EFFECT OF CONCENTRATE ON MILK PRODUCTION, MILK FAT AND BODY WEIGHT CHANGES OF INDIGENOUS COWS RAISED IN CHAR AREA

A Thesis
By

MD. ALHAZ UDDIN
Registration No. 1205116
Session: 2012-2013
Semester: July-December, 2014

MASTER OF SCIENCE (M.S.)

IN

ANIMAL SCIENCE

DEPARTMENT OF ANIMAL SCIENCE AND NUTRITION

HAJEE MOHAMMAD DANESH SCIENCE AND TECHNOLOGY UNIVERSITY DINAJPUR

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DECEMBER, 2014

Dedicated to My Beloved Parents

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ABSTRACT

This study was conducted to know the effect of concentrate on milk production, body weight changes, milk fat of indigenous cows under char condition. This experiment was performed in parbotipur at Zatrapur union in Kurigram Sadar Thana. The experimental duration was three month (April to June). Eight cows were selected on the basis of body weight, milk yield and lactating phase (in second lactation). All the animals were dewormed and vaccinated at initial stage. The animals were divided into two group .The animals of one group (T_1) offered concentrate mixture and other group (T_2) group offered only traditional diet. The milk production of cows recorded daily. The body weight of cows measured every after 30 days. Milk samples was collected every after fifteen days to test the fat content of the milk. Initially the milk production of the animals were

near about 1kg per day. During the study milk production was increased upto 1.80±0.40 kg per day in treated group and 1.15±0.20 kg per day in T_2 group. Body weight changes in cows average 7.0±2.12 kg (T_1 group), average 1.00±.71kg (T_2 group). Milk fat of the T_2 group was less than the T_1 group. Milk fat of the T_1 group was recorded 4.64±2.71gm per kg but in T_2 group milk fat was recorded 4.31±2.31gm per kg.

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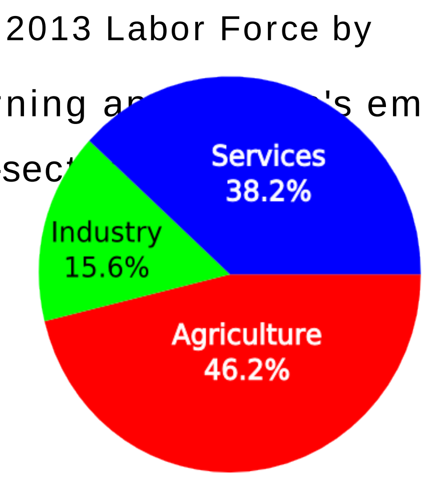
CHAPTER I

INTRODUCTION

The role of livestock sub-sector is vital for the economic development of agro-based Bangladesh. The contribution of livestock to National Gross Domestic Product (GDP) is 2.79 percent and which is 17.15 percent in Agricultural share. About 44 percent of the animal protein comes from livestock sources. Moreover, 4.31 percent of the total export is from the export of leather and leather goods. Furthermore, 20 percent of the population is directly and 50 percent of the population is partially dependent on livestock sector. The sub-sector enjoyed a growth rate of 5.85 percent during the last fiscal year. Poverty reduction, gender equity and empowerment of women are amongst eight set targets of millennium development goals (MDG). To achieve the goals, Bangladesh government has identified livestock as one of the key player of Poverty Reduction Strategy. The government has set strategic targets for meeting protein ation, up-scaling export earning a 's empowerment through the Livestock sub-sec



Source: Economic Review-2013

It is undeniable that the sector has been able to achieve this success due to support from the government in various forms. During the last four decades, the GDP of the agriculture sector grew at an average rate of 3 percent while during 2005-10 by 4.19 percent. In order to maintain the growth momentum and exploit the full potential of the sector the government needs to allocate adequate resources in the national budget. Taking the budgetary constraint into account, the government can prioritise a few areas and sub-sectors within the sector. A number of suggestions may be put forward for consideration in the upcoming budget for fiscal year (FY) 2012-13 in light of this. (Economist and Head of Research at the Centre for Policy Dialogue (CPD). This article was first published in the June 2012 issue of Forum.)

Livestock population in Bangladesh is currently estimated to comprise 25.7 million cattle, 0.83 million buffaloes, 14.8 million goats, 1.9 million sheep, 118.7 million chicken and 34.1 million ducks. This density has been increasing every year in the country. The country has a relative density of livestock population well above the averages for many other countries of the world. In spite of a high density of livestock population, the country suffers from an acute shortage of livestock products like milk, meat and eggs. The shortage accounts for 85.9%, 88.1% and 70.7% for milk, meat and eggs, respectively. The annual growth rates of these products have significantly increased in recent years. However, if we desire to meet the increasing demand from domestic production, we will require an increase in production at the rate of 6 to 9 percent per year up to 2021. For that reason, a higher investment in the livestock sub-sector will be required. It is expected that an increase in investment in livestock research and extension by one Taka will give a return of Taka 1.42 to 3.15 per year depending on the type of livestock species and product.

The cattle of Bangladesh are mostly of indigenous type (Bosindicus) with few cross breeds along with some pure breeds such as Sindhi, Sahiwal, Jersy, Holstein-Friesian. The number of cross bred cattle is increasing day by day with the spread of artificial insemination practices throughout the country. The milk production of our indigenous cattle is low compared to improved breeds of cattle (Hussain *et al*. 1984). Not only milk production growth rate also low due to the lack of balanced ration and poor genitical makeup of the breed associated with poor management practices. Due to malnutrition cows shows delayed maturity, prolong calving interval and retarded growth Salam *et al*. (1967) studied that about 37% of heifers were found to be infertile due to delayed maturity. Hamidul *et al*. (1968) observed slow rate of gain and delayed maturity heifers on low plane of nutrition, compare to that of unrestricted feeding, which showed better body formation.

All the same way the growth rate of calves is very poor. Because they don’t get 5ufficient amount of milk from their mothers udder to meet their nutritional requirement. In present socio-economic condition the farmers are unable to supply sufficient amount of cerial grains to their dairy cows for milk production. Hence the production of milk of their dairy cows are not increasing satisfactorily, To combat this situation we have to think the alternative way to fulfill the needs of concentrates for dairy animals.

As in many countries of the world pressure on the available land in Bangladesh is increasing day by day due to high rate of population growth. With the increasing human population (2.4% per year),farm size decreases and farms are fragmented from generation to generation. Therefore, the fibrous crop residues constitute an important source of food for dairy cattle nutrition in the country. Available feeds are sometimes fed without consideration of their quality or the requirement of the animal. Such diets adversely affect the growth rate and milk production (Saadullah, 1986).

Due to shortage of quality roughages and grains the dairy cow can not show whatever genetical potentiality they inherit. Fibrous residues are generally low in nitrogen content and low of digestibility. Their low digestibility is caused by indigestable cellulose, hemicellulose and lignin of call wall structures which prevent action by microorganisms and enzymes upon the substrates within cell. In an intensive agrarian country like Bangladesh, feed resources for ruminants are mainly derived from crop residues by-products of food for human consumption, grass, legumes, aquatic weeds and tree leaves. Like all other rice growing, country in Asia, Rice straw is the main roughage for dairy cows, which is low in nutritive value and palatability but it contributes 90% of the roughage feed to animals (Bang. J. Anim. Sci. 2009, 38(1&2) : 67 – 85.

Approximately 2kg of straw and 80g of concentrate are available per cattle per day. Under the prevailing condition, the formulation of conventional balanced ration is difficult because of limitation in feed stuffs, both quantitatively and qualitatively. The strategy therefore, is to manipulate this limited amount of feed supplement, cereal, animal by-products, green grasses and tree leaves in such a way that the basic feed requirement are maximized.

Protein is needed in a ration of dairy cows for their maintenance, production and reproduction. The main source of protein in dairy cow's ration in Bangladesh is oil cake. The possible way to improve the nutritive values of poor quality roughage by supplementing some concentrates in the ration of ruminants(Saadullah *et al*. 1981).

OBJECTIVES

The present study was carried out with following objectives-

1. To study the effect of concentrates along with traditional diets on milk yield and body weight changes of indigenous cows under char area.
2. To study the effect of concentrates along with traditional diets on milk fat of indigenous cows under char area.
3. To suggest farmers about adequate level of feeding for their cows under char.

CHAPTER II

REVIEW OF LITERATURE

Different types of research works have been done in different countries of the world on supplementation of feeds. Some of the important research findings are reviewed in this section for easy of clarification. This review is divided into three sections:

(1) Effect of Supplementation of Roughage and Concentrates:

Pachauri and Negi (1978) carried out an experiment to find out the effect of soybean protein supplement in the ration of Jersey cross-bred milch cow. The ration used with a concentrate mixture consisting of mize, groundnut Cake and wheat bran in the ratio of 50:35:15 for one group and the other group was fed same way replacing the standard formulated by mixing soyabean, maize, wheat cutting and wheat bran in equal proportions. The authors observed what there was no significant difference in the feed intake.

Amrith Kumar *et al*. (1985) studied the effect of replacing 20% of cotton seed cake by that of rubber seed cake in the concentrate mixture of 8 Jersy x Tharparkar cows on its milk yield and composition. The cows were fed fodder maize and concentrate mixture to meet their requirements of maintenance and production. There was no significant difference in their dry matter intake, digestible crude protein intake and total digestible nutrients intake per unit metabolic body weight.

A Boodoo, R Ramjee, (1990) an experiment was carried out to evaluate effects of two supplements (a formulated concentrate and cottonseed cake) for cows in villages in Mauritius. The basal diet consisted mainly of sugar cane tops (from July to December) and grasses harvested from roadsides and common lands. The supplements were fed for 3 months prior to calving and throughout lactation. The quantity of milk produced by the village cows in this experiment (9.2 kg/d during 300 days) is higher than the average production of between 3.5 and 9.2 kg/d reported for the Government stations where cow feed is fed at the rate of 0.5 kg/kg milk. It is also relevant to compare it with the milk production of unsupplemented village cows (4 to 5 kg/d for a lactation period of around 225 days)

Adams *et al.* (1995) found that four forage treatments (45% corn silage, 33.75% corn silage plus 11.25% alfalfa hay, 11.25% bermuda grass hay, or 11.25% cottonseed hulls on a DM basis) were arranged factorially with no added fat, 12.5% whole cottonseed, or 2.5% tallow. Different diets were fed during three 28-d periods to 20 control cows and to 20 cows receiving yeast continuously in a split-plot design. Milk yield of cows fed cottonseed hulls with corn silage was 2.4 kg/d higher than with corn silage plus bermuda grass hay and .7 kg/d higher than with corn silage only or corn silage plus alfalfa hay. Whole cottonseed depressed milk yield by 1 kg/d. Cows fed yeast had increased DMI, and yeast interacted with forage so that more milk was produced by cows fed alfalfa diets. Yeast depressed milk protein percentage. Cows in a commercial Florida dairy were fed no yeast or 10 g/d continuously for 60 d; milk fat percentage was greater (3.51 vs. 3.37%) with yeast. In summary, effects on milk and SCM were positive when cottonseed hulls were utilized with corn silage, negative with whole cottonseed, and neutral with supplemental tallow. Yeast effects on SCM, although not significant for either experiment, tended to be positive for both (mean +1.2 kg/d per cow).

Thapa, B. B. (2003) has shown the Effects of feeding different proportion of maize silage and rice straw on milk production and its quality was examined in lactating buffaloes and cows for a period of 56 days at IAAS Livestock Farm, Rampur, Chitwan.

Eight lactating cows were used for the experiment. Animals were mainly fed with different proportion of silage and rice straw67% rice straw +33% maize silage feeding (T2); 33% rice straw + 67% maize silage feeding (T3), and only maize silage feeding (T4). Either 33%, 67% or 100% maize silage supplementation had a superior (P<0.05) milk yield.(3.10, 3.20, and 3.36 kg, respectively / day) compared to rice straw feeding (2.73 kg / day), with the highest yield from 100% maize silage feeding (3.36 kg / day). In order to improve the milk yield as well as its quality in crossbred cows particularly during winter to early spring, maize silage can be used as a supplement, at least 33% of the total daily roughage dry matter requirements.

P. S. Mlay *et al*. (2005) A study was conducted to determine the effect of feeding milking cows a supplement of maize bran alone (MB) or maize bran mixed with sunflower meal (MBS) during the dry season. Eighteen smallholder farms in urban and peri-urban areas of Morogoro practising complete zero grazing with not less than two milking cows participated in the trial. Forty-eight cows were used with ranges of body weight 232-556 kg, previous milk yield 3-13 litres/day, body condition score 2.5-5, parity 2-5, and 3-6 months post calving. For each farm, both MBS and MB treatments were randomly distributed to the cows. Body weights and body condition scores were taken before, at 6th and 12th week of treatment. Daily milk production was recorded three weeks before, 12 weeks during and 3 weeks after the withdrawal of treatments. Milk samples were collected during the 12th week of treatment and analysed for butterfat (BF), crude protein (CP) and total solids (TS). The economic viability of the dairy enterprises in relation to supplementation was also assessed.

MBS fed cows had significantly higher ($P<0.001$) milk yield compared to MB fed cows. No differences were observed in milk composition parameters, body weights and body condition changes. The economic return for sunflower meal incorporation in MBS was found to be very high.

It is concluded that using sunflower meal mixed with maize bran was effective in increasing milk yield during the dry season and was economically profitable compared to maize bran alone.

André de Faria Pedroso *et al.* (2009) Have performed an experiment with aiming at evaluating the performance of dairy cows fed milk production from maize silage; milk production is reduced with immature or sugarcane silages treated with additives compared to cows fed fresh forage. Twenty-four cows were grouped in blocks of three cows, according to parity order and milk production level.

Cows receiving ration produced with sugarcane ensiled with additives may present lower dry matter intake and milk production compared to cows fed ration with the fresh forage although feed efficiency may be improved. Fat content in milk of cows fed silage inoculated with *L. buchneri* may be positively affected, compensating for small reductions in milk production, allowing for the production of 3.5% fat corrected milk to be similar to production of cows fed fresh sugarcane.

The present study was conducted at Livestock Research and Development Station Surezai, Peshawar during June to August 2011 by Hayaz Uddin, Abdur Rahman. The objectives of this study were to determine the effect of

Cotton Seed Cake (CSC) on milk yield, milk composition, feed intake, Body Condition Score (BCS) and live weight of Holstein Friesian (HF) crossbred cows. A total of nine mid-lactation higher milk fat 4.46±0.22 percent and have significant (P<0.05) effect on milk fat content while the control group produced the least 3.35±0.22 percent fat. CSC had no significant (P>0.05) effect on protein content in milk as cows on 35% CSC diet produced the least 2.7±0.09 percent protein, while the control group produce the highest 3.00±0.09 percent.

These results concluded that milk yield; milk fat and feed intake was increased with supplementation of high level of cotton seed cake in the dairy cattle ration. Higher proportion of CSC (35%) has shown the best efficiency of production as compare to other rations.

Richard Dewhurst (2013) has shown in his experiment that quite a wide range of maturities (300 – 350 g kg^{-1} DM) that leads to maximum dry matter intakes and over–mature maize crops.

Maghsoud Besharati and Akbar Taghizadeh (2013) Carried out this study with aimed at determining the effects of feeding whole cottonseed, monens in and vitamin E on milk production, milk composition, and blood parameters of lactating dairy cows. Eight lactating cows were separated from the rest of the herd and housed in the individual stalls diet with 20 percent whole cottonseed of DM plus 12000 IU of vitamin E/cow perday. Protein and lactose percentages were not significantly affected by experimental treatments, but milk fat percentage and milk fat yield were significantly different among treatment.

(2) Effect of Supplementation of Molasses:

It was reported by Clark (1952) that urea and molasses can be used to maintain the bacteria of the fourth stomach of ruminants and helps to improve the utilization of hay and to prevent loss of weight, usually in winter. 3-4 ozs of urea is the maximum for cattle. Molasses and urea in the ratio of 10:1 is satisfactory in the mixture.

Two compensatory feeding trials over 8- 10 weeks. with cows of early lactation were conducted by Parking *et al*. (1975) Using a cubed molasses-sugar beet pulp product, containing about 3% urea and with added minerals and vitamins, they found that in cine experiment 50% substitutions of acereal/vegetable protein mixture resulted in a depression in mean milk yield of about 0.8 kg. In the 2nd experiment, the concentrate contained about 30% dried distillers grains and in this case replacement of 1/2 with the supplemented molasses sugar beet pulp product did not decrease milk yield. There was no significant effect of milk composition.

Lian (1984) reported that it is possible to replace 0.75 kg soybean oil meal (SBM) and0.75 kg maize grain by 100 g urea without decreasing milk yields.

Su *et al.* (1984) studied body weight change with beef cattle using molasses and urea. A total of 30 Charolais x Chinese yellow cattle 17 to 19 months old were fed in 5 groups on a low energy, low protein diet without or with urea 0.06 and molasses 0.5, 1.0, 1.5 or 2.0 kg/head daily. They observed average total body weight gain was 32.3, 36.0, 37.2, 39.0 and 37.5 kg. The 4thgroup which gain 39kg ate daily 1.96 kg concentrates, 1.5 kg molasses and 120 g urea. Compaired with the 1st group, the 3rd took 0.36 kg less concentrate for each kg gained. It was suggested that a daily allowance of molasses and urea at 1.06-1.45 and 0.1 to 0.5% of body weight respectively was suitable.

Daniel *et al*. (1986) conducted an experiment with crossbred calves fed on urea-molasses liquid diet, six Holstein- Friesian x Haryana calves, 8-12 month sold, were given a conventional ration (CR). A similar group was given to appetite for 150 days urea 2.5, molasses 92, minerals 3 and water 2.5% then CR to day 306and finally 1.5 times CR to day 336.The control group was given 2 kg green sorghum and wheat straw to appetite whereas the 2nd group got straw 0.8 kg/kg body weight. Weight initially and at 150, 306 and 336days were 147, 205 and 325kg respectively in the control group and 157, 154, 260 and 290 kg in the 2ndgroup. Daily Weight gains for the 3 periods were 458,651 and608; 102, 679 and983 g. It was concluded that younger calves fed on urea-molasses had a such lower growth rate than older ones. Weight losses could be compensated even after 5 months. Urea-molasses given during periods of feed scarcity can be practiced if there is proper feeding subsequently.

Davison *et al*. (1987) observed milk yield responses to 2 dietary levels of molasses (3.5 and 0.5 kg/cow daily) and Christmas is phosphate (9.6 and 0 g/cow daily) in a 2 x 2 factorial experiment. 32 Friesian cows grazed tropical grass legume pastures at 1.3kg, cows/ day and were supplemented for 280 days. Milk yield averaged 4150 and 3598 kg cow (p<0 0l) for the high and low molasses group and 4034 and 3714 kg/cow (p<0.053) for groups with and without phosphorus supplement respectively.

Wojtasik *et al*. (1987) conducted an experiment with 31 polish Black and white low land cows and where divided into four groups and 4 experimental diets were given containing either soybean meal (group- 1), crystalline feed grade urea. Urea replaced 450 g digestible crude protein in group 2 and 3 and 300 g in group 4. Milk production was lower in group 2, 3, and 4 than in group 1. Production in group 2 given crystalline urea was l4% less. There was no significant difference among groups in milk fat concentration but milk from cows given urea, contained less protein. Cows in all groups lost body weight, but the greatest weight loss was with crystalline urea.

Urea as amide concentrate supplement and extruded grains, added at 18% total protein to the diet, given to lactating cows, ensured normal digestion and metabolism and produced an average daily yield of 4% fat corrected milk of 14.4kg and reduced the cost of grain feeds by 5.4 to 14.9% (Guglya and Safonov, 1988).

B. Srinivas and Gupta (1997) was conducted a study about substitution of concentrate mixture by urea-molasses-mineral block (UMMB) lick supplements for 20 lactating crossbred cows in 2nd and 3rd lactation was studied. Animals of control group were given concentrate supplement, while in treatment groups 10% of the concentrate requirement was substituted with 3 different types of UMMB lick type A (T1), type B (T2) and type C (T3). FCM yield was increased by 140, 410 and 460 g/d, in T1, T2 and T3, respectively, in comparison to control group but differences were statistically invalid. Though fat per cent was reduced, fat yields were remain constant among treatments.

Result demonstrated that UMMB licks could be partial supplemented up to 10% of the concentrate requirement of crossbred cows yielding on an average 14kg/d without any adverse effect on feed intake, nutrient utilization and mild production. Comparatively, UMMB lick type B and C was proved better than type A and also economically viable.

M.S. Hossain and Haque (2002) conducted an experiment with Thirty-six indigenous postpartum cows. Which were given dry straw *ad libitum* + 1.5 kg concentrates (control) or UMS *ad libitum* + 1.5 kg concentrates (treated). Cows were stall fed. Calves were tied up at night and allowed to free access or suckling to the cows during the whole day. The cows were milked only in the morning. Live weight change of cows and calves were recorded monthly and milk yield was recorded daily. There productive performance of cows was also studied. Live weight change of cows -57.40 and 37.75 g/d ($P < 0.05$); milk yield of cows 1.83 and 2.52 kg/d ($P < 0.01$); calf weight gain 96.99 and 139.35 g/d ($P < 0.01$); calving to first service interval 182 and 113 days ($P < 0.01$) ; calving to conception interval, 210 and 134 days ($P < 0.01$) and number of services per conception 2.11 and 1.94 ($P > 0.05$), for controlled and treated groups respectively. It is concluded that UMS can be fed for improving the productive and reproductive performance of indigenous cows under the village conditions of Bangladesh.

Broderick GA, Radloff WJ, (2004) Drawn an experiment to identify the Effect of molasses supplementation on the production of lactating dairy cows.

Adding sugar to the diet has been reported to improve production in dairy cows. In each of 2 trials, 48 lactating Holsteins (8 with ruminal cannulas) were fed covariate diets for 2 wk, blocked by days in milk into 12 groups of 4, and then randomly assigned to diets based on alfalfa silage containing 4 levels of dried molasses(trial 1) or liquid molasses (trial 2). In trial 1, experimental diets contained 18% CP and 0, 4, 8, or 12% dried molasses with 2.6, 4.2, 5.6, or 7.2% total sugar. With increasing sugar, there was a linear increase in dry matter intake (DMI), and digestibility of dry matter (DM) and organic matter (OM), but no effect on yield of milk or protein.

This resulted in linear decreases in fat-corrected milk (FCM)

In trial 2, experimental diets contained 15.6% crude protein (CP) and 0, 3, 6, or 9% liquid molasses with 2.6, 4.9, 7.4, or 10.0% total sugar, respectively. . Again, there were linear declines in FCM.

An estimate of an overall optimum, based on yield of fat and FCM (trial 1) and yield of milk, protein, and SNF (trial 2), was 5.0% total sugar, equivalent to adding 2.4% sugar to the basal diets. Feeding more than 6% total sugar appeared to depress production.

There is Effects of feeding sugars on productivity of lactating dairy cows is proved by Masahito Oba (2011). Sugars are water-soluble carbohydrates that are readily available in the rumen. Although sugars ferment faster than starch or fibre in the rumen, the rates of disaccharide hydrolysis and monosaccharide fermentation vary greatly depending on the type of sugar and rumen environment.

However, feeding high-sugar diets often increases dry matter intake, butyrate concentration in the rumen, and milk fat yield.

E Tekeba *et al.* (2012) this study was conducted at Fogera and Bahir Dar Zuria (BDZ) districts during very dry months (December – May) where feed shortage is very critical. A total of 18 multi-parous lactating local Fogera cows of parity two and three in the Fogera district and 16 multi-parous Fogera x Holstein Friesian (HF) crossbred dairy cows in BDZ district with a similar distribution of parities as for the Fogera cows were used over a period of 5 months (December 2010 to April 2011)

Fogera cows in the rural subsistence area were grazing between 9 am and 6 pm either on communal or private grazing lands. Crop residues were fed during the morning and evening hours. UMMB was supplied early in the morning between 6-8 am before milking and between 6-7 pm in the evening after milking. On the other hand, crossbred cows in market oriented peri-urban production system, were usually offered hay, a mixture of local brewery by-products, wheat bran and nug seed cake after milking and before they went out for grazing and UMMB supplementation continued for an hour after the morning supplementation and the cows remained in the pasture between 9-12 am afterwards. Between 12 am and 3 pm, crossbred cows were usually kept around the homestead and allowed to lick the block for about 3 hours. During the afternoon, they went out again for grazing between 3 -5 pm. Similar to the morning feeding, supplements were given during the evening before milking and then UMMB was offered after milking for about an hour.

Dietary supplementation with UMMB of dairy cows in two different livestock production systems generally increased saleable milk and milk energy off-take, milk constituents, postpartum oestrus, estimated body weight gain, body condition and net return from milk production.

Khaddaet al. and Kanak Lata (2013) a trial was conducted to evaluate the effect of UMMB on overall performance of crossbred cattle and economics at KVK-Panchmahals under the semi- arid condition of Gujarat, India, during the year 2012–13. Lactating HF crossbred cows (20) were divided into groups T_1 (control) and T_2 (UMMB) of 10 cows in each. The feeding of selected animals in group (T_1) was consisted of 5–6 kg dry fodder and 25 kg green fodder with 2.5 kg /day/animal concentrate mixture. In group T_2, in addition to the above, a regular supply of UMMB as a lick was offered during the period of study without interruption. Supplementation of UMMB significantly improved the basal diet. UMMB supplemented cows produced 31.42% more milk with significantly higher milk yield in the animals of UMMB group as compared to control without any adverse affect on health of the animals.

Silva, D.N.L. da *et al*. (2013) this study examined the effects of a forage source [wheat straw (WS) versus grass hay (GH)] prepartum and supplemental carbohydrate source [corn (dry feed; DF) versus molasses (liquid feed; LF)] on pre- and postpartum intake, digestibility, selective particle consumption, milk yield, and lipid metabolism. The objectives were to determine if forage or pre- and postpartum supplement alters periparturient intake, energy balance, and milk yield. Sixty (n = 15) multiparous dairy cows were used in a randomized complete block design with a 2 × 2 factorial arrangement of treatments to compare WS versus GH diets supplemented with either DF or LF. Dietary treatments were (1) WS prepartum + DF pre- and postpartum (WSDF), 2) WS prepartum + LF pre- and postpartum (WSLF), (3) GH prepartum + DF pre- and postpartum (GHDF), and (4) GH prepartum + LF pre- and postpartum (GHLF).

After calving, liquid feed decreased DMI and energy balance, but not yield of milk or 3.5% fat-corrected milk, resulting in greater feed efficiency compared with DF.

In conclusion, feeding diets containing wheat straw resulted in lower postpartum serum NEFA, higher liver glycogen, and a tendency for greater milk production.

(3) Effect of supplement of Protein:

Lee *et al*. (1985) conducted an experiment to evaluate the role of protein meal supplements (mixture of cotton seed, fish and meat meal) for lactating beef cows (Hereford) given a low quality subtropical grass and suckling their calves(mean age 37± 2.2 days). The rates of supplementation were 5.25, 10.5, 15.75and 21.0gm pelleted protein meal per kg live weight$W^{0.75}$. The consumption of grass hay, and estimated metabolisable energy intake (MEI) by the cows, were significantly increased ($p<0.01$) by supplements of protein meal, and their rate of live weight loss was reduced ($p<0.01$). It was observed that unsupplemented cows lost 2.56 kg/day compared with a 0.15 kg. gain/day for cows given the highest rate of supplementation. Milk production and yields of milk protein, lactose, solids-not-fat increased linearly ($p<0.01$) with increasing amounts of protein meal. On day thirty three, the milk yield in the cows, given 21g protein meal/kg $W^{0.75}$ was 83% higher than that of the unsupplemented cows. In a second period the rate of supplementation of cows was altered on day thirty four from 0 to 21.0 g/kg $W^{0.75}$.

Milk yield at day forty seven increased the same output as that of cows supplemented at 210 g/kg $W^{0.75}$ from day 0. Growth rates of calves, over both periods, tended to be higher in those calves whose dams received the higher rates of supplementation, but the difference did not become significant until day forty seven. There were no significant differences in voluntary intakes of hay by the calves whose dams received the various rates of protein supplementation.

Small and Gordon (1985) carried out two trials to evaluate the different types of protein supplements for lactating cows. Their first trial was a short term change over design comparing four protein sources and the Second, a longer term production trial comparing two of the same protein sources. In the first, twenty four British

Friesian cows in a partially balanced change over design experiment were offered eight treatment rations containing protein from one of the following sources soyabean, formalde-hyde-treated soya, fish and fish/ soya mixture. Each protein source was included in a concentrate to produce two protein concentrations of 150 and 200 g/kg fresh weight. The concentrates were offered at the flat rate of8 kg/head per day along with grass silage adlibitum. No significant interactions between protein sources and protein concentrations were observed. Increasing the protein concentration of the supplement improved milk yield with the response being 0.14 kg milk per 10 g/kg increase in protein concentration. Animal performance was unaffected by the source of supplementary protein. The second trial was 2x2x2 factorial design using eighty spring calving British Friesian cows and involved two silage types, two systems of feeding and two supplementary protein sources (soyabean meal and fish meal). The concentrate treatments contained l80g CP/kg fresh weight and were offered at a flat rate of 7.6 kg/day from calving until turnout, a mean period of eighty five days. Milk yield was not significantly affected by protein source being 25.9 and 26.1(± 0.44) kg/day with the soyabean meal and fishmeal treatment respectively. Milk protein was significantly improved with fishmeal. Grieve and Forster (1982) studied the response of by-pass protein in lactation. The results did not show dramatic response to by-pass protein in their experiment, but they indicated some potential for increasing yields. Responses were most likely to occur in early lactation.

Atwal *et al. (*1992) Holstein cows in early lactation, producing about 30 kg/d of milk, were fed high energy diets containing 5% Megalac. Three protein treatments, soybean meal diet (16% CP), fish meal diet (16% CP), and soybean meal-fish meal diet (20% CP) were compared in a change-over design. Daily production of milk and milk components (fat, protein, and lactose) were highest and BW gain lowest for the high protein soybean meal-fish meal diet. The fish meal and soybean meal-fish meal diets increased fat percentage but decreased lactose percentage of milk compared with soybean meal diet. This suggests that, for each diet, the energy supply was adequate, and the observed changes were the effects of protein supply to the cows. Thus, there seems to be good reason to feed a good quality undegradable protein like fish meal to cows producing more than 30 kg/d of milk.

N. Adachi, *et al.* (2000) conducted an experiment with 15 multiparous Holstein cows kept at Ibaraki Prefectural Animal Experiment Station were collected from 10 weeks prepartum to 20 weeks postpartum. Cows were assigned randomly to a soybean meal (SBM) diet or a fish meal (FM) diet from 4 weeks before expected calving date to 20 weeks postpartum. Each diet was formulated to contain similar amounts of CP, ADF, and NDF. In the FM diet, 2.5 and 5% of fish meal were supplemented as total mixed rations in prepartum and postpartum periods, respectively. Compared to the SBM diet, undegraded intake protein (UIP) and Met were higher in the FM diet, but Lys was low. Body weight and dry matter intake were not affected by supplemental FM, and dry matter intake increased by 6 weeks postpartum and maintained constant after 7 weeks postpartum. Cows in the FM diet remained high milk production during the experimental period, but milk yield in the SBM diet decreased gradually after 6 weeks postpartum. Supplemental FM increased milk yield and protein yield from 10 to 20 weeks postpartum when FM intake was 1.19 kg/d, although milk protein was not improved. There were no significance differences in fat content and fat yield between FM and SBM diets. Thus, the increased milk and protein yield may be due to the combination of carryover effect of supplemental UIP or Met in FM from 4 weeks prepartum to 10 weeks postpartum and direct effect of supplemental FM.

Pham Kim Cuog *et al.* (2007) conducted the experiment on the Bavi Cattle and Forage Research Centre.

Four cross bred Holstein Friesian milking cows (75% HF) were used. The cows were at around the third month of lactation with a milk yield of approximately 15 kg/day. Body weights ranged from 553 to 578 kg. The feeds used in the trial were elephant grass, alfalfa hay, dried sliced cassava roots, maize meal, soybean meal, mulberry leaves, molasses and mineral blocks. The diets offered to the cows during the experimental period were formulated so that the protein from soybean meal of the diet were substituted by that of mulberry leaves at 0, 33, 66, and 100%. The quantities of mulberry leaves needed for the experiment were collected from one harvest and dried before being ground through a 6 mm screen. The experiment was conducted using a single 4*4 Latin Square Design. The experiment was run for four consecutive periods of 28 days each. Each period consists of 14 days of adaptation and 14 days of data collection. The four experimental diets were formulated to have the same content of metabolisable energy (ME) and crude protein (CP).

In a short-term (Latin square design), replacing soybean meal with mulberry leaf meal did not affect milk yield or quality in Holstein-Friesian crossbred cows fed in confinement on elephant grass as the basal diet.

Lee C, *et al.* (2007) the objective of this study was to investigate the effect of metabolizable protein (MP) deficiency and coconut oil supplementation on N utilization and production in lactating dairy cows.

The experiment was conducted for 10 wk with 36 cows (13 primiparous and 23 multiparous), including 6 ruminally cannulated cows. The experimental period, 6 wk, was preceded by 2-wk adaptation and 2-wk covariate periods. Cows were blocked by parity, days in milk, milk yield randomly assigned to one of the following diets: a diet with a positive MP balance (+44 g/d) and 16.7% dietary crude protein (CP) concentration (AMP); a diet deficient in MP (-156 g/d) and 14.8% CP concentration (DMP); or DMP supplemented with approximately 500 g of coconut oil/head per day (DMPCO).

Coconut oil supplementation decreased short-chain fatty acid (C4:0, C6:0, and C8:0) concentration and increased medium-chain (C12:0 and C14:0) and total trans fatty acids in milk.

Coconut oil decreased feed intake and similar to DMP, suppressed fiber digestibility. Despite decreased protozoal counts, coconut oil had no effect on the methanogen population in the rumen.

Moussavi, A.H. *et al.* (2007) the study was designed to test the effects of pre- and postpartum feeding Fish Meal (FM) on milk yield and composition in early lactating cows. From 21 days before predicted calving time to 35 d in Milk (DIM), cows were fed diets containing none (control) or 3.5 and 1.95% fish meal during prepartum and postpartum periods. Diets were formulated to be isoenergetic and provide similar amounts of NEL and NFC using the Cornell Net Carbohydrate and Protein System. Milk yield (36.25, 38.73±3.67 kg d^{-1}) and dry matter intake (18.72, 19.13±0.94 kg d^{-1}) were similar among the diets. Dietary treatments had no significant effect on milk composition or body weight change. Body condition score was also similar between the diets. Results from this experiment demonstrate that dietary supplementation with 3.5 and

1.95% fish meal during prepartum and postpartum periods had no effect on milk production and composition, dry matter intake and blood metabolites.

Ankur Khare (2014) the study was conducted in Ghana village, Bargi Block of Jabalpur, M.P. state of India. Eighteen cattle (local indigenous breed) were selected for the study. The standard management practice was grazing for 8-10 hours. The cows were hand-milked twice daily. Daily milk yield of each animal was recorded for a period of 6 months. The body weight of the animals was calculated twice (before and at the end of the experiment) from hearth girth measurements and Shaffer's formula.

The feeds used (Table 1) were: wheat straw, grass, pigeon peanut husks (agro-industrial byproduct of *Cajanus cajan*), wheat bran, gram husk and mustard oilseed cake.

Table 1. Mean values (kg±SE) for daily feed intake and body weight before the start of experiment

	CTL	MOC	AZ
Body weight	148±3.63	138±6.84	142±9.41
Wheat straw	2.45±0.34	1.33±0.49	2.36±0.30
Grass	3.33±2.10	6.66±2.10	1.66±1.66
Pigeon pea by-product	0.07±0.06	0.10±0.07	0.36±0.14
Wheat bran	0.07±0.06	0.07±0.06	0.20±0.08
Gram husk	0.01±0.01	0.01±0.01	0.05±0.02
Mustard oilseed cake	0.01±0.01	0.01±0.01	0.05±0.02

Table 2. Mean values (kg±SE) for daily feed intake after supplementation

	CTL	MOC	AZ
DMI	2.89±0.09	3.15±0.13	3.26±0.12
Wheat straw	1.87±0.35	1.63±0.41	2.07±0.42
Grass	5.00±2.23	5.00±2.23	1.67±1.66
Pigeon pea byproduct	0.07±0.06	0.07±0.06	0.23±0.08
Wheat bran	0.15±0.09	0.07±0.06	0.20±0.08
Gram husk	0.02±0.02	0.02±0.02	0.05±0.02

DM intake decreased in the control animals and increased in those fed supplements containing mustard oil cake and azolla (Table 5). At the end of the experiment the body weight and milk yield were higher in cattle fed the supplements with mustard oil cake and azolla compared with the control treatment.

Table 3. Mean values for dry matter intake, live weight and milk yield before and at the end of the experiment of cows supplemented with mustard oil cake (MOC) or azolla meal

	Control	MOC	Azolla	SEM	*p*
DM intake, kg/d					
Beginning	3.06	3.02	2.72	0.19	0.42
End	2.85	3.24	3.20	0.089	0.014
Body weight, kg					
Beginning	148	138	142	7.20	0.58

End	141	151	151	1.01	<0.001
Milk yield, kg/d					
Beginning	1.78	1.42	1.37	0.35	0.42
End	0.69	1.41	1.46	0.08	<0.001

CHAPTER II

MATERIALS AND METHODS

The experiment was conducted at Parbotipur village of Zatrapur Union in Kurigram Sadar Thana and BRAC Chilling center at Razarhat for a period of six months.

3. a) Statement of the Problem

The experiment was carried out to know the effect of supplementary concentrate feeding on milk yield, milk fat and body weight changes of indigenous cows under chars condition.

3. b) Experimental Animals

Eight indigenous non-descriptive milking cows having similar milk production and body weight were used in this study. Cows were divided into three nearly similar groups on the basis of their milk yield, body weight and number of lactations. The two groups of cows were designated as T_1, T_2.

Before starting of the study, cows were de-wormed using Triclabendazole +Levamisole (Endex one bolus /seventy kg body weight) and were vaccinated against Anthrax, Foot and Mouth disease(FMD) and Hemorrhegic Septicemia (HS).

3. c) Feeding regimes

Two types feeds are used in the experiment (1) Concentrate mixture +traditional diet (straw; green grass, tree leaves etc) (2) Only traditional diet. Cows on T_1 group received the concentrate mixture. On the other hand, cows of T_2 group were given only traditional diet usually fed by farmers in *adlibitum*.

Fig. 1: Ready feed Fig. 2: Napier grass

Table 4. Whole ration for different groups of cows

Group of Animal	Name of the Ingredients	Ingredients of Concentrates	Roughages
T_1	Ready Feed Mixture Maize (44%) Wheat Barn (22%) Till oil Cake (25%) Coconut Oil cake (5%) Fish Meal (1%) Molasses (2%) DCP (1%)	Moisture 10-12% CP 22% CF 8% Crude Fat 2.5-3% Calcium 1% Phosphorus 0.5% TDN 65%	Napier grass, rice straw, tree leaves etc. usually offered by farmers
T_2	Mustard oil cake, Rice washing water, Rice crust	-	Do

The feed is formulated by the Agro Industrial Trust (AIT) company which is used by the farmers in the selected area.

3. d) Working Procedure:

The experiment was started after two weeks of calving. Animals on each group were reared by applying traditional methods, only exception was for T_1 groups where they were offered concentrate mixture. Concentrate mixture was fed about half an hour before milking. All cows were hand milked twice a day after having been suckled by their calves for about 1-2 minutes. Morning milking under consideration which milked at 08'0 clock in the morning. After milking, daily milk off-take was measured using graduated plastic jug by the farmers and yield was recorded daily in the pass book.Representative milk samples were taken every two weeks(15Days) in test tube.Samples from each cow was analysed at BRAC chilling center at Razarhat in Digital Fat Testing (DFT) machine at 15 days interval to monitor the quality. Analysis was carried out to measure the milk fat.

Fig. 3: Feeding of animal

Before starting the experiment weight of all the cows were taken initially by measuring heart girth and shoulder to bone by applying the formulla

Live Weight, $W = \frac{L \times G2}{2.2 \times 300}$ kg

Where, L is length (inch) from shoulder point to buttock and G is heart girth (inch).

And then after every 30 days interval to know their body weight changes.

3.e) Data Analysis

The raw data were entered and sorted into MS Excel spread sheet, then transferred to the analytical software SPSS (Statistical Package for the Social Sciences, version, 16) for descriptive analysis.

CHAPTER IV

RESULTS AND DISCUSSION

4. a) Milk Yield of Cows

Average milk yield of the cows for whole experiment was 1.80 ± 0.40,and 1.32± 0.20 kg/cow/d for groups of T_1, T_2 respectively(table 6) Statistical analysis showed that milk yield of group T_1 was significantly higher ($P<0.05$) than the cows that were on group T_2. It is mentioned earlier that cows on T_1 group received the concentrate mixture which contain high level of UDP and low level of RDP. Fishmeal was added in the diet of T_1 group as a source of UDP.

Average daily milk yield of the cows during the different weeks of lactation are presented in Table 6. From the table it is evident that milk yield increased gradually with advancing stages of lactation, up to around 10 weeks of experiment, after which there was a decreasing tendency of milk production in all group. This might be due to effect of stages of lactation.

Average daily milk yield of the cows during the different weeks of lactation are presented in Table 5. From the table it is evident that milk yield increased gradually with advancing stages of lactation, up to around 10 weeks of experiment, after which there was a decreasing tendency of milk production in all group. This might be due to effect of stages of lactation as we know that milk production decrease after three months of lactation.

Table5. Milk yield (Ltr.) of different groups of cows.

Groups of animals	Sl. No. of Animals	Weeks of Experiment													Average of all weeks
		1	2	3	4	5	6	7	8	9	10	11	12	13	
T_1	1	1.300	1.15	1.25	1.56	1.95	1.95	2.20	2.25	2.20	2.20	2.10	2.15	2.20	1.86±0.44
	2	0.75	0.80	1.00	1.49	1.59	1.70	1.89	2.00	1.95	1.85	1.75	1.75	1.70	1.56±0.41
	3	1.25	1.45	1.65	1.85	1.91	2.00	2.10	2.00	1.90	1.95	1.90	1.90	1.80	1.83±0.23
	4	1.00	1.15	1.31	1.51	1.69	1.80	2.50	2.50	2.40	2.45	2.25	2.25	2.20	1.92±0.52
	Total average														1.8±0.40
T_2	1	1.00	1.10	1.00	1.25	1.15	1.40	1.60	1.40	1.45	1.40	1.40	1.40	1.31	1.28± ± 0.18
	2	1.10	1.0	1.0	1.1	1.2	1.2	1.5	1.6	1.6	1.4	1.4	1.4	1.4	1.30±0.22

			0	0	5	5	0	0	2	9	9	5	5	0	
	3	0.80	1.00	1.10	1.25	1.30	1.20	1.50	1.55	1.59	1.41	1.42	1.42	1.39	1.31±0.22
	4	1.00	1.20	1.25	1.40	1.61	1.62	1.51	1.40	1.42	1.40	1.30	1.30	1.25	1.37±0.16
	Total average														1.15±0.20

4. b) Body Weight Changes of Cows

Cows on T_1 group gained little weight during the study period except cow on T_2group which just maintained its weight without loss or gain. Body weight change of cows during the different period of experiment are presented in table 6.Total weight gain during the whole period of experiment are shown in Table 6. Total weight gain for T_1 and T_2 group was 7.0 ± 2.12 and 1.0 ± 0.71 kg respectively. Statistical analysis showed that body weight gain of cows that were on T_2 group was significantly lower ($P<0.05$) than the cows that were on T_1 groups.

Table 6. Body weight changes (kg) of different groups of cows

Groups of animals	Sl. No.	Time of experiment				Total weight gain	Group average
		1st week	30 days	60 days	90 days		
T_1	1	90	91	93	97	7	7.0±2.12
	2	95	97	100	101	6	
	3	100	102	105	108	8	
	4	88	90	91	97	9	
T_2	1	89	90	89	90	1	1.0±0.71
	2	102	100	102	103	1	
	3	92	93	93	94	2	
	4	75	74	75	75	0	

Cows on T_2 group received only traditional diet during the study period. On the other hand, cows on T_1 group received concentrate mixture which might have created significant difference between weight gain of different groups of cows. This might be due to the effect protein in concentrate. Amino acids for absorption from the small intestine more directly and more efficient (Islam, 1988).For this reason body weight gain of cows were highest in T_1 group than T_2 groups.

4. c) Milk Fat of Cows:

Milk samples were analysed to know the fat. Average fat content of milk during the different periods of study are shown in Table 7. and average fat content of milk for all group for the whole experimental period are shown in Table

7. From the table it is observe that fat content in the milk of cows that were on group $T_1$and T_2 was 4.64±2.71 and 4.31±2.31 g/kg milk respectively. Statistical analysis showed that there was no significant different between the fat content of milk of different groups of cows. The fat content of milk of our indigenous cows are high. Slightly high fat content of milk of T_2 groups might be due to the fact that they were reared mainly on roughage feeds and their milk production was also low. It is now well established that milk fat percentage depends on milk production also. When milk production decreases then milk fat %increases.

Table 7. Average fat content (/kg) in the milk of cows

Groups of animals	Sl. No.	Time of experiment							Average
		Initial	15 days	30 days	45 days	60 days	75 days	91 days	
T_1	1	4.20	4.20	4.40	4.80	4.60	4.70	4.50	4.49±2.17
	2	3.90	3.90	4.50	4.80	5.00	4.90	4.90	4.56±4.40
	3	4.00	4.10	4.50	4.20	4.90	4.60	4.60	4.41±3.00
	4	4.90	5.00	5.20	5.10	5.50	5.00	5.00	5.10±1.85
									4.64±2.71
T_2	1	3.90	4.20	4.1o	4.0	4.50	4.40	4.60	4.24±2.44
	2	4.50	4.50	4.50	4.80	4.70	4.60	4.80	4.63±1.28
	3	3.80	3.90	3.90	4.20	4.00	4.10	4.00	3.99±1.25
	4	4.00	4.20	4.20	4.10	4.70	4.60	4.80	4.37±2.96
									4.31±2.31

From the result of this experiment, it may be pointed out that milk production of our indigenous cows can be increased by feeding concentrates along with their usual basal diets. In order to increase the livestock production of the country more research work is needed on different aspects of our indigenous milking cows.

CHAPETR II

SUMMARY AND CONCLUSION

Table 8. Summary of the results of experiments

Parameters Studied	Groups of cows		Level of significance
	T_1	T_2	
a) Milk yield (kg/d)	1.80± 0.40	1.32±0.20	*
b) Body wt. changes of cows (Total gain in kg)	7.0± 2.12	1.0±.71	*
c) Milk composition : Milk fat (g/kg)	4.64±2.71	4.31±2.31	NS

* = Significant at 5% level

NS = Non-significant.

From the result of the experiment it was found that average milk yield of the cows for the whole study period was 1.80 ± 0.40 and 132 ± 0.02kg/cow/d respectively. Statistical analysis showed that, milk production of T_2group (without supplement) was significantly lower than the milk production of T_1 group. Similar types of result was seen for body weight changes of cows and Calves. Cows on T_1 and T_2 group gained 7.0 ± 2.12 and 1.0 ± 0.7 kg respectively during the experiment.

Analysis of milk samples in DFT machine showed that milk fat content was higher in the milk of T_2group (43.1±2.31 g/kg), followed by T_1(4.64±2.71 g/kg) group. Milk fat content was little higher forT_1 group but statistical analysis showed that there was no significant difference between the fat content of milk of different groups of cows.

From the result of the experiment it may be concluded that milk production of our indigenous cows can be increased by supplementing concentrates along with their as usual traditional diets. Quality of milk of our local cows are satisfactory. More research work is needed on indigenous cows to increase the milk production of the country.

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