool for distinguishing differences in nutritional needs of cows in the herd. This system uses a numeric score (1 - 5) to estimate body energy reserves in the cow.

Lactation length: The lactation length was measured in days.

Total lactation yield: The total quantity (litres) of milk produced throughout the lactation is considered as total lactation yield.

Average milk yield per day: It is the total milk yield in lactation divided by total number of days in that lactation and was measured in litters.

Peak milk production per day: Highest milk production per day in a lactation which measured in liters.

Days required to reach at peak: Milk production trend is early lactation increasing after calving then reach peak production in mid lactation and gradually decreasing in late lactation.

Gestation period: The period from the date of service (actual conception) to the date of parturition is termed as parturition period or pregnancy period.

Days open: The time from when a cow calves until when she conceives.

Service per conception: The average number of services required for each successful conception.

Hours to release placenta: The time required for release of placenta naturally after parturition.

Calf birth weight: Live weight of calf at birth. It was measured by kg.

Weaning age of calf: The average age, at which calves are weaned off milk, which may be provided by the dam or by artificial means. This typically happens at 6 to 8 weeks of age.

Weaning weight of calf: Weaning weight means measurement of live weight of calf at the time of weaning. Calves reared on a high milk system can be weaned at a minimum of 75-80 kg.

Average daily growth (ADG) up to weaning: Average daily gain is simply the rate of weight gain per day over a specified period of time.

Feeding practices

Improved feeding

All animals were fed according to the BDEP formulated ration (wheat bran-50%, Rice bran-15%, Maize Crush-10%, Soybean meal-19%, Sugar-5%, Limestone-0.5% and Salt-0.5%) rations according to individual requirement of CP (gm), DM (kg) and MJME and maintained improved management. Chopped maize green fodder was provided 20 kg per head/day together with concentrate feed three times daily to all cows along with 2 kg rice straw for filling

the stomach and aiding digestion. Adlibitum fresh clean water was supplied.

Traditional feeding

In traditional management system, cows were fed with available ingredient such as wheat bran, lentil bran, rice bran and mustard oil cake that were insufficient. Green fodder like Jambo, Napier, Bura, kheshari, Black gram and local grass were provided to the cow without chopping or processing. During monsoon, they were fed only unchopped rice straw and small amount concentrate feed. All animals were tied up in front of feed trough and water provided two times daily.

De worming, Vaccination and CMT test

Before starting the study, selected cows of improved feeding management group were de wormed and vaccinated using Anthrax and FMD vaccines. California Mastitis Test (CMT) perform to find out sub-clinical mastitis and then to prevent clinical mastitis. Cows under traditional feeding management were not de wormed, vaccinated and California Mastitis Test (CMT).


Photograph-1. Vaccination and CMT

Improved management

Improved feed troughs were made into two separate mangers one for feeds and fodder supply and another for only 24 hours water. Good housing and environment was provided


. **Photograph: Improved feeding and housing management**

Traditional management

Farmer usually provided feed mixed with small amount of water which was also unhygienic. There was no ventilation and free space for sand bed. The cow shed were too low and drainage systems were very poor. Farmers provided unchopped green fodder and rice straw;

Photograph-3. Traditional Feeding and Housing Management

Data collection

Data were collected every day as follows: morning and evening milk production, concentrate feed intake, roughage intake and residue or left over of feed and others information about the cow by well formatted data collection sheet for both improved and traditional feeding management practices.

Statistical analyses

The significant levels tested by least-squares analyses of variance using the Generalized Linear Model (GLM) procedure of the Statistical Analysis System (SAS) (SAS institute Inc., 2009) computer package, version 9.1.3 to find out the effects of parameters. Duncan multiple range test (DMRT) was performed to separate mean values if they were statistically significant.

Results and Discussion

Results from the 40 improved and 25 traditionally managed cows, and their calves, are presented in the following table.

The average milk yield, total milk yield, peak milk production, days required to reach peak and body condition score (BCS) were in improved and traditional feeding management 9.9±0.3, 5.3±0.5 litre/ day, 3253.7±107.6,1826.2±192.4 litre/ lactation, 14.1±0.3, 8.4±0.6 litre/ day, 63.0±2.9, 88.0±5.2 day and 3.0±0.1, 2.1±0.2 respectively. All mentioned parameters differed significantly ($p<0.01$) (Table 1) between improved and traditional feeding management practices while body weight and lactation length showed insignificant variation. Kamal *et al.* (2009) found that milk production 30 % increased in maize based concentrate supplement for local cows. Huque (2014) indicated that, the average milk production per day/ cow, lactation length of crossbred cows under the rural dairy system was 6.39 litre and 300 days respectively. Another study of Huque *et al.* (2014) indicated that an average rural dairy in the selected area having an average herd size of 1.3 produces 1.20 Kg milk/cow, and a crossbred cow, having support of better feeding and nutrition in a structured market area produces 9.80 Kg milk/head daily. Ahmed (2006) showed that feeding increased the milk yield significantly ($P<0.01$). The average milk yield of some crossbred cows was significantly ($P<0.01$) higher than in some other crossbreds which affected by malnutrition.

Table 1. Production performances of dairy cows in different feeding practices

Trait/ Parameter	Improved feeding management	Traditional feeding management	Level of significance
Dam body weight (kg)	385.5±6.9 (40)	316.7±12.4 (25)	NS
Body condition score (BCS)	3.0±0.1 (40)	2.1±0.2 (25)	**
Lactation length (day)	325.3±5.37 (40))	341.5±9.61 (25)	NS
Total milk yield (L/lactation)	3253.7±107.6 (40)	1826.2±192.4 (25)	**
Average milk Yield (L/D)	9.9±0.3 (40)	5.3±0.5 (25)	**
Peak milk production (L/D)	14.1±0.3 (40)	8.4±0.6 (25)	**
Days required to reach peak (d)	63.0±2.9 (40)	88.0±5.2(25)	**

**Significant at 1% level ($p<0.01$);NS=Non significant; Figures in the parentheses indicate number of observation.

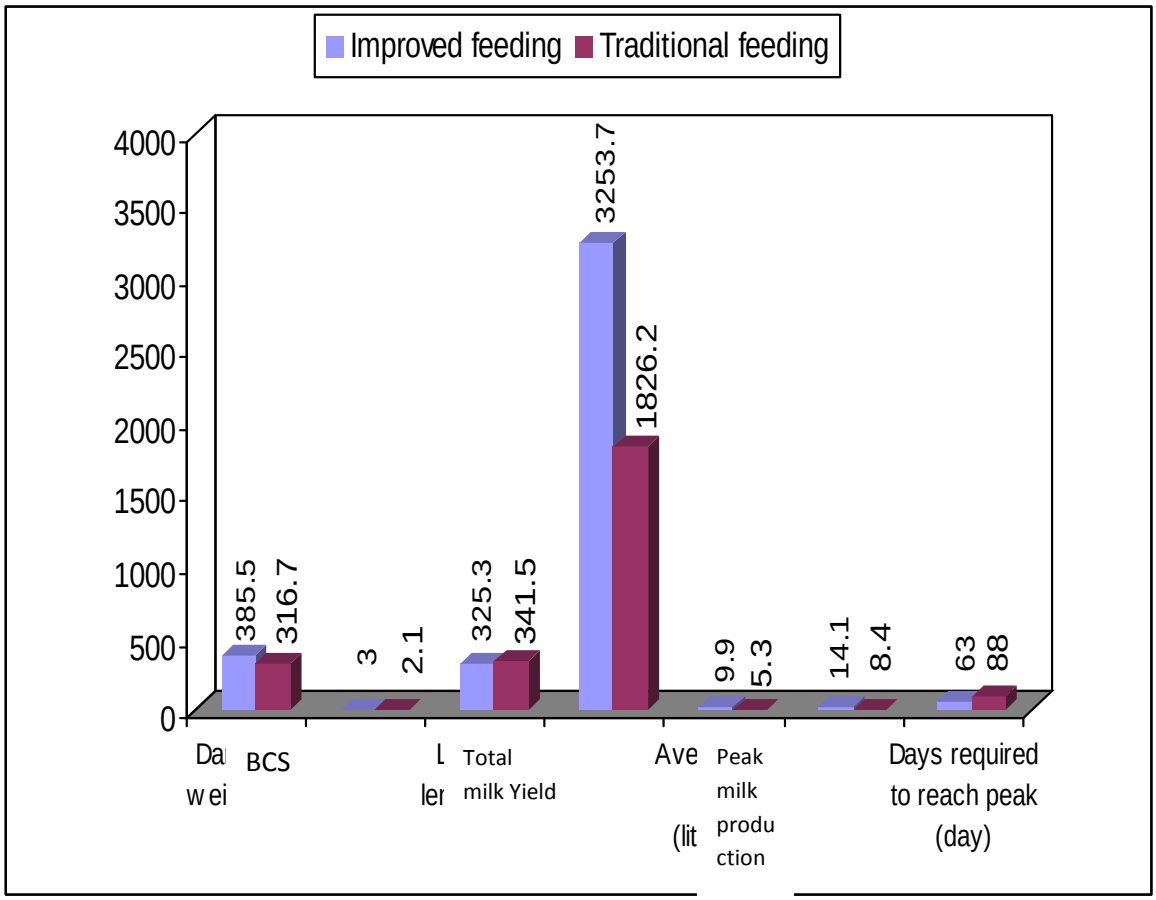

Figure 1.Production performances of dairy cows in different feeding practices

Days open, service per conception and hours to release placenta in improved and traditional feeding management were 76.3±3.3, 180.8±5.9 day, 1.5±0.1, 3.6±0.3 and 1.8±0.3, 11.9±0.5 hour respectively. All mentioned parameters differ significantly ($p<0.01$) (Table 2) between improved feeding management practices and traditional feeding management practices. Gestation period did not vary significantly in between improved and traditional feeding management practices. More or less similar findings were found by Alam and sarder (2010) they reported that services per pregnancy of cows in groups A, B and C were 1.7 ± 0.7, 1.9 ± 0.6 and 2.5 ± 0.9 which significantly affected by body condition score (BCS) and body weight. Kamal (2010) observed that, Days open in case of non-descriptive cows was 120.04 ±7 days and service per conception was 1.76, 1.78 and 1.6 respectively.

Table 2. Reproductive performances of dairy cows in different feeding practices

Trait/ Parameter	Improved feeding management	Traditional feeding management	Level of significance
Gestation period (day)	283.1±0.6 (40)	283.3±1.0 (25)	NS
Days open (day)	76.3±3.3 (40)	180.8±5.9 (25)	**
Service per conception	1.5±0.1 (40)	3.6±0.3 (25)	**
Hours to release placenta (hour)	1.8±0.3 (40)	11.9±0.5 (25)	**

**Significant at 1% level ($p<0.01$);NS=Non significant; Figures in the parentheses indicate number of observation.

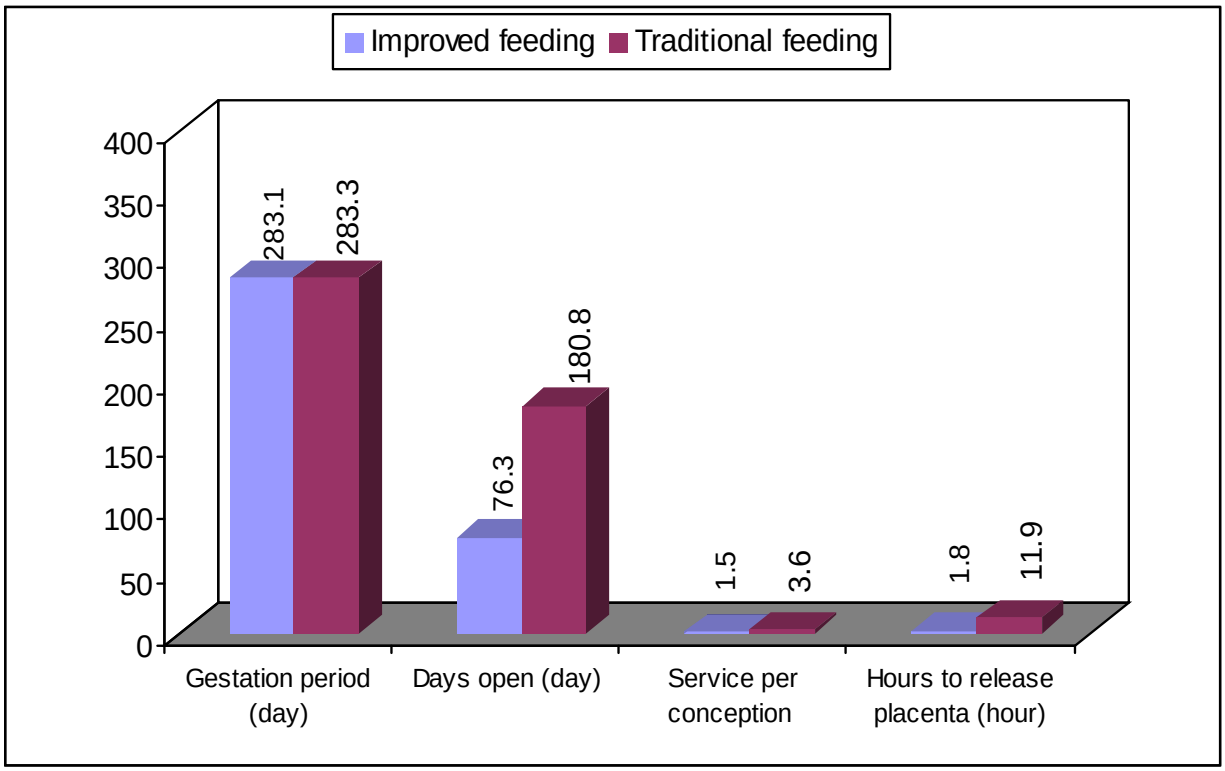

Figure 2. Reproductive performances of dairy cows in different feeding practices

The average daily growth (ADG) up to weaning, calf at birth weight, weaning age and weaning weight were in improved and traditional feeding management 455.7±9.6, 298.0±17.3 gm/day, 28.4±0.5, 18.4±1.0 kg, 94.4±2.5, and 205.7±4.5 day, and 70.7±1.4, 79.6±2.5 kg respectively. All the mentioned parameters differ significantly ($p<0.01$) between improved feeding management practices and traditional feeding management practices (Table 3). Result agreed with Hossain *et al*. (2016) who found that female calf birth weight, body weight at 60 days of age and average daily weight gain were 28.06±1.24, 52.00±1.57 and 0.398±0.024 kg respectively which were similar with calf birth weight and other two parameter differed with other researcher due to age, small sample size sample collection error etc.

Table 3. Calf performance during experimental period in different feeding practices

Trait/ Parameter	Improved feeding management	Traditional feeding management	Level of significance
Calf birth weight (kg)	28.4±0.5 (40)	18.4±1.0 (25)	**
Weaning age of calf (day)	94.4±2.5 (40)	205.7±4.5 (25)	**
Weaning weight of calf (kg)	70.7±1.4 (40)	79.6±2.5 (25)	**
Average daily growth(ADG) (gm/day) up to weaning	455.7±9.6 (40)	298.0±17.3 (25)	**

**Significant at 1% level ($p<0.01$); Figures in the parentheses indicate number of observation.

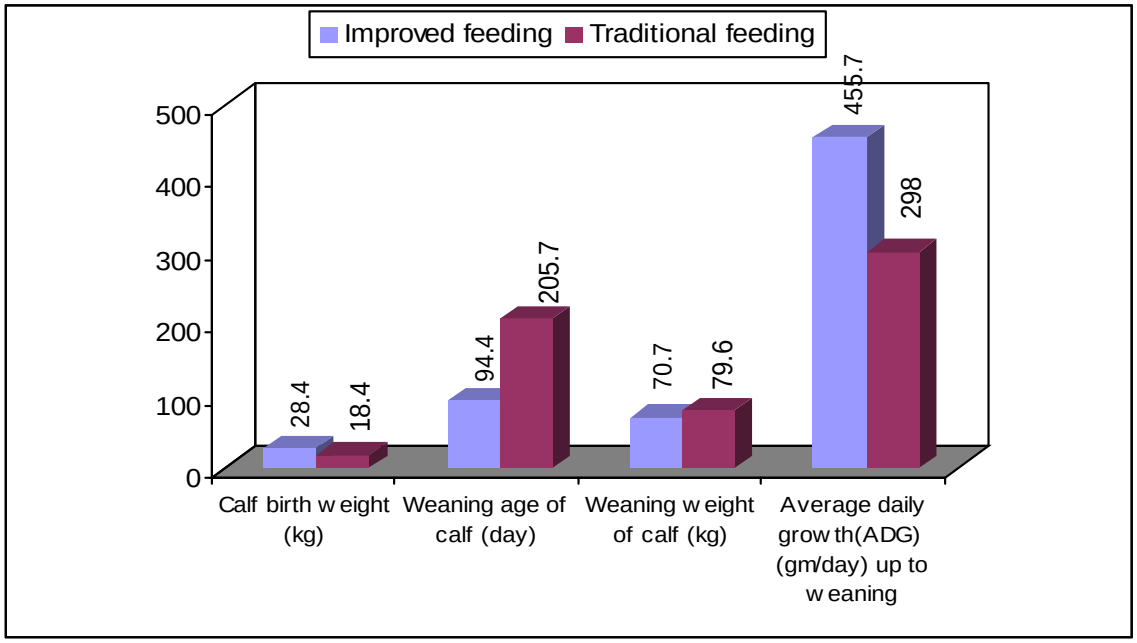

Figure 3. Calf performance during experimental period in different feeding practices

Conclusion

The study revealed that under improved feeding management practices group gained knowledge to improve feeding management, advance animal husbandry and reduced feeding cost which helped to increase the production as well as income from small scale dairy farming.

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