



An Official Journal of Bangladesh Livestock Research Institute (BLRI)

## Bangladesh Journal of Livestock Research

Journal Homepage: <https://www.banglajol.info/index.php/BJLR>



ISSN 1022-3851

### Case Study

## A case study on year round fodder production scheme for smallholder dairy producers in Bangladesh

N.R. Sarker, F. Tabassum D. Yeasmin, M.A. Habib, and M.R. Amin

Fodder Research and Development Project, Bangladesh Livestock Research Institute  
Savar, Dhaka-1341.

### Abstract

This study was undertaken to develop a year round fodder production model for small scale dairy farmers. Five pregnant dairy cows of Red Chittagong Cattle (RCC) genotype were selected. For rearing five cows, 66 decimal of land was selected from existing fodder plots under Pachutia Research Farm at Bangladesh Livestock Research Institute (BLRI), Savar, Dhaka. The selected land was divided into two parts (33 decimal in each). One part was brought under perennial (Napier-4 and Splendida) and the 2<sup>nd</sup> part of land for seasonal (Maize & Matikalai) fodder production. Data on live weight and live weight gain of cows, birth weight of calves, feed intake, milk production, actual biomass yield for both perennial and seasonal fodder, yearly manure production were recorded and calculated. Napier-4 grass, splendida, maize, straw, silage were supplied to the experimental cows according to the seasonal availability in different months. Concentrate mixture were also supplied consisting of wheat bran, kheshari (red gram), soybean meal, maize crushed, til oil cake, DCP and common salt. Economics of the model revealed that considering the sale of milk, calves and manure and cost included only feed and land leased, a farm/family rearing 5 indigenous dairy cows with his/her family labours, he/she could earn around BDT 98 thousand in a year (1\$ = 85 BDT) and the benefit cost ratio of the model on total variable cost and total cost were 1.86 and 1.66, respectively. Therefore, it may be recommended that a farmer having 5 adult dairy cows with 66 decimal land under fodder cultivation may earn substantial share of his/her family income as small-scale rural dairying.

**Key words:** Fodder production model, smallholder dairying, cost-benefit analysis.

Bang. J. Livs. Res. Vol. 26 (1&2), 2019: P. 79-102 <https://doi.org/10.3329/bjlr.v26i1-2.49940>

### Introduction

Feeds and forage production at farm levels is one of the priority tasks for expediting dairy development in the country. A diet of

ruminant animals consists of roughage and concentrate. Crop residues (rice and wheat straw, maize stover, sugar cane by-products, pulse crop shreds, banana pseudostem), green grasses (winter and monsoon forage

\*Corresponding author: sarkernr62@yahoo.com

and fodder, natural green biomass, water and crop weeds) and tree foliage and leaves (jackfruit, leucaena, mulberry, other edible tree leaves and bushes) are major sources of roughage for the ruminant of Bangladesh. Losses due to the absence of preservation and processing facility or knowledge gaps of users, natural calamity, difficulties in bulk transportation of roughages; and their otherwise uses affect availability to animals. Concentrate feeds, on the other hand, mostly of grain by-products considered to have required nutritional quality but, its quantitative supply is not sufficient to support the demand. This has made feed problem for livestock raising more acute, and made dairy and fattening farming most competitive and challenging to sustain under open market trading policy. Tareque (1985) reported that 29.1 million tons of roughage is available for ruminants, but some other reports indicated that the average fresh green grass availability is about 1 kg per animal/day from road side, fallow lands, homesteads and embankments etc (Tareque and Saadullah, 1988).

Huque and Sarker (2013) estimated the feed requirements in the country. The total annual production of fibrous feed except road side grazing and cut and carry grasses estimated as 32.8 million tons, and that of concentrates as 2.76 million tons. Nevertheless, the availability of fibrous feed to animals reported as not more than 50%, and a percent of concentrate is lost due to otherwise uses. The estimated dry matter requirement of fibrous feed for the present stock of farm animals was calculated to be 27.0 million tons, and that of the concentrate including poultry and fish is 12.6 million tons. Considering availability of fibrous dry matter to animals (50.0% of the total production makes 16.4 million tons) the

estimated annual deficiency of the roughage dry matter would be calculated as 39.3%, and that of the concentrate dry matter is 78.1% of the total quantitative requirement (Huque and Sarker 2013). Nevertheless, roadside grazing and cut and carry grasses help to some extent minimize quantitative requirement of roughage dry matter, but their qualitative deficiency (av. M/D-5.5 MJ/KgDM and CP-6.5% DM) and time space between production and demand still affect production performances of the animals. The deficiency of the concentrate dry matter may rise further due to other wise use of the by-products.

The shortage of quality feed and fodder remains one of the major reasons for low productivity in livestock in developing countries like Bangladesh (Tareque and Chowdhury, 2010). Most of the livestock farmers meet their fodder requirements by grazing animals on common land, fallow agricultural field or harvested agricultural land. Larger farmers also meet fodder requirements through cultivated forage crops. But grazing land is decreasing day by day, and farmers increasingly depend upon concentrate feed. Despite owning a couple of cattle, an extreme poor family can neither afford to buy improved feed nor spare land for forage production. Most of these families have to rely upon natural green grass or purchased straw. Daily harvesting of natural green grass is, however, always difficult with insufficient family labour.

Very recently, fodder production get momentum as an income generating and employment opportunity in certain areas of Bangladesh, especially where small-scale dairying, fattening and milk marketing facilities prevails. Price fluctuation of

concentrate feeds is a great problem in commercial dairying and fattening farming which cuts off profit margin. Therefore, sustainable availability of green fodder round the year may be a solution for the farmers to reduce the production cost. Hence, to develop a year round fodder production model for small-scale dairy farmers, the present study has been conducted.

## Materials and Methods

Five pregnant cows of indigenous Red Chittagong Cattle (RCC) genotype were selected to conduct the experiment in Pachutia Research Farm, BLRI, Savar, Dhaka. For rearing five cows, about 66 decimal (2 Bigha) of land was selected from existing fodder plots. The selected land was divided into two parts i.e. 33 decimal in each. One part (33 decimal) was brought under perennial fodder (BLRI Napier-4 and Splendida in approximately 50:50 land) and the 2<sup>nd</sup> part of land was allowed for seasonal fodder (Maize & *khesari* as intercropping

followed according to the standard method adopted at BLRI (Farm yard manure, urea, triple super phosphate and muriate of potash at the rate of 20 tons, 60, 70 and 30 kg per hectare, respectively, were applied before ploughing and top dressing with urea at the rate of 60 kg/ha during first weeding after 30 d of plantation along with adequate irrigation). Silage was prepared during the time when there were abundant supplies of perennial fodder, especially in monsoon. Data on live weight and live weight gain of cows, birth weight of calves, feed intake, milk production, actual biomass yield for both perennial and seasonal fodder and yearly manure production were recorded and calculated. The year round production and supply of green roughages along with additional supply of straw and concentrate are given in Table 1. However, Fig. 1 demonstrates the year round feeding pattern. Economics of the model was also calculated based on cost-profit analysis.

Table 1. Round the year fodder production model for 5 cows

Name of the feed		Land occupied for cultivation (decimal)	Amount produced (Kg)	Amount supplied (Kg)
Perennial fodder	Napier 4	33	9840	14340
	Splendida		4500	
Seasonal fodder	Khesari(red gram)	33	1360	4800
	Maize ( <i>Zea mays</i> )		3440	
Silage		-	8800	8800
Straw		-	1100	1100
Concentrate		-	-	4050

pattern) production. The later part of land was utilized into two cropping system; rice cultivation in summer and seasonal fodder production in winter. The straw from rice cultivation was used for feeding cows when the scarcity of green grasses was existed. Land preparation and fodder production was

About 14.34 tons of perennial and 4.8 tons of seasonal fodder along with 1.1 tons of rice straw had been produced from 66 decimal of land in a year which had been supplied to 5 cows. The intake was determined by subtracting the amount of leftover from the amount of feed supplied on the previous day

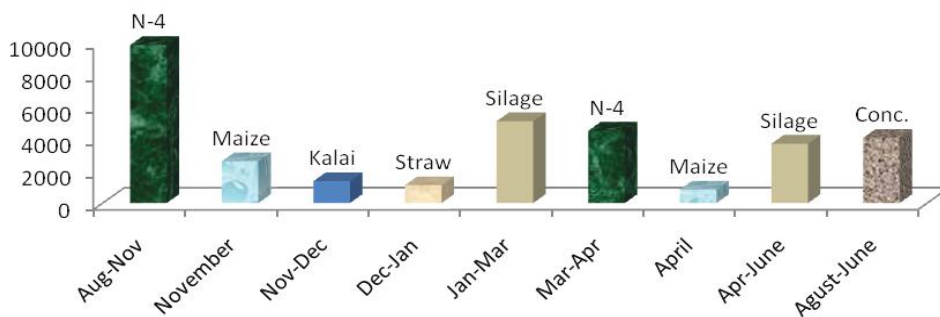


Fig 1. Monthly feeding pattern of RCC cows (kg)

in case of grasses, straw and silage. Required amount of concentrate mixture composed of wheat bran, *khesari* (red gram) bran, soybean meal, maize, til oil cake, di-calcium phosphate and common salt was also supplied daily. All data were statistically analyzed by SPSS package.

## Results and Discussion

The biomass yield of seasonal and perennial fodder crops produced round the year in the specified amount of land with their nutrient intake are given in Table 2. Perennial fodder was produced higher amount than that of seasonal fodder.

weight gains of 5 cows varied from 71 to 185g with an average of 150 g. Each animal had given at least one calf during the experimental period. A total of about 2866 L of fluid milk had been extracted from five (5) cows for an average lactation period of 200 days with an average of 2.9 litres /cow/day. A similar model with 2 hectares of land produced sorghum, oat and legume fodders for 10 Holstein Friesian cows was studied by Indian Council of Agricultural Research in India. From that modeling system about 3000 liters of milk, 40 tons of fresh manure and 22000 liters of urine were collected which cost about BDT. 377000.00. Another model was developed considering same animals where 2.5 hectares land was used. Legume,

Table 2. Data on total yield and feed intake

Feed Ingredients	Total Yield (kg)	Fresh Intake (Kg)	DM Intake (Kg)	CP Intake (Kg)	Daily DM Intake (Kg)	Daily CP Intake (Kg)
Concentrates	4050	4050	3614.22	653.8124	12.90793	2.335044
*Perennial grass	14340	12921	2821.946	273.4466	21.87555	2.119741
#Seasonal grass	4800	4440	999	134.865	24.975	3.371625
Silage	8800	7487.5	1332.775	97.95896	12.6931	0.932943
Straw	1100	925	815.7575	28.55151	22.0475	0.771663

\*Napier-4 and Splendida; #Maize and black gram

Table 3 shows the weight gain of cows and number of calf gave birth under above year round feeding system. In case of weight, all animals had gained which varied from 35-52 kg during the experimental period. The daily

oat and broom were cultivated there and results were same.

Data on milk production records of 5 experimental cows are given below in Table

Table 3. Live weight gain of cows and number of calf born during the period of experiment

Parameter	Cow 1	Cow 2	Cow 3	Cow 4	Cow 5
Initial weight (Kg)	228.0	198.0	208.0	200.0	222.0
Final weight (Kg)	280.0	243.0	243.0	239.0	242.0
Average live weight (Kg)	52.0	45.0	35.0	39.0	20.0
Daily weight gain (g/d)	185	160	125	139	71
Number of calf born	1	2	1	1	1

4. Among different months of milk production, first month (August) production was highest (760L) and it decreased gradually in the later months. Total sum of milk production in full lactation period (around six months) varied among cows and it averaged to about 573L milk.

research work is shown in the Table 5 and 6. However, in the current model income was derived from the sales value of milk, calves and manure and cost included only feed and land leased. This calculation did not consider the daily labour wages, but it was assumed that a family member can rear 5 dairy cows

Table 4. Milk Production record of 5 experimental cows

Month	Cow 1	Cow 2	Cow 3	Cow 4	Cow 5	Total (L)	Avg.
August	155.0	170.5	139.5	139.5	155.0	759.5	151.9
September	135.0	150.0	108.0	120.0	120.0	633.0	126.6
October	108.5	124.0	77.5	108.5	108.5	521.0	104.2
November	90.0	90.0	60.0	90.0	901.0	420.0	84.0
December	62.0	77.5	46.5	80.6	83.7	350.3	70.1
January	30.0	46.5	-	30.0	62.0	168.5	33.7
Total	580.5	658.5	431.5	568.6	627.2	2866.3	573.3

Profit is the main goal of any enterprise and it can be manipulated either by reducing inputs or increasing the output to an optimum level. The cost-benefit analysis of the present

with his/her family works and could earn BDT. 97,691.00 in a year on full cost basis. The benefit cost ratio on TVC and TC basis were 1.86 and 1.66, respectively.

Table 5. Cost of production for rearing five dairy cows

Cost items	Amount (Kg)	BDT/Kg	Total Cost (BDT)
Concentrates	4050	25.00	1,01,250.00
Perennial grass	14340	0.75	10,755.00
Seasonal grass	4800	1.5	7,200.00
Silage	8800	1.5	13,200.00
*Straw	1100	-	-
Total Variable cost (TVC)			1,32,405.00
Fixed cost (Tk.)			
Land use cost (Tk. 8,000/33decimal/year)			16,000.00
Sub-total			16,000.00
Total Cost (TVC+FC)			1,48,405.00

\*The cost of straw was ignored with yields of rice

Table 6. Total income of five dairy cows

Items	Amount produced (Kg)	Price (BDT/Kg)	Total Income (BDT)
Milk	2866.00	50.00	1,43,300.00
Cow dung	12796	1.00	12,796.00
Calf (No.)	6	15,000	90,000.00
Gross Return			2,46,096.00
Net Return (on TVC basis)			1,13,691.00
Net return ( on TC basis)			97,691.00
BCR (on TVC basis)			1.86
BCR (on TC basis)			1.66

\*BCR, benefit-cost ratio; TVC, total variable cost; TC, total cost (TVC+total fixed cost)

## Conclusion

Based on the above findings, it may be concluded that a farmer having 5 indigenous adult cows with 66 decimal of land may earn substantial share of his/her family income as small-scale rural dairying. Further, on-farm in-depth trial is needed considering the socio-economic perspective of the farmers and land availability for fodder production in the respective areas.

## References

- Huque, K.S. and Sarker, N.R. 2013. Current status of farm animal nutrition & feeding perspectives & challenges of Bangladesh . Paper presented in a seminar on Livestock feeding & nutrition- global perspective & options for Bangladesh, jointly organized by
- FAO and BLRI on 23 Sept. 2013.
- Indian Council of Agricultural Research. Doable Technology - Feed and Fodder Production Model for Livestock from Watershed under hot and humid, high rainfall and acidic soil condition for sustainability of the system.
- Tareque, A.M.M. and Chowdhury, S.M.Z.H. 2010. Agricultural Research Priority: Vision-2030 and Beyond. Sub-sector: Livestock (Dhaka: Bangladesh Agricultural Research Council). Available online at: <http://www.barc.gov.bd/documents/Final-Prof.Tareque.pdf> (accessed 30 December 2012).
- Tareque, A.M.M. 1985. Bangladesh Pashupushti Bartaman Porishthiti Samashyaboli. BARC, Dhaka, Bangladesh.
- Tareque, A.M.M. and Saadullah, M. 1988. Feed Availability, Requirements for Animals and Current Pattern of Utilization in Bangladesh. International Development Research Centre (IDRC), Canada.