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EFFECT OF IMPROVED FEEDING ON PRODUCTIVE AND REPRODUCTIVE PERFORMANCES OF CROSSBRED HEIFERS AND COWS

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ABSTRACT

The study was designed to investigate the productive and reproductive performances of Local×Holstein-Friesian (L×HF) and Local×Sahiwal (L×Sh) crossbred heifers and cows reared under traditional feeding system and improved feeding system. A total of 100 crossbred heifers and cows (50 L×HF and 50 L×Sh) were selected from three upazillas of Lalmonirhat District reared under improved feeding system or traditional feeding system. In traditional feeding system, animals were grazed in the field from early morning to afternoon and supplied 2–3kg straw daily as evening meal but in improved feeding system additionally supplied ready feed @ 1 kg/d/heifer and 2–3 kg/d/dairy cow. The ready feed was formulated by Advance Chemical Industry (ACI) - Godrej feed company. The productive performances, like daily milk yield and lactation period and reproductive performances, like age at first heat, services per conception, age at first calving, gestation length, post-partum heat period and calving interval. The result revealed that daily milk production was improved ($p<0.05$) in the L×HF crossbred heifers and cows were reared under improved feeding system compared to the cows were under traditional feeding system. On the other hand, age at first heat, services per conception, post-partum heat period, calving intervals were also improved ($p<0.05$) in the crossbred heifers and cows were reared under improved feeding system than the traditional feeding system. Age at first heat, age at first calving and calving intervals in L×HF crossbred and services per conception and post-partum heat period in L×Sh crossbred were slightly improved ($p>0.05$) by improved feeding system. Where daily milk production of L×Sh crossbred cows and lactation period of L×HF crossbred and L×Sh crossbred cows were not significant ($p>0.05$) by improved diet. So, it may be suggested that the farmers should provide improved diet to their crossbred heifers and cows to achieve better productive and reproductive performances.

Key Words: Cows, crossbred heifers, improved feeding, reproductive performance

INTRODUCTION

Bangladesh is agriculture based subtropical developing country. Most of the people of this country are engaged in agriculture sector. Livestock is an important segment of this sector which playing vital role to promote human health and poverty alleviation. Among the different livestock species, cattle is the main source of animal protein as they give meat and milk, and also the source of draft power, hides etc. (Anon 2008). The total cattle population of the country is about 22.87 million, (1.79% of the world and 5.47% of Asian cattle population) (FAO 2004). In the last 10 years the cattle population has increased by 0.3% in contrast with 0.4% of the world. Number of cattle per livestock household is 2.58 and that of 0.94 for all households (BBS 2010). 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. The productivity of cattle is low because of poor fertility, nutrition, herd health and management. The cattle in Bangladesh are mostly of indigenous type (*Bos indicus*) with a few crossbreds of Sahiwal and Friesian (Khan *et al*. 1999). It is imperative to improve productivity in order to increase food production and poverty alleviation. The Government of Bangladesh has recently given priority in cattle rearing that encouraged the rural people to consider livestock keeping as commercial enterprise. But in Bangladesh there are many constraints in cattle production, among them malnutrition and parasitism are the major limiting factors (Jabber and Green 1983). Moreover, farmers are very poor; most of them pass their day by hand to mouth. They are not able to supply sufficient feed to their cattle. As a result the productive and reproductive performance of their cattle is very poor due to malnutrition. Poor nutrition delays puberty, reduces conception rate and increases pregnancy losses in heifers (Lemenager *et al*. 1980).

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However, there is a paucity of information about productive and reproductive performances related with feed supply to dairy cattle in Bangladesh. Comprehensive reports on productive and reproductive performances of indigenous Zebu cattle (Desi) and crossbred cattle under various management conditions in Bangladesh are very limited. Therefore, the present study was undertaken to evaluate the effect of improve feeding on productive and reproductive performances of crossbred heifers and cows.

MATERIALS AND METHODS

The study was conducted under the project Pathways for Poverty (PFP) Bangladesh and UK-Aid and implemented by a local NGO named Own Village Advancement (OVA) during the period 2009 to 2013 in three upazillas namely Sadar, Aditmari and Kaligong of Lalmonirhat District in Rangpur Division. A total of 50 Local×Holstein-Friesian (L×HF) and 50 Local×Shahiwal (L×Sh) crossbred heifers and cows were selected for this study. Feeding and management were almost uniform throughout the year for all animals as the feeds were supplied by the NGO. In traditional feeding system animals were grazed in the field from early morning to afternoon and supplied 2–3 kg straw daily as evening meal but in improved feeding system additionally supplied ready feed @ 1 kg/d/heifer and 2–3kg/d/dairy cows. The ready feed formulated by Advance Chemical Industry (ACI) - Godrej feed company is shown in Table 1.

Table 1. Chemical composition of improved diet

General Details	Specification
Ingredients*	Corn Gluten Meal, DDGS, Grains, Pluses, Essential Amino Acids, Vitamins, Minerals, Trace Minerals, Toxin Binders and Mold Inhibitor
Ingredient Profile	100% Vegetarian
Moisture (% Maximum)	12
Calculated nutrients	**Amount (%)**
Crude protein	21
Crude fiber	9 – 10
Crude fat	4 – 4.5
Total digestible	64

Source: Advance Chemical Industry (ACI) - Godrej feed company.

*All cows and heifers access to ad libitum drinking water with iodized salt. *Ingredients are specified but the amounts are not specified due to the secret policy of the company*

Insemination and medication: Heifers and cows were inseminated by artificially by trained AI technicians. The heifers and cows were treated with deworming tablets and injection alternately contained tetramisole hydrochloride (2.0 g) and oxyclozanide (1.2 g) per 100–150 kg body weight in every four month interval. All the animals of this study received vaccination against infectious diseases like Foot and Mouth Disease (FMD), Anthrax, Hemorrhagic Septicemia (HS), Black Quarter (BQ) etc.

Data collection: A formatted data sheet was supplied to each farmer and a training was arranged to the farmers on importance of data record and how to put data in data sheet. In order to obtain reliable data a lot visits were made by researchers. The data regarding age at first heat of heifer, genotypes of heifers and cows, age of heifers and cows, date and time of AI, number of service per conception, pregnancy diagnosis, gestation length, age at first calving, milk yield, lactation length, post partum heat period and calving interval etc. were recorded.

Statistical analysis: The collected data were entered and sorted into MS Excel spread sheet and then transferred to the analytical software SPSS (version 16.0) for descriptive analysis. The mean values were compared under paired sample T-test to know the reproductive performance considering different factors. All data are expressed as mean ± SEM. Differences were considered significant at the level of $p<0.05$.

RESULTS AND DISCUSSION

Age at first heat: Effect of improved feeding on the age at first heat is shown in Figure 1. The present result revealed that the average age at first heat of L×HF and L×Sh crossbred heifers were 22.22 and 26.04 months in traditional feeding system where 20.60 and 23.16 months in improved feeding system, respectively. The age at first heat was reduced ($p<0.05$) in L×Sh crossbred heifers where slightly reduced ($p>0.05$) in L×HF crossbred heifers by improved feeding system compared to the traditional feeding system. The present findings were partially concur with those of Rahman and Rahman (2006); Sarder *et al*. (2007); Khan and Khatun (1998), Haque *et al.* (1999). But agreed with the result of Alam *et al*. (2008) who found that the age at first heat of L×HF and L×Sh crossbred heifers were 23.9 and 26.2 months, respectively. Sultana *et al.* (2001) also recorded the age at first heat of L×HF and L×Sh crossbred heifers were 21.4 and 24.4 months, respectively. Whereas Sarder (2006) recorded higher period of age at first heat in L×HF was 27.7 months and L×Sh was 30.5 months. Moreover, our result revealed that the age at first heat were significantly higher in L×Sh than

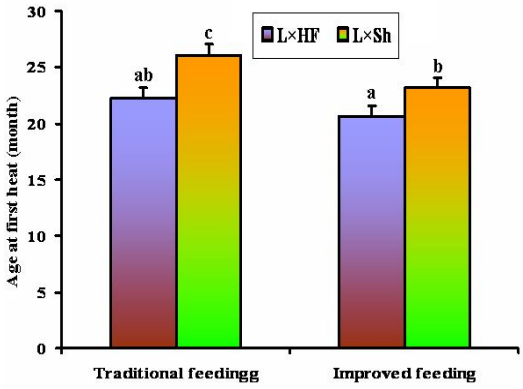
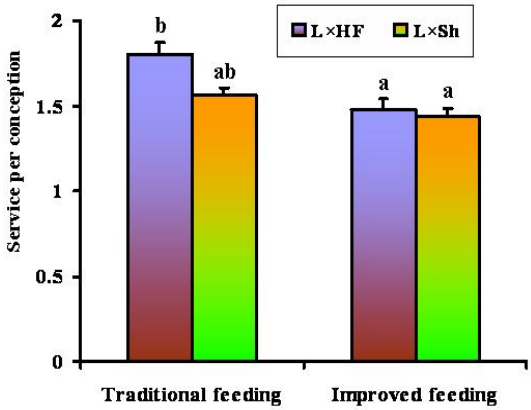


Figure 1. Effect of improved feeding on age at first heat of crossbred (L×HF and L×Sh) heifers. Each bar with error bar represents Mean ± SEM value. Without a common lowercase letter on error bars indicate significant differences ($p<0.05$) between the treatment groups.

in L×HF crossbred heifers reared under traditional feeding systems or improved feeding system.

Service per conception: The results expressed that the average value of service per conception of L×HF and L×Sh crossbred cows were 1.80 and 1.56 in traditional feeding system and 1.32 and 1.44 in improved feeding system, respectively (Figure 2). The service per conception of L×HF crossbred cows were reduced significantly ($p<0.05$) where slightly reduced ($p>0.05$) in L×Sh crossbred cows by improved feeding system compared to the traditional feeding system. 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. Kabir and Islam (2009) reported the service per conception in L×HF and L×Sh crossbred cows were 1.60 and 2.00, respectively. Rokonuzzaman *et al*. (2009) observed in productive and reproductive performance of dairy cows where the service per conception were1.84 and 1.32, respectively in L×HF and L×Sh crossbred cows. Rahman and Rahman (2006) recorded service per conception in L×HF and L×Sh crossbred cows were 1.75 and 1.65, respectively. Uddin *et al*. (2004) found the service per conception in L×HF and L×Sh crossbred cows were 1.71 and 1.60, respectively. The present study revealed that the service per conception were slightly higher in L×HF than in L×Sh crossbred heifers or cows in traditional feeding system.

Age at first calving: The present result demonstrated that the average age at first calving of L×HF crossbred and L×Sh crossbred cows were 34 and 37 months in traditional feeding system where 32 and 34 months in improved feeding system, respectively. The age at first calving of L×HF and L×Sh crossbred cows were slightly reduced ($p>0.05$) by improved feeding compared with traditional feeding system (Figure 3). The present result was agreed with the result of Rokonuzzaman *et al.* (2009) recorded age at first calving L×HF and L×Sh crossbred cows were 34.12 and 36.64 months, respectively. Kabir and Islam, (2009) shown that the age at first calving in L×HF and L×Sh crossbred cows were 35 and 38 months, respectively. Sarder (2006) reported the age at first calving of L×HF and L×Sh crossbred were 35.80 and 39.10 months, respectively. On the other hand, our result showed the age at first calving were significantly ($p<0.05$) higher in L×Sh than in L×HF



crossbred heifers reared under traditional feeding systems.

Figure 2. Effect of improved feeding on service per conception of crossbred (L×HF and L×Sh) heifers.

Gestation length: The average gestation length of L×HF crossbred and L×Sh crossbred cows were 278 and 278 days in traditional feeding system and 279 and 279 days in improved feeding system, respectively. The values have no significant difference ($p>0.05$) between the groups of cows reared under the two feeding systems (Figure 4). The present results were agreed with the result of Sarder *et al*. (2007) who found that gestation length of L×HF and L×Sh crossbred cows were 278 and 279 days, respectively. Kabir and Islam (2009) found the gestation length of L×HF and L×Sh crossbred cows were 283 and 282 days, respectively. Rokonuzzaman *et al*. (2009) recorded gestation length of L×HF and L×Sh crossbred cows were 276 and 277 days, respectively. Alam *et al*. (2008) recorded gestation length of L×HF and L×Sh crossbred cows were 278 and 278 days, respectively. The same was stated by Rahman and Rahman (2006), Nahar *et al*. (1992), Majid *et al*. (1995), Sarder (2006), Islam and Bhuiyan (1997), Uddin *et al.* (2004) and Khan and Khatun (1998). They found that the gestation length of different genetic groups ranged from 270 to 284 days. The gestation length of the present study fallen within that range. The gestation length was not

significantly differed among the genotypes because it is the species characteristics which were fixed genetically and variation may occur due to maternal and fetal as well as seasonal influence (Sarder 2006).

Daily milk yield: Effect of improved feeding on daily milk yield is shown in Figure 5. The present result revealed that the average daily milk yield of L×HF crossbred and L×Sh crossbred cows were 6.70 and 5.10 litters in traditional feeding system and 9.48 and 6.06 litters in improved feeding system, respectively. The daily milk yield of L×HF crossbred cows were significantly ($p<0.05$) increased where L×Sh crossbred cows were slightly increased ($p>0.05$) in improved feeding system compared with the traditional feeding system. The present results were agreed with the result of Alam *et al.* (2008) found that the average daily milk yield of L×HF and L×Sh crossbred cows were 6.30 and 5.10 litters, respectively. Rokonuzzaman *et al*. (2009) recorded the average daily milk yield of L×HF and L×Sh crossbred cows were 8.36 and 4.53 litters, respectively. Sultana *et al*. (2001) observed daily milk production of L×HF and L×Sh crossbred cows were 7.20 and 4.90 litters, respectively. This present results shown that the milk yield were significantly ($p<0.05$) higher in L×HF than in L×Sh crossbred cows reared under traditional feeding systems or improved feeding system.

Globally, milk productions were increased 1.5% per year due to use of artificial insemination (AI), progeny testing, and intense selection of bulls. Milk yield is highly heritable, as cows produce more milk either by using ingested food or by mobilizing body fat (Schei *et al*. 2005). Management and nutrition are important for milk production and fertility (Windig *et al*. 2005, 2006).

Lactation length: The present result revealed that the average lactation length of L×HF crossbred and L×Sh crossbred cows were 276 and 246 days in traditional feeding system where 293 and 265 days in improved feeding system, respectively. Lactation length of L×HF and L×Sh crossbred cows were slightly increased ($p>0.05$) in improved feeding system compared with the traditional feeding system (Figure 6). The present results were agreed with the result of Sultana *et al*. (2001) found that the lactation length of L×HF and L×Sh crossbredcows were 287 and 254 days, respectively. Rokonuzzaman *et al*. (2009) recorded the average lactation length of L×HF and L×Sh crossbred cows were 270 and 250 days, respectively. Alam *et al*. (2008) recorded the average lactation length of L×HF and L×Sh crossbred cows were 254 and 241 days, respectively. Kabir and Islam (2009) found that the average lactation length of L×HF and L×Sh crossbred cows were 295 and 281 days, respectively which is not agreed with the present study. Khan *et al*. (2001) found that lactation length of Local and Local × Friesian were 221 and 281 days, respectively. The present findings were agreed partially with those of Ahmed and Islam (1987), Mondal (1998), Uddin *et al*. (2004), Rahman and Rahman (2006), Sarder (2001, 2006) and Sarder *et al*. (2007). But the results differed from Nahar *et al*. (1992) who observed that the average lactation length of L×HF crossbred cows were 330 days. Our results revealed that the lactation length were significantly ($p<0.05$) higher in L×HF than in L×Sh crossbred heifers reared under traditional feeding systems.

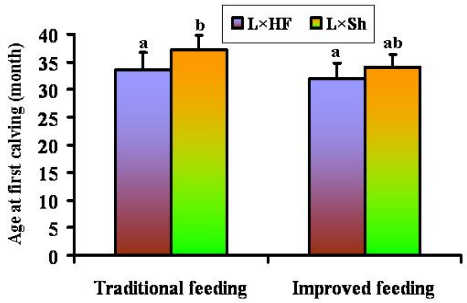


Figure 3. Effect of improved feeding on age at first calving of crossbred (L×HF and L×Sh) heifers.

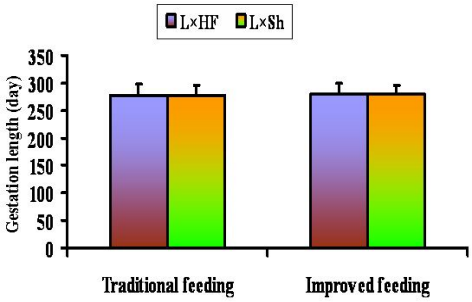


Figure 4. Effect of improved feeding on gestation period of crossbred (L×HF and L×Sh) heifers. The values have no significant differences ($p>0.05$) among the group of crossbred cows reared under the two feeding system.

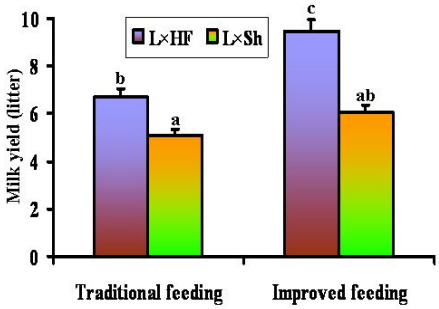


Figure 5. Effect of improved feeding on milk yield of crossbred (L×HF and L×Sh) cows.

Post-partum heat period: Effect of improved feeding on post partum heat period is presented in

Figure 7. The present result revealed that the average post-partum heat period of L×HF crossbred and L×Sh crossbred cows were 170 and 167 days in traditional feeding system and 125 and 146 days in improved feeding system, respectively. The post-partum heat period of L×HF crossbred cows were significantly ($p<0.05$) reduced where L×Sh crossbred cows were slightly reduced ($P>0.05$) in improved feeding system compared with the result of traditional feeding system (Figure 7). The result of post-partum heat period of L×HF and L×Sh crossbred cows were agreed with the

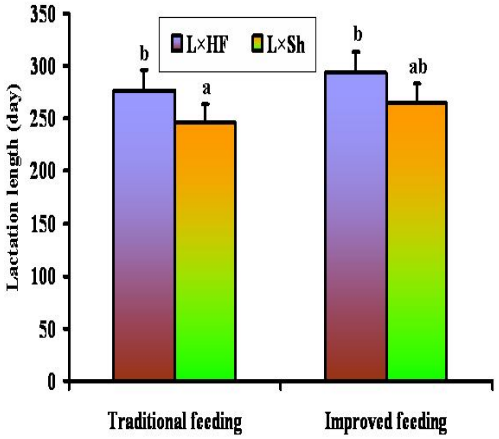


Figure 6. Effect of improved feeding on lactation length of crossbred (L×HF and L×Sh) cows.

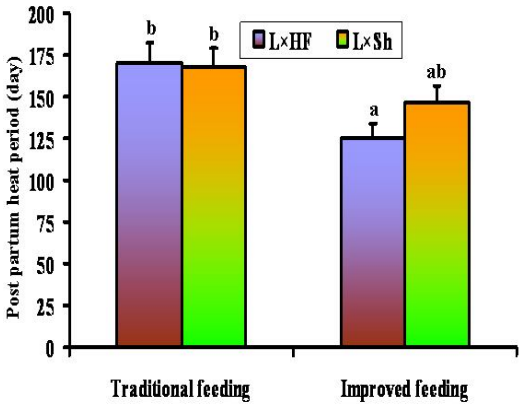


Figure 7. Effect of improved feeding on post partum heat period of crossbred (L×HF and L×Sh) cows.

result of Sarder *et al*. (2007) found the time of post partum heat period was 170 and 167 days, respectively. Uddin *et al*. (2004) stated that post-partum heat period of L×HF and L×Sh crossbred cows were 182 and 172 days, respectively. Alam *et al*. (2008) recorded the average post-partum heat period of L×HF and L×Sh crossbred cows were 167 and 170 days, respectively. Rokonuzzaman *et al*. (2009) found the average post-partum heat period of L×HF and L×Sh crossbred cows were 94 and 120 days, respectively. This study revealed that post-partum heat period was slightly higher but not significant ($p<0.05$) in L×Sh compare with L×HF crossbred heifers reared under improved feeding system.

Calving interval: The present result revealed that the average calving intervals of L×HF crossbred and L×Sh crossbred cows were 481 and 459 days in traditional feeding system where 413 and 435 days in improved feeding system, respectively. The calving interval were reduced in L×HF cows ($p<0.05$) and slightly reduced ($p>0.05$) in L×Sh by improved feeding system compared to the traditional feeding system (Figure 8). The calving intervals of Local and L×HF crossbred cows were 484 and 489 days, respectively (Uddin *et al*. 2004). Alam *et al*. (2008) recorded the average calving intervals of L×HF and L×Sh crossbred cows were 487 and 493 days, respectively. Kabir and Islam (2009) recorded average calving intervals of L×HF and L×Sh crossbred cows were 448 and 417 days, respectively. Sultana *et al*. (2001) found that the calving interval of L×Sh crossbred cows were 454 days. Nahar *et al*. (1989) found that the mean of calving interval of L×HF and L×Sh crossbred cows were 479 and 463 days, respectively. Hasan (1995) observed that the mean of calving interval of L×HF and L×Sh crossbred cows were 515 and 491 days, respectively. Mondal *et al*. (2005) recorded that the mean of calving interval of L×HF and L×Sh crossbred cows were 414 ± 51.4 and 445 ± 94.9 days, respectively. The present findings were partially agreed with those of Rahman and Rahman (2006), Sarder (2006), Sarder *et al*. (2007) and Majid *et al*. (1995).

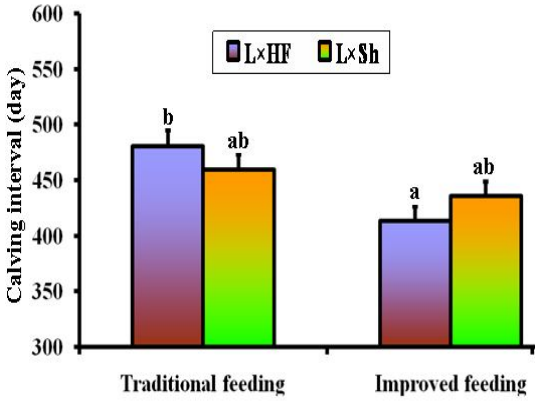


Figure 8. Effect of improved feeding on calving interval of cross bred (L×HF) and (L × Sh) cows.

CONCLUSION

The productive and reproductive performances of crossbred heifers and cows were higher under

improved feeding system compared to the traditional feeding system. Therefore, it may be suggested that the farmers should provide improved diet to their crossbred heifers and cows to achieve the better performances.

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