EFFECT OF SWEET JUMBO GRASS (*Sorghum bicolour Sorghum sudanefe)* ON CROSSBRED AND LOCAL MILKING COWS AVAILABLE IN CHAR AREAS OF PABNA SADAR UPAZILA OF BANGLADESH

A Thesis
By

MD. SHAHJAHAN ALI
Reg. No.: 1305093
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MASTER OF SCIENCE (M S)

IN

ANIMAL SCIENCE

DEPARTMENT OF GENERAL ANIMAL SCIENCE AND NUTRITION

HAJEE MOHAMMAD DANESH SCIENCE AND TECHNOLOGY

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Submitted to the Department of General Animal Science and Nutrition, Faculty of Veterinary and Animal Science, Hajee Mohammad Danesh Science and Technology University, Dinajpur in partial fulfilment of the requirements for the degree of

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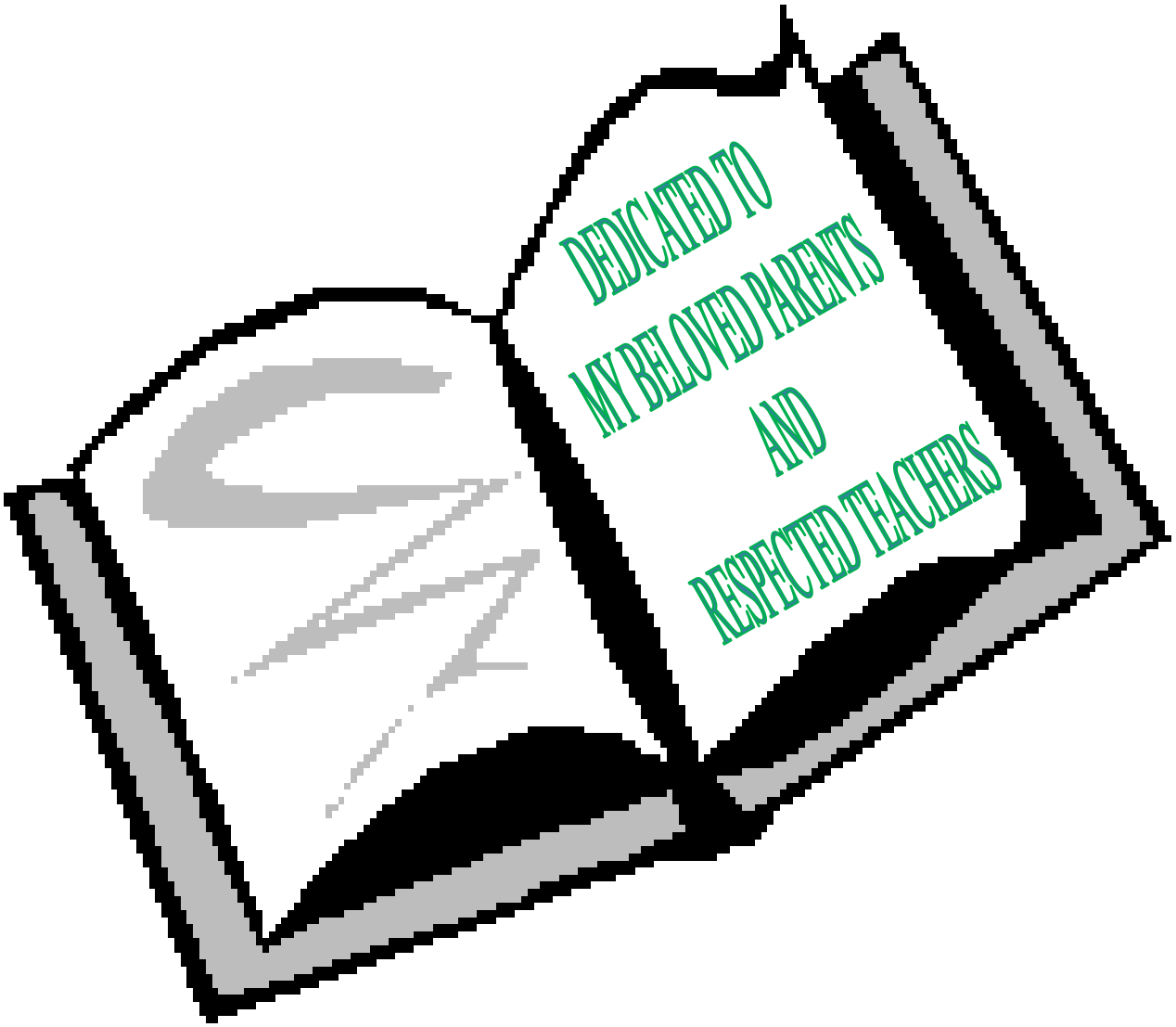
DEDICATED TO
MY BELOVED PARENTS
AND
RESPECTED TEACHERS

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Abstract

This study was conducted for a period of 6 months at char areas of Pabna Sadar Upazila under Pabna District to evaluate the effect of sweet jumbo grass on productive and reproductive performance of Sahiwal cross bred (L×SH) and Local (L) milking cows. A total 08 number of crossbred milking cows and 08 number of local milking cows (L×SH, 08 and L, 08) were selected from the study area and reared three months under feeding with high yielding sweet jumbo and road side green grass and they were assigned into two groups (treatment & control group). The productive performances like, daily milk yield, milk composition especially fat%, body weight gain of cow and reproductive performances like post-partum heat period and service per conception were studied by collecting data through a well prescribed questionnaire. The results revealed that among the productive parameters; daily milk yield was significantly ($p<0.05$) improved in the crossbred (L×SH) and local (L) milking cows which were fed high yielding sweet jumbo green grass compared to the cows were fed road side green grass. On the other hand milk fat%, body weight gain, post-partum heat period and service per conception were also improved ($p<0.05$) in the crossbred and local milking cows. So, it is suggested that to achieve the desire productive and reproductive performance of crossbred and local milking cows may be improved by feeding high yielding sweet jumbo green grass.

Abbreviation and symbols

AI : Artificial Insemination

ADF : Acid Detergent Fiber

BBS : Bangladesh Bureau of Statistics

BSS : Bangladesh Songbad Shostha

BLRI : Bangladesh Livestock Research Institute

BQ : Black Quarter

BER : Bangladesh Economic Review

CLP : Chars Livelihoods Programme

CRD : Completely Randomized Design

CP : Crude Protein

CF : Crude Fiber

DLS : Department of Livestock Services

DM : Dry Matter

EE : Ether Extract

FAO : Food and Agriculture Organization of the United Nations

FMD : Foot and Mouth Disease

GDP : Gross Domestic Product

HS : Haemorragic Septicemia

ISSN : International Standard Serial Number

L×HF : Local × Holstein Friesian

L×Sh : Local × Sahiwal

L×L : Local × Local

MMDP : Milk Market Development Project

NGO : Non Government Organization

NFE : Nitrogen Free Extract

OM : Organic Matter

SNF : Solids Not Fat

SME : Standard Error Mean

SPSS : Statistical Package for Social Sciences

SJG : Sweet Jumbo Grass

RP : Rectal Palpation

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Chapter I

Introduction

Bangladesh is an agriculture based subtropical developing country. Nearly 85% peoples of Bangladesh are engaged in agriculture sector, where livestock constitute an important segment of this sector which plays an important role to promote human health and poverty alleviation. Cattle population ranks Bangladesh as 12th in the world and 3rd in the Asian countries (Alam *et al*., 1994). The total cattle population of Bangladesh is 23.2 million of which 9.22 million is dairy cows. The calculated number of lactating cows varies from 4.08 million to 4.16 million out of the total adult female of 9.04 million to 9.22 million during 2006 to 2013 (BER 2013) and (Huque et al., 2013). About 92% of the dairy cattle are non descriptive indigenous and only 8% are reported to be crossbred (BBS, 2006). These indigenous cattle are of multipurpose in providing milk, draught, meat and dung as fuel and organic fertilizer. About 20% of the people directly depends on the livestock sector and the magnitude of contributes around 16.5% to the country GDP (BBS, 2010).

Cattle is the main source of animal protein as they give meat and milk, it is also the source of draft power, hides etc. (Anon, 2008). Despite such a high density of cattle population, the outputs of animal production such as milk, meat and draught power fall far short of requirement. These short falls are encouraging due to lack of optimum level of nutrition, disease control, proper housing management practices and efficient reproductive performance and well thought systematic breeding program etc. These animals are kept mainly in the stall with limited grazing on the roadside, embankment slopes, and fallow land etc. where paddy straw is the stable food. Management practices are responsible for 85-90% and genetic factor for only 10-15% of low productivity (Dikey, 1985). Men, women and youth of rural people are the active partners in

various farming activities. In addition to crop production, dairy is practiced as a subsidiary enterprise in rural areas. Dairy farming got an impetus with support price by the government and well developed infrastructure for milk marketing (Shivalingaiah Veerabhadraiah, 1996). Several dairy management practices including feeding straw and green forage, breeding practices cleaning and sanitation activity and milk processing, storing and marketing are being done directly by rural people.

Landless, marginal, small, medium or a large farmer of the selected regions had an average total land of 0.1, 0.3, 0.6, 1.3 and 4.7 ha/farm, respectively keeping an average of 1.2, 1.7, 1.2, 1.9 and 2.3 milking cows, respectively which produce 3.9, 4.2, 3.7, 7.8 and 8.2 L/day of milk, respectively (Huque, 2014). Irrespective of land categories and region a rural dairy farmer kept 5.7 cattle of 2.41:1 local to crossbreds, produces 5.6 L/day of milk with a benefit to cost ratio of 1.78:1. About 63% of their annual income depends on the dairy. The rural dairy farmers feed rice straw, cut-and-carry green grass and average concentrate mixture of 50% rice bran, 24% wheat bran, 19% oil cake and 6% broken rice. The average daily allowance per animal of individual feed was 5.2 kg dry rice straw, 5.4 kg cut-and-carry grass and 1.5 kg concentrate. About 47%, 29% and 24% of the dairy farmers feed their animals in stalls, stall cum open or open system, respectively (Huque, 2014).

A number of NGOs under the Chars Livelihoods Programme (CLP), being funded by the UKaid through the Department for International Development (DFID), have been assisting the char people in ten northwestern riverine districts (Pabna, Sirajgonj, Tangail, Bogra, Lalmonirhat, Nilphamari, Rangpur, Kurigram, Gaibandha and Jamalpur) for farming sweet jumbo grass since 2008 to till now. Commercial cultivation of sweet jumbo grass on the sandy char lands in the Padma basin has brought success to the extremely poor char people in achieving economic self-reliance in recent years, (reports BSS, 2014). Similar success is noticed in the animal husbandry sector as well as instrument against poverty by rearing cows, milking those and farming of the Australian hybrid variety grass. Milk production has been increased by 40 per cent with easy fattening of cows while the incidents of cattle deaths have been reduced by certain level. The fodder crisis of the heads of cattle during the rainy seasons has also been resolved by and large in the char areas. The char farmers of Pabna Sadar Upazila also receive training from Chars Livelihoods Programme (CLP) to preserve the grass during monsoon, when many farmers are

compelled to sell their cows due to fodder shortage. The farmers harvest the sweet jumbo grass five times from January to August. Expanded cultivation of the grass has led to better milk production due to fatter cattle, fewer deaths of cattle and less fodder crisis during the rainy season (report BSS, 2014).

More than 500 extremely poor families under Pabna Sadar areas have become self-reliant through commercial cultivation of sweet jumbo grass in sandy Char areas of the Padma basin in the past few years. Expanded cultivation of the sweet jumbo grass has also been helping the backward people of remote Char areas in boosting animal husbandry and eradicating abject poverty through enhancing the prospective sector. Farmers of the remote char (landmass emerged from riverbed) areas in the district are opting for grass farming, finding it more profitable than farming other crops. Farmers of several Char areas of the Padma river could bring wide changes in their lifestyle by cultivating the high yielding 'Sweet Jumbo' variety of grass on their lands. After feeding the grass to their own cattle first, they sell a large amount of it and earn a handsome profit, which ultimately brings them economic self-sufficiency (reports BSS, 2014). The Char farmers are happy with the large production of the high yielding variety of grass that is behind their economic uplift.

However, there was a little number of systemic studies on this work. Therefore, considering the above facts and circumstances the present study was undertaken with the following objectives:

i) To evaluate the effect of sweet jumbo and road side local green grass on crossbred and local milking cows.

ii) To know the productive and reproductive performance of crossbred and local milking cows.

Chapter II

Review of literature

Many research works have been done in different countries of the world on sweet jumbo green grass on productive and reproductive performances of different type of dairy milking cows. In Bangladesh there is a limited number of research works have been carried out to monitor the effect of sweet jumbo green grass on productive and reproductive performance of crossbred and local dairy cows under treatment & control feeding system. Some of related findings of research carried out in Bangladesh or elsewhere are reviewed in this section.

To make easy and clear the reviews are divided into several sections.

i) Daily milk yield
ii) Milk composition specially fat%
iii) Body weight gain of cow
iv) Post-partum heat period
v) Service per conception.

2.1 Daily milk yield

Milk yield is an important for economic return of lactating cows. It is the essential criteria to choose a dairy cow for profitable dairy business. It was found that the average milk yield of Holstein cross, Sindhi cross, Sahiwal cross and local cows were 12.03 ± 3.73, 7±1.58, 5.16±0.8 and 2.1±0.41 liter/day, respectively. The results showed that there was significant differences ($p<0.01$) within

the milk yield of different breeds. Among the different types of cows highest milk production was recorded in Holstein cross and lowest was recorded in Local cows.

Nahar et al. (1992) reported that the average milk yield of Pabna breed 7.31 kg, Local cows 3.09 kg and crossbred cows 8.24 kg. Average milk yield of Holstein x Local was 5.5 ±0.1kg under rural condition of Bangladesh. Ahmed (1995) state that the milk production of crossbred cows in Summer, Autumn, Winter and Spring season was 2.79 ± 0.068, 3.58 ± 0.390, 4.16 ± 0.536, and 3.11 ± 0.455 kg/day respectively.

Ahmed and Islam (1987) studied that the milk production of different genotypes of maintained at Dairy and Cattle Improvement Farm, Savar, Dhaka was varied and average daily milk yield for local, Sindhi, Sahiwal, Jersey, Friesian cross and Jersey cross were 2.56, 3.33, 3.60, 7.62, 9.30 and 5.74 kg respectively.

Halim (1992) who found that average milk yield of crossbreed dairy cows was 11.09 litre/day. Similarly Nahar et al. (1992) reported that average daily milk yield of Sindhi x Local, Sahiwal x Local, and Holstein x Local graded animals were 5.0±0.1, 4.9±0.1, and 7.5±0.1 kg, respectively.

Sultana *et al.* (2001); Alam *et al. (*2008) observed that the daily milk production of Local, L×HF and L×Sh crossbred cows were 1.7 to 2.60, 6.3 to 7.20 and 4.90 to 5.1 litres, respectively. Mondal *et al.* (2005) found that the average milk yield of Sahiwal crossbred were 2.84 litres, Holstein crossbred was 3.20 litres.

Kabir and Islam (2009) founded that the average milk production of L×HF and L×SH crossbred cows were 12.03 and 5.16 litres respectively in the comparative study on productive and reproductive performance of local and different crossbred dairy cows. The average daily milk production of L×HF and L×SH crossbred cows were 8.36 and 4.53 litres, respectively (Rokonuzzaman *et al.* 2009). Although the milk production of crossbred cows of my experiment agrees more or less with the findings of above authors.

2.2 Milk composition especially fat%

Eckles et al. (1981) reported that milk is highly nutritious food. It contains on an average 87.25 (%) water, 3.80 (%) fat, 3.50 (%) protein, 4.80 (%) of lactose and 0.07 (%) minerals. Besides, milk

contains considerable amounts of fat soluble vitamins (Vit-A, D, E & K) and water soluble vitamins (Vit-B complex and Vit-C).

Uddin et al. (2003) studied that the fat content of milk collected from different farmers. The fat Content ranged between 4.28 to 5.60%. It is reported that the fat content was 3.6 and 5.70% respectively. On the other hand milk fat collected from Jersey cross, Sahiwal cross and Red Chittagong was higher may be due to the supply of more concentrate feed and dry roughage specially rice straw offer on account of their milk production which supported by Hossain (1968) who found that milk fat of indigenous cows was 4.60%±0.64. And the Holstein cross of high yielding animal, which reduce the fat content of milk sample. This result agree with Islam *et al.* (1992) who reported 2.3 to 3.60 fat for market milk supply in Mymensingh town (Bangladesh).

Islam and Alam (1987) studied that the fat % of Pabna cows, Local cow and Crossbred cows were 3.85, 5.05 and 4.7 respectively. Fat of milk from Bangladesh Agricultural University Dairy farm was 4.88%. Mean percentage of fat from different villages of Mymensingh Sadar Thana was within the range of 2.9 to 5.6%. Average fat of indigenous cows' milk of different district varied from 4.4% to 6.8% while individual cow's milk of Trishal Thana of Mymensingh district contained 4.72% fat (Talukdar, 1989).

Rahman et al. (1987) observed that fat in milk found at Japanese market varied from 2.85% to 3.6 %. The fat% of cows of BLRI and of cows of Pabna region was 4.64 and 4.07 respectively. The protein % was 3.70 in cows of both BLRI and Pabna region. The lactose %, SNF % and mineral % in cows of BLRI and Pabna region were 5.29, 9.76, 0.42 and 5.29, 9.75 and 0.42.

Uddin et al. (2003) studied that generally fat content ranged between 4.28% to 5%. Fat content of milk collected from different farmers was ranged from 3.60 to 5.70%. Milk fat of indigenous cows was 4.60%±0.64 and Holstein crosses of high yielding animal, which reduce the fat content of milk sample.

Yadav and Saraswat (1982) found that maximum SNF (Solids Not Fat) value was obtained from local cows (9.94%) which were statistically similar with both Pabna cows (9.69%) and Crossbreed cows (9.64%). Market milk of different genotype and found that SNF content varies from 6.39 to 8.86% (US Public Health Services, 1965).

Islam et al. (2008) reported that significantly more fat, protein and total solids in Red Chittagong Cattle (RCC) milk compared to crossbred (Holstein cross, Jersey cross and Sahiwal cross) cow's milk. The composition of milk may also change over a period of time and may vary from country to country as a result of interaction effects of several factors like breeding program and feeding strategy.

Khan et al. (2005) stated that Sahiwal cow is the best breed existing in Indo-Pak region with per lactation capacity of 1500-2200 liters having 4.5 % fat content. A good milking process in dairy cows requires optimization of management, technological and physiological processes. For fast and complete milk removal, the active role of dairy cows must be considered.

2.3 Body weight gain of cow

Rahman et al. (2014) studied that the live weights of Crossbred cows (334.10 kg) were greater than Pabna (277.00 kg) and Local cows (136.90 kg). Daily feed intake of Crossbred cow was higher than the Pabna and Local cow due to its higher live weight. The daily DM intake of Pabna, Local and Crossbred cow was 11.46 Kg, 10.35 Kg and 11.96 Kg which were not significant.

Mahmud et al. (2014) studied that the daily CP, CF and EE intake of Crossbred cow is higher than the Pabna and Local cows. The live weight of cows of BLRI and cows of Pabna region were 252.10 kg and 247.00 kg respectively which were not significant. The DM, CP, CF and ME intakes of cow of BLRI were 8.20 Kg, 850 gm, 3 Kg, 71.91 MJ/day and Cows of Pabna were 7.90 Kg, 845.00 gm, 2.98 Kg, 69.01 MJ/day respectively which differs non significantly due to genetically and environmental cause. The daily intake of ash of cow of BLRI and Pabna region cows was 0.89 kg and 0.78 kg respectively which were no significant.

Chopade et al. (2002) stated that the average live weight of Local Zebu cows is about 150 kg, which is 25-30% less than that of Indian Zebu cattle. The poor physical condition and low reproductive performance are mostly due to consumption of insufficient and imbalanced feed along with parasitic infestation. The feed deficit becomes more serious in floods, monsoons and droughts. The feed shortage, especially of forages, is one of the main constraints in livestock development.

Bhatnagar et al. (1979) observed that Sahiwal and Red Sindhi are the most widely used dairy breeds of zebu cattle. Records collected at the Indian National Dairy Research Institute indicate that the two breeds also perform similarly. Body weight of mature cows was 300 to 350 kg, and average milk yield about 2000 kg per lactation with 5 per cent fat. Individual cows of both breeds have produced more than 4000 kg of milk in lactation. Both Sahiwal and Red Sindhi are rather small in numbers, but have been widely used for upgrading of local cattle in many countries, both in South-east Asia and in other continents.

2.4 Post-partum heat period

Post partum heat period is defined as the interval between calving and first insemination date. It is the number of days from calving to the first subsequent service of a cow. Dunn (1969) defined post partum involution as a process of return of the uterus to its normal non pregnant size.

Faruk Omar et al. (2004) studied that the average post partum heat period of Local, Sahiwal × Local, Friesian × Local and Jersey × Local was 102 ± 8.7, 95.0 ± 25.0, 90.0 ± 13.42 and 92.9 ± 7.2 days respectively. The results support the findings of other author (Alam et al., 2008) found that the average post partum heat period of Local, Sahiwal × Local and Friesian × Local was 108.5 ± 36.3, 97.6 ± 36.0 and 98.7 ± 40.6 days respectively. In this study the postpartum anestrous period of Local cows was (102 ± 8.7) days which was higher than the crossbred cows (92.4 ±5.8 days) and the difference between them was significant ($p<0.05$). These results are partially similar with Majid et al. (1993) who observed that average postpartum anestrous period for Local and Friesian × Local were 120.0 ± 7.8 and 117.2 ±7.3 days, respectively. Hossain et al. (2005) stated that the average calving to first service for crossbred and indigenous were 116 and 137 days, respectively, which were significantly different ($p<0.01$).

Dunn (1969) defined that post partum involution is a process of return of the uterus to its normal non pregnant size. Sarder *et al*. (2007); Alam *et al*. (2008) they observed that the post-partum heat period of L×HF and L×Sh crossbred cows were 170 to 182 and 167 to 172 days, respectively. Rokonuzzaman *et al.* (2009) found that comparatively shorter post-partum heat period in L×HF and L×Sh crossbred cows were 94 and 120 days, respectively.

2.5 Service per conception

Service per conception depends largely on the breeding system. It is higher under uncontrolled natural mating and lower under controlled mating or artificial insemination. Mondal et al. (2005) observed that average service per conception for different dairy cows were 1.63±0.61, 1.63±0.64, 1.60±0.65 and 1.67±0.62 for jersey cross, Sahiwal cross, Sindhi cross and Red- Chittagong cows, respectively. Statistical analysis showed that there was no significant difference within the service per conception of different genotypes.

Jabbar and Ali (1988) studied that the productive performance of local and crossbred cows in Bangladesh, and overall value of service per conception was 1.66±0.57. The observed value of crossbred, local (milk) and local (draft) were 1.61±0.52, 1.26±0.30 and 1.72±0.59, respectively. Average service per conception for local, local x Holstein and Sahiwal x Holstein cows were 1.70±0.91, 1.72±0.88 and 2.01±1.03, respectively (Chowdhury, 1995).

Halim (1992) found that the average conception rates of local and crossbred cows were 77.65 and 74.47 % and service per conception was 1.31 and 1.39, respectively. Bhuiyan and Sultana (1994) found that the highest value of service per conception in HF× SH was 2.05 and lowest was in Sahiwal was 1.12. The numbers of service per conception were in L×HF and L×SH crossbred cows were 1.56 and 1.69 respectively (Ghosh, 1995) .

Rahman and Rahman, 2006; Sarder *et al.*,2007; Alam *et al.*,2008 they found that the services per conception in L×HF and L×SH crossbred cows were 1.71 to 1.75 and 1.6 to 1.65, respectively. The services per conception in L×HF and L×SH crossbred cows were 1.60 and 2.0, respectively (Kabir and Islam, 2009). Rokonuzzaman *et al.* (2009) observed that the service per conception in L×HF and L×SH crossbred cows was 1.84 and 1.32, respectively.

Chapter III

Materials and Methods

3.1 Study area

The study was conducted from January 2015 to June 2015 in one Upazila namely Pabna Sadar under Pabna District in Rajshahi Division of Bangladesh.

The reasons for selecting this area for present study are given below:

i) Crossbred & Local milking cows were available in island Char areas.
ii) High yielding sweet jumbo green grass cultivation are available in Char areas.
iii) Data collection was easier for the researcher because most of the farmer were under Milk Market Development Project (MMDP) – Chars Livelihoods Programme (CLP).
iv) The developmental work with lactation cycle improvement support, cow comfort demonstration & their result demonstration for the dairy farmers had been started since 2014 under the Milk Market Development (MMDP) Project–Chars Livelihoods Programme (CLP).
v) The farmers' co-operation was available under the area so that reliable data could be obtained.

3.2 Grouping of animal

3.2.1 Groups of animal: The animals are divided into two groups.

(i) Treatment group (Same age & same lactation cycle)

First lactation cycle local cow is 02 numbers & first lactation cycle cross bred is 02 numbers under treatment group. Again second lactation cycle local cow is 02 numbers & second lactation cycle cross bred is 02 numbers under treatment group.

(ii) Control group (Same age & same lactation cycle)

First lactation cycle local cow is 02 numbers & first lactation cycle cross bred cross is 02 numbers under control group. Again second lactation cycle local cow is 02 numbers & second lactation cycle cross bred is 02 numbers under control group.

3.2.2 Breed of cows: Total numbers of animal or sample size is 16.

Two breeds were selected as follows

(i) Local x Local (Indigenous cow) o8 in numbers.

(ii) Sahiwal x Local crosses o8 in numbers.

3.2.3 Age of animal

The age of cows was determined by observation of teeth eruption. The age of Cows were divided into the following two groups:

- 2.5-3.5 years of first lactation cycle milking cows under treatment & control group.
- 3.5-4.5 years of second lactation cycle milking cows under treatment & control group.

3.3 Animal selection and management:

A total of 08 Sahiwal crossbred milking & 08 Local milking cows were selected for the study. Two types of cow (08 of each type) such as Local milking cow and Crossbred milking cow were selected from Pabna Sadar Upazila under Pabna district. Data were collected on daily milk yield every, milk composition specially fat%, body weight gain every 15 days interval, post partum heat show & service per conception within the study period.

Live weight was measured by using formula: Live weight = (L×G2) ÷ 300 pound.

Feeding of animal:

Feeding and management were uniform throughout the three month period. In control group; feeding system were supplied 12 kg road side green grass (Dorba, Baksha, Gama, Sema, Vadai etc), 3 kg local concentrate feed & 2–3 kg straw as daily meal per individual milking cow but in treatment group; feeding system were 12 kg high yielding sweet jumbo green grass, 03 kg local concentrate feed & 2-3 kg straw as daily meal per individual milking cow. The entire animals were studied under the same management condition at farms level.

3.4 Chemical composition of Sweet Jumbo grass:

Sweet Jumbo grass (*Sorghum bicolour Sorghum sudanefe*) Proximate and fiber composition of Sweet Jumbo Grass (SJG) is shown in below:

Chemical composition of (%DM basis)

Parameters	**Amount (%)**
Dry matter	15.9
Crude protein (CP)	11.0
Neutral detergent fiber (NDF)	75.2
Acid detergent fiber (ADF)	39.7
Acid detergent lignin (ADL)	4.3
Hemicellulose	35.5
Cellulose	35.4
Ash	8.59
Gross energy (Mcal/kg)	3.28

Source: Pakistan Vet. J., 2009, 29(1): 5

3.4.1 Chemical composition of common road side grasses:

Components	Road side grasses
Dry matter (%)	16.7

Composition (%):-

Parameters	Amount (%)
Crude Protein (CP)	11.0
Crude Fibre (CF)	31.4
Ether Extract (EE)	1.89
Nitrogen Free Extract (NFE)	47.1
Ash	8.57
Organic matter (OM)	91.4

Source: Online journal of biological sciences 2(6): 364-365, 2002. ISSN (608- 4127).

All milking cows are access to ad libitum drinking water with iodized salt.

3.5. Body weight

The weights of animals were estimated by measuring length and girth using the Shaeffer's formula as described by McNitt (1983). The animals were measured at the beginning of the experiment and then the animals were measured fortnightly throughout the experiment of 3 months. Body weight of cows was determined using measuring tape (Chinghai, China). The cows were divided in to the following groups:

(i.) First lactation cycle local cow 130-170 kg

(ii.) Second lactation cycle local cow 150-200 kg

(iii.) First lactation cycle Sahiwal cross bred cow 250-300 kg

(iv.) Second lactation cycle Sahiwal cross bred cow 301-350 kg.

3.6 Vaccination and medication

All the animals of this study received vaccination against infectious diseases like Foot and Mouth Disease (FMD), Anthrax, Hemorrhagic Septicemia (HS) and Black Quarter (BQ) etc. All animals were dewormed orally using one bolus containing Triclabendazole (900mg) and Levamisole (600mg) per every 70 kg body weight.

3.7 Data collection

Data was collected from January 2015 to June 2015. A formatted data sheet was supplied to each farmer and suggestions were given to the farmers on importance of data record and how to put data in data sheet. In order to obtain reliable data every 07 days interval of several visits were made in the research area by researcher. Some data are collected from local NGO (named ASEAB, Pabna) established milk chilling centre & Pran Dairy Limited chilling centre, Nabinbazar, Pabna Sadar, Pabna. Sometimes data was collected by farmer's response process from focus group discussion and formal interview.

The following information was recorded as shown in Appendix-I:

i) Name and address of farmer
ii) Genotype of milking cows

iii) Breed, age, body weight of cows
iv) Age of the milking cows
v) Lactation cycle of cows
vi) Daily Milk yield
vii) Milk composition of cow Specially Fat%
viii) Body weight gain of cows
ix) Post partum heat period
x) Date and time of oestrus

3.8 Estrus detection

Sexual Cycle length 21 (18-24) days

- Heat - 60% at night (Cool periods)
- Heat period 18 (2-24) hours
- Spontaneous ovulator
- Ovulation occurs 30 hours after onset of heat

Sing of heat in the cow

Jumps on others (Pro heat)

- Stand to be mounted (Heat)
- Clear mucous discharge (Bulling)
- Vulval lips swollen
- Vaginal mucous membranes red & bright
- Some cows bellow!!!
- 7-8% post heat bleeding

- 8-11% cows show heat 10-12 days after AI

3.9 Artificial insemination by AI technician

For Best AI results

Correctly detect cows in heat

- Use clean & sterilize AI gun
- Main cold chain for semen transportation
- Deep frozen semen in liquid nitrogen
- Thawing of frozen semen (10-15 sec at 37°C)
- Loading of AI gun with semen straw
- Hygienically passage of loaded AI gun
- Deposition of semen in the body of uterus

Insert AI gun dorsally of Vulval wall

- Locate & grasp the cervix
- Pass the AI gun tip through cervix
- Locate AI gun tip in the uterine body
- Spell semen pushing plunger of AI gun
- Withdraw AI gun gently
- Excessive genital palpation is prohibited
- After AI keep cows in cooler place
- Advise owner to keep record of AI date

The instruments were washed with tube well water and the metal instruments were treated with boiling water before use. It was checked, and adjusted the water temperature in the thawing flask within a range of 35°-38°C. The straw was placed in the thawing water as quickly as possible and leaved it there for a minimum of 12 seconds. Approximately 20 cm of paper was tearing off. By using fingers the straw were removed from the thawing flask and dried it with a paper towel. The straw was held by the manufacturer's end after drying completed. The insemination gun was removed from the clips on the inside of the kit box lid. The plunger of the gun was pulled back about 120-180 mm. The straws were hold by the end the manufacturer's end was thread into the gun as far as it would gun. It was prepared to cut-off the laboratory end of the straw by thoroughly cleaned and dried scissors. The loaded gun was hold vertically at eye level and clean sharp scissors a horizontal cut was made 10 cm above the gun to remove the crimped end. A sheath was placed over the barrel of the gun. The sheath was pushed through the leveled centre hole of the locking ring and twisted it down on the conical seat of the gun. The loaded AI gun was held in mouth. Plastic disposable gloves were used. A small quantity of glove lubricant was applied. The vulva was thoroughly cleaned of dung and dirt by wiping it with the piece of paper used on the tail. A cone was formed with the gloved fingers and inserted hand into the rectum. The lips of the vulva were parted. The gun was inserted cleanly betweens the lips of the vulva into the vagina. The semen was pushed to the body of uterus. The gun was removed slowly from the vagina. The arm was withdrawn slowly from the rectum of the cow.

4.10 Pregnancy diagnosis by rectal palpation

All inseminated animals were subjected to pregnancy diagnosis by per rectum examination after 80-90 days of performing post AI. The result of pregnancy diagnosis was recorded.

4.11 Data analysis

The collected data under this study was analyzed and presented using simple statistical techniques. The raw data were entered and sorted into MS Excel spread sheet then transferred to the analytical software SPSS (version 16.0) for descriptive analysis. The collected data were statistically analyzed as per Steel and Torrie (1980) using Completely Randomized Design (CRD). Compare mean values under pair sample T-test to know the effect of sweet jumbo green grass on cross bred

& local milking cows considering different factors. All data are expressed as mean ± SEM. Differences were considered significant at the level of $p<0.05$.

Chapter IV

Results and Discussion

4.1 Effect of sweet jumbo grass on daily milk yield of cow

Effect of sweet jumbo grass on daily milk yield of cow is shown in Table 1. Each of the result is calculated averagely of two (pier) animal data of every group. The present result revealed that the average daily milk production of L×L first lactation and L×L second lactation milking cows were 0.93 and 1.39 litters in control feeding system and 1.80 and 2.40 litters in treatment feeding system, respectively. The daily milk yield of SH×L first lactation and SH×L second lactation milking cows were 3.33 and 3.48 litters in control feeding system and 4.21 and 5.50 litters in treatment feeding system. The present results were agreed with the result of Ahmed and Islam (1987) studied that

the milk production of different genotypes of maintained at Dairy and Cattle Improvement Farm, Savar, Dhaka was varied and average daily milk yield for local, Sindhi, Sahiwal, Jersey, Friesian cross and Jersey cross were 2.56, 3.33, 3.60, 7.62, 9.30, 6.64, and 5.74 kg respectively. It was found that the average milk yield of Sahiwal cross and local cows were 5.16±0.8 and 2.1±0.41 liter/day, respectively. The results showed that there was significant differences ($p<0.01$) within the milk yield of different breeds.

Group	Variety	Mean ± SE of mean						Average day /litre	Signific-ance	p-value
		15th day/litre	30th day/litre	45th day/litre	60th day/litre	75th day/litre	90th day/litre			
First Lactation Control group	Sahiwal cross	2.52 [b] ± 0.03	3.40 [a] ± 0.40	3.52 [a] ± 1.02	3.55 [a] ± 0.45	3.50 [a] ±0.50	3.51 [a] ± 0.49	3.33 [c]	*	0.0021
	Local	0.50 [b] ±0.20	0.95 [a] ± 0.25	1.00 [a] ± 0.30	0.98 [a] ±0.22	1.10 [a] ± 0.10	1.05 [a] ± 0.15	0.93 [f]	*	0.0073
First Lactation Treatment group	Sahiwal cross	3.00 [b] ±1.00	4.22 [a] ± 0.72	4.51 [a] ± 0.49	4.55 [a] ±0.45	4.52 [a] ±0.98	4.50 [a] ±0.50	4.21 [b]	*	0.0018
	Local	0.95 [b] ±0.20	1.75 [a] ±0.25	2.0 [a] ± 1.00	1.98 [a] ±0.52	2.11 [a] ±0.89	2.05 [a] ±0.45	1.80 [e]	**	0.0326
Second Lactation Control group	Sahiwal cross	3.00 [a] ± 1.00	3.88 [a] ±0.62	4.00 [a] ±1.00	4.05 [a] ±0.95	4.11 [a] ±0.89	4.00 [a] ± 0.49	3.84[bc]	*	0.3710
	Local	0.75 [b] ± 0.25	1.45 [a] ± 0.55	1.50 [a] ±0.50	1.62 [a] ±0.38	1.51 [a] ±0.49	1.53 [a] ±1.53	1.39 [e]	*	0.0124
Second Lactation Treatment group	Sahiwal cross	4.50 [b] ± 0.50	5.66 [a] ± 1.16	5.75 [a] ±0.75	5.72 [a] ±0.72	5.71 [a] ±1.71	5.70 [a] ± 0.70	5.50 [a]	*	0.0006
	Local	1.53 [b] ±0.30	2.48 [a] ±0.48	2.50 [a] ± 0.50	2.45 [a] ±.0.55	2.55 [a] ±0.95	2.54 [a] ±0.46	2.40 [d]	**	0.0675

* = Significant at the level of 0.05%

** = Significant at the level 0.01 %

Table 1. Effect of sweet jumbo grass on daily milk yield of crossbred & local milking cows. Each group with error group represents Mean ± SEM value. Without a common lower case letter on error groups indicate significant differences ($p<0.05$) between the treatment groups.

4.2 Effect of sweet jumbo grass on milk composition of fat%

Effect of sweet jumbo grass on milk composition of fat% is shown in Table 2. Each of the result is calculated averagely of two (pier) animal data of every group. The higher Fat% was observed in local milking cows and lower in cross (SH×L) milking cows, but mostly there were no significant ($p>0.05$) difference in fat% among the different lactation cycle of cows (Table 2). The present

result revealed that the average milk fat% of L×L first lactation and L×L second lactation milking cows were 5.28% and 5.07 % in control feeding system and 5.51% and 5.18% in treatment feeding system, respectively (Table 2). The milk fat% of Sh×L first lactation and Sh×L second lactation milking cows were 4.11% and 4.01% in control feeding system and 4.47% and 4.10% in treatment feeding system. Uddin et al. (2003) studied that fat content of milk obtained from four different genotypes were significant at 1% level of probability. The highest fat (%) was observed from Red Chittagong, and Sahiwal cross and the lowest fat (%) from Holstein cross. The present results were agreed with the result of Islam and Alam (1987) studied that the fat % of Pabna cows, Local cow and Crossbred cows were 3.85, 5.05 and 4.7 respectively. Fat of milk from Bangladesh Agricultural University Dairy farm was 4.88%. Mean percentage of fat from different villages of Mymensingh Sadar Thana was within the range of 2.9 to 5.6%. It is difficult to find out the effect of sweet jumbo grass on their fat% of daily milk production.

Group	Variety	Mean ± SE of mean						Average g/kg	Significance	p-value
		15th day g/kg	30th day g/kg	45th day g/kg	60th day g/kg	75th day g/kg	90th day g/kg			
First Lactation Control group	Sahiwal cross	3.93 [a] ± 0.07	3.98 [a] ±0.10	4.10 [a] ±0.30	4.21 [a] ±0.21	4.25 [a] ±0.25	4.23 [a] ±0.13	4.11 [d]	NS	0.00
	Local	4.89 [a] ±0.11	5.22 [a] ± 0.22	5.24 [a] ±0.24	5.35 [a] ±0.10	5.50 [a] ±0.50	5.52 [a] ±.0.30	5.28 [ab]	*	0.3395
First Lactation Treatment group	Sahiwal cross	4.05 [b] ±0.15	4.28 [ab] ±0.24	4.37 [ab] ±0.17	4.68 [a] ±0.18	4.75 [a] ±0.25	4.72 [a] ±0.20	4.47 [c]	*	0.1033
	Local	5.21 [a] ±0.21	5.29 [a] ±0.09	5.57 [a] ±0.43	5.63 [a] ±0.13	5.70 [a] ±0.20	5.69 [a] ±0.21	5.51 [a]	NS	0.00
Second Lactation Control group	Sahiwal cross	3.75 [a] ±0.25	3.97 [a] ±0.10	4.10 [a] ±0.20	4.21 [a] ±0.21	4.08 [a] ±0.18	4.00 [a] ±0.10	4.01 [d]	NS	0.00
	Local	4.75 [a] ±0.25	4.89 [a] ±0.31	5.10 [a] ± 0.20	5.33 [a] ±0.20	5.16 [a]± 0.16	5.21 [a] ±0.21	5.07 [b]	NS	0.00
Second Lactation Treatment group	Sahiwal cross	3.95 [a] ±0.25	4.08 [a] ±0.08	4.11 [a] ±0.11	4.15 [a] ±0.15	4.13 [a] ±0.13	4.18 [a] ± 0.18	4.10 [d]	NS	0.00
	Local	4.85 [ab] ±0.15	4.94 [ab] ± 0.09	5.22 [a] ±0.22	5.29 [a] ±0.10	5.38 [a] ± 0.18	5.40 [b] ±0.20	5.18 [b]	*	0.0895

* = Significant at the level 0.05 %

NS = None Significant

Table 2. Effect of sweet jumbo grass on milk fat% of crossbred & local milking (SH×L and L×L) cows. Each group with error group represents Mean ± SEM value. Without a common lower case letter on error groups indicate no significant differences (p>0.05) between the two groups.

4.3 Effect of sweet jumbo grass on body weight gain of cow

Effect of sweet jumbo grass on daily milk yield is shown in Table 3. Each of the result is calculated averagely of two (pier) animal data of every group. The present result revealed that the average body weight gain of L×L first lactation and L×L second lactation milking cows were 142.6 kg and 163 kg in control feeding system and 162.5 kg and 179 kg in treatment feeding system, respectively. The body weight gain of SH×L first lactation and SH×L second lactation milking cows were 257 kg and 296.33 kg in control feeding system and 296.67 kg and 319.5 kg in treatment feeding system. The present results were agreed with the result of Rahman et al. (2014) studied that the live weights of Crossbred cows (334.10 kg) were greater than Pabna (277.00 kg) and Local cows (136.90 kg). Live weight of Pabna cows, Local cows and Crossbred cows are 277.00 kg, 136.90 kg, and 334.10 kg.

Group	Variety	Mean ± SE of mean						Average day/kg	Signific-ance	p-value
		15th day/kg	30th day/kg	45th day/kg	60th day/kg	75th day/kg	90th day/kg			
First Lactation Control group	Sahiwal cross	235.0 [c] ± 35.00	244.0 [bc] ±10.00	252.0 [abc] ± 7.0	266.0 [ab] ± 6.0	270.0 [ab] ± 20.0	274.0 [a] ± 14.0	257 [c]	*	0.0338
	Local	130.0 [b] ± 20.0	135.0 [ab] ± 15.0	141.0 [ab] ± 5.00	147.0 [ab] ± 3.00	150.0 [ab] ± 20.00	153.0 [a] ± 10.00	142.6 [e]	**	0.1873
First Lactation Treatment group	Sahiwal cross	243.0 [d] ± 20.00	253.0 [cd] ± 27.00	265.0 [bcd] ± 5.00	277.0 [abc] ± 5.00	285.0 [ab] ± 15.00	295.0 [a] ± 15.00	269.67[c]	*	0.0015
	Local	140.0 [c] ± 20.00	147.0 [c] ± 20.00	155.0 [bc] ± 5.0	171.0 [ab] ±6.00	179.0 [a] ± 16.0	183.0 [a] ± 8.00	162.5 [d]	*	0.0010
Second Lactation Control group	Sahiwal cross	280.0 [c] ± 20.00	288.0 [bc] ± 12.00	294.0 [abc] ± 6.0	301.0 [ab] ± 19.00	306.0 [ab] ± 6.0	309.0 [a] ± 9.00	296.33[b]	*	0.0300
	Local	150.0 [a] ± 20.00	155.0 [a] ± 20.00	161.0 [a] ± 6.00	167.0 [a] ± 8.00	170.0 [a] ± 20.00	175.0 [a] ± 5.00	163 [d]	**	0.2735
Second Lactation Treatment group	Sahiwal cross	295.0 [d] ± 20.00	303.0 [cd] ± 23.00	314.0 [bcd] ± 6.00	322.0 [bc] ± 12.00	335.0 [ab] ± 10.00	348.0 [a] ±8.0	319.5 [a]	*	0.0021
	Local	160.0 [d] ± 10.00	167.0 [cd] ± 8.0	175.0 [bc] ± 5.00	184.0 [b] ± 11.0	180.0 [bc] ± 10.00	200.0 [a] ± 10.00	179 [d]	*	0.0001

* = Significant at the level of 0.05%,
** = Significant at the level 0.01 %

Table 3: Effect of sweet jumbo grass on body weight gain of crossbred & local milking cows. Each group with error group represents Mean ± SEM value. Without a common lower case letter on error groups indicate significant differences ($p<0.05$) between the treatment groups.

4.4 Effect of sweet jumbo grass on post-partum heat period

Effect of sweet jumbo grass on daily milk yield is shown in Table 4. Each of the result is calculated averagely of two (pier) animal data of every group. The present result revealed that the average post partum heat show of L×L local first cycle and L×L local second cycle milking cows were 152.5 days and 160.5 days in control feeding system and 127 days and 122.5 days in treatment feeding system, respectively. The post partum heat show of SH×L cross first cycle and SH×L cross second cycle milking cows were 136 days and 140 days in control feeding system and 103.5 days and 97.5 days in treatment feeding system. The present results were agreed with the result of Alam et al. (2008) found that the average post partum heat period of Local, Sahiwal × Local and Friesian × Local was 108.5 ± 36.3, 97.6 ± 36.0 and 98.7 ± 40.6 days respectively. In this study the postpartum heat period of

Local cows was (102 ± 8.7) days which was higher than the crossbred cows (92.4 ±5.8 days) and the difference between them was significant ($p<0.05$).

Group	Sahiwal cross (Mean ± SE of mean)	Local (Mean ± SE of mean)
First Lactation Control group	$136.0^{a} \pm 7.00$	$152.5^{a} \pm 7.5$
First Lactation Treatment group	$103.5^{b} \pm 6.50$	$127.0^{b} \pm 7.00$
Second Lactation Control group	$140.0^{a} \pm 5.00$	$160.5^{a} \pm 5.50$
Second Lactation Treatment group	$97.50^{b} \pm 7.50$	$122.5^{b} \pm 5.50$
p value	0.0209	0.0332
Significant	*	*

* = Significant at the level of 0.05%

Table 4. Effect of sweet jumbo grass on post partum heat period of crossbred (SH×L) and Local (L×L) cows. Each group with error group represents Mean ± SEM value. Without a common lowercase letter on error groups indicate significant differences ($p<0.05$) between the treatment groups.

4.5 Service per conception

Effect of improved feeding on service per conception is presented in Table 5. Each of the result is calculated averagely of two (pier) animal data of every group. The present result revealed that the average service per conception of L×L first lactation and L×L second lactation milking cows were 2.00 in control feeding system and 1.5 in treatment feeding system, respectively. The service per conception of SH×L first lactation and SH×L second lactation milking cows were 2.00 and 1.5 in control feeding system were 1.00 in treatment feeding system, respectively (Table 5). The present results were agreed with the result of Mondal et al. (2005) observed that average service per conception for different dairy cows were 1.63±0.61, 1.63±0.64, 1.60±0.65, 1.60±0.59 and 1.67±0.62 for jersey cross, Sahiwal cross, Sindhi cross and Red- Chittagong cows, respectively. Statistical analysis showed that there was no significant difference within the service per conception of different genotypes. Alam *et al.* (2008) found that service per conception of L×HF and L×Sh crossbred cows were 1.70 and 1.60, respectively. Sarder *et al.* (2007) stated the service per conception in L×HF and L×Sh crossbred cows were 1.60 and 1.68, respectively. Our result also revealed that the service per conception were slightly higher in Sh×L than in L×L milking cows in control feeding system.

Group	Variety	Number of insemination	Pregnancy diagnosis by RP method	Service per conception (Mean ± SE of mean)
First Lactation Control group	Sahiwal cross	4	Positive (+ ve)	$2.00^{a} \pm 1.00$
	Local	4	Positive (+ ve)	$2.00^{a} \pm 0.50$
First Lactation Treatment group	Sahiwal cross	2	Positive (+ ve)	$1.00^{c} \pm 0.25$
	Local	3	Positive (+ ve)	$1.50^{b} \pm 0.20$
Second Lactation Control group	Sahiwal cross	3	Positive (+ ve)	$1.50^{b} \pm 0.25$
	Local	4	Positive (+ ve)	$2.00^{a} \pm 0.50$
Second Lactation Treatment group	Sahiwal cross	2	Positive (+ ve)	$1.00^{c} \pm 0.25$
	Local	3	Positive (+ ve)	$1.50^{b} \pm 0.25$
p value				0.00
Significant				*

* = Significant at the level of 0.05%

So, Service per conception: Control group = $\frac{7.5}{4} = 1.87$, Treatment group = $\frac{5}{4} = 1.25$

Table 5: Effect of sweet jumbo grass on service per conception of crossbred (SH×L) and Local (L×L) milking cows. Each group with error group represents Mean ± SEM value. Without a common lowercase letter on error groups indicate significant differences ($p<0.05$) between the treatment groups.

Chapter V
Summary and Conclusion

The present study was conducted for a period of January 2015 to June 2015 in the Pabna Sadar Upazila of Pabna District. A total of 16 no. of Sahiwal crossbred and Local (SH×L, 08 and L, 08) milking cows were selected for this study. The collected data were compiled, decoded and analyzed statistically.

The average daily milk production of L×L local first cycle and L×L local second cycle milking cows were 0.93 and 1.38 litters in control feeding system and 1.80 and 2.40 litters in treatment feeding system, respectively. The daily milk yield of SH×L cross first cycle and SH×L cross second cycle milking cows were 3.33 and 3.48 litters in control feeding system and 4.21 and 5.50 litters in treatment feeding system. The daily milk yield of (SH×L) crossbred cows were significantly ($p<0.05$) increased where (L×L) local cows were slightly increased ($p<0.01$) in treatment feeding system compared with the control feeding system.

The composition of milk fat% of LxL & SH×L cross cows there were no significant ($p>0.05$) difference among the different lactation cycle of cows in treatment feeding system (feeding sweet jumbo grass) compared with the control feeding system (feeding road side grass).

The average body weight gain of L×L local first cycle and L×L local second cycle milking cows were 142.6kg and 163kg in control feeding system and 162.5kg and 179kg in treatment feeding system, respectively. The body weight gain of SH×L cross first cycle and SH×L local second cycle milking cows were 257kg and 296.33kg in control feeding system and 296.67kg and 319.5kg in treatment feeding system. The body weight gain of (SH×L) crossbred cows were significantly ($p<0.05$) increased where (L×L) local cows were slightly increased ($p<0.01$) in treatment feeding system compared with the control feeding system.

The average post partum heat show of L×L local first cycle and L×L local second cycle milking cows were 152.5 days and 160.5 days in control feeding system and 127 days and 122.5 days in treatment feeding system, respectively. The post partum heat show of SH×L cross first cycle and SH×L cross second cycle milking cows were 136 days and 140 days in control feeding system and

103.5 days and 97.5 days in treatment feeding system. The post partum heat show of Sh×L crossbred cows were significantly ($p<0.05$) reduced where L×L local cows were slightly reduced ($p>0.05$) in treatment feeding system compared with the control feeding system.

The service per conception of SH×L milking cows were significantly ($p<0.05$) reduced where slightly reduced ($p>0.05$) in L×L milking cows by treatment feeding system compared to the control feeding system.

This result indicates that high yielding crossbred dairy cows are not well adopted in our country condition. Rearing cost of crossbred cows are generally high, they need more feed, more care and are not well adopted with our hot humid climatic condition and the same time their disease resistance capacity is very low. On the other hand, we can not ignore our native cows. Although milk production of Sahiwal dairy cows are slightly lower than other crossbreed cows, but the other performances are also very good. Their size is smaller than crossbreed cows and needs less feed. By selective breeding of better type of native breed it will be possible to bear in mind that native cows are well adopted with the climatic condition of Bangladesh, they can thrive well with fluctuant level of nutrition and they have high disease resistant capacity.

The char farmers of Pabna Sadar Upazila also can receive training from Chars Livelihoods Programme (CLP) to preserve the grass for that season by silage making, when many farmers are compelled to sell their cows due to fodder shortage. By the Cultivation & feeding of sweet jumbo grass; farmers of char areas may earn more money by rearing cross bred cattle rather than indigenous cattle. After feeding the grass to their own cattle first, they can sell a large amount of it and can earn a handsome profit, which ultimately brings them economic self-sufficiency.

The present result revealed that the productive and reproductive performances of crossbred & local milch cows were higher under treatment feeding system compared to the control feeding system. So it may be suggested that the farmers of Pabna Sadar Upazila of Pabna District should provide sweet jumbo grass feeding rather than road side grass to their crossbred & local milking cows to achieve better performances.

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Appendices

Appendices 1. Pre – tested questionnaire for interviewing the farmer along with other necessary records

For M.Sc. Student, Department of General Animal Science & Nutrition , Hajee Mohammad Danesh Science and Technology University, Dinajpur, Bangladesh.

Sl. No. Date:

1. Name and address of the farmer:

2. Present Status of Farmers:
   a. Numbers of HH member:

   b. No. of earning member in HHs:

c. Farmers Occupation (√)

i) Day Labor.

ii) Agriculture.

iii) Business.

iv) Services

v) Others.

d. Monthly income of farmer HHs:…….. (TK.)

e. Monthly expenditure of farmer HHs:…… (TK.)

f. Farmers land size …….(Decimals)

i. Below 0.5 acre.

ii. 0.5 – 01 acre.

iii. 01 – 03 acre.

g. Farmers Education level:

i. Illiterate.

ii. Primary.

iii. High school.

iv. Others.

h. Farmers Training on Heifer/ cow rearing: (√)

i. Yes.

ii. No.

3. Housing system:

i. Building.

ii. Semi building.

iii. Tin shed.

iv. Straw.

4. Feeds and feeding :

a. Types of fodder cultivation: (√)

i. Sweet Jumbo
ii. Napier.
iii. Maize.
iv. Others.

b. Major constraints of fodder cultivation :(√)

i. Scarcity of land.
ii. Scarcity of seed / cutting.
iii. Lack of knowledge.
iv. Others.

c. Feeding system:

i. Treatment.
ii. Control.

5. Information about A.I. :

a. A.I. done (√)

- Yes
- No

b. A.I. facilities available (√)

i. Yes
ii. No

c. Source of A.I. facilities (√)

i. DLS office. ii. BRAC. iii. Others (Please specific's)

6. Production Performance:

xi) Lactation cycle of cows
xii) Daily Milk yield
xiii) Milk composition of cow Specially Fat%
xiv) Body weight gain of cow

7. Reproductive performance :

vi. Post partum heat period (Days) :
vii. Post partum service period (Days) :
viii. Date and time of oestrus :

8. Disease incidence:

i.	Mastitis.	ii.	Brucellosis
iii.	Anthrax.	iv.	Tetanus.
v.	Coccidiosis.	vi.	Black Quarter.
vii.	Hemorrhagic Septicemia.	viii.	Dystocia
ix.	FMD.	x.	Others (Please specific's).

9. Information about prevention and control:

b. Vaccine done (√)

- Yes
- No

b. Treatment facilities have got (√)

i. Yes

ii. No

c. Source of treatment facilities (√)

i. Veterinary surgeon.

ii. Quake.

iii. Others (Please specific's)

10. Constrains / Problems: (On priority basis) (√)

i.	Feed.	ii.	AI.
iii.	Treatment.	iv.	Others (Please specific's).

11. Opinions of the owners about cow rearing ……

……..

Signature of the surveyor

Appendix 2. Proforma of data collection

Milking cow's record

Name and address of the farmer: Genotype of cows:

Feeding system:

Sl. No.	Body weight gain (kg)	Date & time of A.I	Milk composition of Fat%	Milk yield (Litre)	Post partum Heat period (Day)

Date:

Name of the data collector:

Annex-1: Format of Master roll for disbursement money for establishment of comfort cattle shed

সদস্যের নাম	স্বামী/পিতার নাম	গ্রাম ও ইউনিয়ন	উপজেলা ও জেলা	মোট বরাদ্দকৃত টাকার পরিমান	কত তম কিস্তি (১ম/২য়/৩য়	গ্রহণকৃত টাকার পরিমান	টাকা গ্রহণের তারিখ	গ্রহণকারীর টিপ সহি/স্বাক্ষর
Name of HH	Name of Husband/Father	Village and union	Upazila and district	Total amount allocated (Tk.)	Which installment (1^{st}/2^{nd}/3^{rd})	Disbursement by 1^{st} installment	Date of money received	Signature/finger print

Annex-2: Information about sweet jumbo grass demonstration

General Information:

Name of Participants	Father/ Husband Name	Name of group	Village and Union	Upazila and District	HH ID (if any)

Information at starting stage

Date of starting concentrate feed demo	Source of concentrate feed, status of fodder and straw management	Description of required changes (like any modification of cattle shed, establishment of manger, , etc)	Amount (Tk.) is required for the changes (shed, manger and others)

Starting Status

Date of date collection

Types of cattle	Breed	Body weight (Kg)	Age (year)	Health condition (good, fair, poor)	Milk Production (litre/day)	Green grass supply (Kg/day)	Concentrate feed supply (kg/day)	Frequency of water supply per day	Present value of cattle (Tk.)
Cow									
Cow									

Status after 3 months (Information to be collected for the same cattle) **Date of date collection:**

Types of cattle	Breed	Body weight (Kg)	Age (year)	Health condition (good, fair, poor)	Milk Production (litre/day)	Green grass supply (Kg/day)	Concentrate feed supply (kg/day)	Frequency of water supply per day	Post partum heat show(day.)
Cow									
Cow									

Annex-3

Status of body weight, value, feed supply and milk production before and concentrate feed (for the specified cow)

Status before starting demo

ID number of the cow	Body weight of cow (kg)	Body weight of calf (kg)	Appro. Value of the cow (Tk.)	Milk Fat%	Concentrate feed supply		Roughage			Appro. total cost of feed per day (Tk.)	Milk prod (liter/day)
					Mixture of local feed ingredients (kg/day)		Straw (kg/day)	Local green fodder (kg/day)	HY green fodder (kg/day)		

Status after 90 days

ID number of the cow	Body weight of cow (kg)	Body weight of calf (kg)	Approximate Value of the cow (Tk.)	Approximate Value of the calf (Tk.)	Milk Fat%	Milk production (liter/per day)

Annex-4

Day wise status of feed supply and milk production (for the specified cow)

Day	Date	Feed supply				Approximate total cost of feed (Tk.)	Milk production (liter)
		Mixture of local feed ingredients (kg/day)	Straw (kg/day)	Local green fodder (kg/day)	HY sweet jumbo green fodder (kg/day)		
1							
2							
3							
4							
35							
36							
37							
89							
90							

Note:

- Compare the status of milk production (liter/day) incase of the selected cow:
- Compare the body weight:
- Compare the milk Fat%:
- Compare the post partum heat show:

Name of the data collector: