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Effect of pre and post-natal nutrition on the performances of ewes and lambs under semi intensive rearing system

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Abstract

The study was conducted to know the effect of different levels of pre and post-natal nutrition on the performances of ewes and their lambs until 1 year of age and the profitable slaughter age of lambs under semi intensive system. Twenty eight (28) native Bengal ewes at 7 weeks of gestation were randomly assigned to four groups (T₀, T₁, T₂, T₃) and supplemented with a concentrate mixture at 0.0, 1.0, 1.5, 2.0% of their body weight respectively. Ewes were allowed to graze 8 hours daily. Creep mixture (20 g/lamb/day) was provided to lambs from 2 weeks age with an increment of 10 g/lamb/week. After weaning, 20 growing male lambs were selected and reared 01 year of age with concentrate mixture at 1.5% of their body weight and 8 hours grazing irrespective of treatment groups. Parameters like, ewe's litter size, daily milk yield, post-partum heat and lamb's birth weight, weaning weight, live weight at 06, 09 and 12 months were recorded. The data were analyzed in an ANOVA with CRD by using SPSS v. 20. The mean differences were tested by DMRT at a probability level of P<0.05. After weaning, the lamb growths were analyzed considering age as fixed factor. Regression correlations among different parameters with different ages were also performed. Significantly higher daily milk yield (P<0.01), weaning weight (P<0.05) and daily weight gain of lamb until weaning (P<0.05) were observed in T2 group. Besides, lambs weight at 06, 09, and 12 months differ significantly (P<0.01) along with corresponding daily weight gain (P<0.05). Lambs daily weight gain did not differ significantly from weaning to 09 months of age but significantly reduced (P<0.05) from 09 to 12months age. Finally, it may be concluded that a concentrate diet containing 20% CP during late pregnancy to lactation should be supplied to obtain maximum performances of ewes and their lambs. Besides, native Bengal lamb would be slaughtered between 06 to 09 months of age to get maximum return.

Keywords: Pre and post-natal nutrition, Semi-intensive, Slaughter age, Bengal ewe, Lamb.

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Introduction

Under traditional feeding system sheep are raised by grazing on post-harvest fallow

lands or on natural grazing beside roads and canals almost without concentrate supplementation, hence, produces low quality

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carcass and usually take over two years for marketing (Sultana *et al.*, 2010). This system of production causes reduced growth rate and poor reproductive performance, which in turn results in severe economic losses.

The profitability of lamb production is strongly depends upon the nutritional practices adopted throughout the production cycle (Oddy and Sainz, 2002; Treacher and Caja, 2002). The weight of lambs at weaning represents the cumulative effects of maternal nutrition during pregnancy and lactation (Thompson *et al.*, 2011). The first few weeks of lamb's growth depends basically upon milk intake (Mekoya *et al.*, 2009, Ahmed *et al.*, 2017) and, thus, improving ewe nutrition may be a more effective way to enhance lamb development. Inadequate nutrition during late gestation and lactation might led to a reduction of birth weight, mammary development and milk production (Aziz and Al-Dabbagh, 2008, Jaquier *et al.*, 2007, Ford *et al.*, 2007, Hamada *et al.*, 2013, Abd-Allah, 2013, Ahmed *et al.*, 2017). Besides, when multiple bearing ewes are offer additional feed in late pregnancy, lamb mortality is reduced for single and twin lambs (Scales *et al.*, 1986). Moreover, improving early growth of lambs could be beneficial to improve their post-weaning growth and reduce time to reach slaughter weight, besides affecting carcass composition. The data regarding ewe nutrition during the late pregnancy to lactation on performances of native Bengal ewes and their lambs until weaning and subsequent post weaning performances of lambs and their profitable slaughter age are absent or scarce. Thus, objectives of the study were undertaken to determine the effect of pre and post-natal nutrition of dam on performances ewes and

lambs and to determine the profitable slaughter age of lambs under semi intensive management system.

Materials and Methods

Experimental site and duration

The experiment was carried out at the Goat and Sheep Research Farm under Goat and Sheep Production Research Division, Bangladesh Livestock Research Institute (BLRI), Savar, Dhaka-1341, Bangladesh during July 2015 to June 2016.

Experimental animals and feeding management

A total of 28 native ewes of 2nd and 5th parities were randomly allocated into four different treatment groups (T₀, T₁, T₂, T₃) at the stage of 7 weeks gestation. Ewes were allowed 8 hours grazing in the natural pasture and rest of the time housed in individual cage and lambs remained with their dams continuously except for the days of milk yield measurement.

The ewes of T₁, T₂ and T₃ groups were supplemented with a concentrate mixture (Crushed Maize 40%, Soybean meal 26 %, Wheat bran 22%, Rice polish 10%, Salt 1%, Vitamin-mineral premix 0.5% and DCP 0.5%, Table 1), at 1.0, 1.5 and 2.0% of their liveweight, respectively where, T₀ considered as the control (no concentrate supplementation). From the age of 2 weeks, lambs were supplemented with a creep mixture (Crushed maize 68%, Soybean meal 30 %, Vitamin-mineral premix 1% and Salt 1%, Table 1) at 20g/lamb/day with a weekly increment of 10g /lamb/week until weaning. The required amount of concentrates were

divided into two equal parts and supplied twice daily (morning and evening).

After 90 days weaning, 20 growing male lambs were selected and continued to graze 8 hours with a concentrate supplement at 1.5% of their body weight until they reached at one year of age irrespective of treatment group.

Data collection

Data were collected on litter size, daily milk yield (Ahmed *et. al.* 2017), post-partum heat and birth weight of lambs, weaning weight and live weight at 06 months, 09 months and

detergent fibre (ADF) composition were analysed using the method described by Goering and Van Soest (1970). The chemical compositions of experimental diets are presented in the Table 1.

Experimental design and statistical analysis

The data were analyzed for ANOVA in Completely Randomized Design (CRD) using SPSS v.20. The mean differences were analyzed by Duncan's new multiple range test (DMRT) at a probability level of ($P < 0.05$). The data collected from lambs after weaning

Table1. Chemical composition of the natural grass in pasture and supplemented concentrate feed for ewe and lamb

Diets	DM (% fresh)	Chemical composition (% DM)				
		Ash	OM	CP	NDF	ADF
Natural Grass	17.41	11.46	88.54	13.80	75.55	49.635
Concentrate Mixture (ewe)	88.38	5.97	94.03	20.32	33.05	10.58
Creep Mixture (lamb)	88.15	5.41	94.60	21.16	32.76	10.76

01 year of age. Weight of individual animal was measured at the onset of the trial and subsequently on weekly basis. The sample of the natural pasture grasses were collected every 15 days interval to determine the nutritive value of the grasses.

Chemical analysis

The chemical compositions of the natural pasture are presented in the Table 1. After measurement of DM all the samples were ground in a grinding mill through a 1mm sieve before analysis. The CP content was determined using Kjeldahl method (AOAC, 1995). Dry matter content of the feed was determined by drying the samples at 105° C overnight, while ash was measured by burning further at 500° C for 4 hours. The neutral detergent fibre (NDF) and acid

were analyzed by performing regression correlations among different parameters considering weaning weight as a fixed factor.

Results and Discussion

The effect of maternal nutrition during pre and post-natal period on the performances of lambs under semi intensive management is presented in Table 2. The birth weight of lambs did not differ significantly among the treatment groups but it was increased numerically with the increasing supplementation of concentrate feed. It is well established that poor nutrition in late pregnancy can results in lighter lamb birth weights and lower lamb survival (Robinson *et al.*, 2002; Kenyon and Webby, 2007). In Hamandi ewes a non-significant effect also found on

post-natal weight traits of lambs for different plane of nutrition in late pregnant ewes (Aziz and Al-Dabbagh, 2008). It has been generally shown that BW of lambs not only depends on the nutrition of ewes during late stage of pregnancy but also correlated with litter size and sex of lambs (Ahmed *et al.*, 2017).

ewe nutrition, lamb weaning weight and ewe's milk production, lambs weaning weight and lamb milk consumption per day.

The weaning weight ($p < 0.05$) and daily weight gain of lamb until weaning differ significantly ($p < 0.05$) among treatment groups. Significantly higher daily milk yield,

Table 2. Effect of maternal nutrition during pre and post-natal period on the performances of ewes and lambs until weaning period

Parameters	Ewe's diet				SEM	Level of Sig.
	T ₀	T ₁	T ₂	T ₃		
Litter Size (no.)	1.43	1.00	1.43	1.29	0.087	NS
Birth weight of lamb (kg)	1.66	2.15	2.01	2.19	0.089	NS
Milk yield of ewe (g/day)	253.60 ^a	318.76 ^{ab}	416.64 ^b	390.16 ^b	19.98	**
Post-partum heat of ewe (day)	61.14	56.29	45.86	41.43	3.964	NS
Weaning Weight of lamb (kg)	8.40 ^a	12.27 ^b	12.43 ^b	12.11 ^b	0.592	*
Weight gain of lamb until weaning (g/day)	93.33 ^a	136.31 ^{ab}	138.11 ^b	124.00 ^{ab}	0.011	*

NS= Non significant, * $p < 0.05$, ** $p < 0.01$; ^{a, b} values within the same raw with different superscripts differ significantly,

Similarly, growth and weaning weight also depends on ewes' milk yield that highly correlated with ewes' nutrition at lactation. In this experiment, daily milk yield strongly influenced ($p < 0.01$) by different plane of nutrition and highest daily milk yield observed in T₂ treatment group. Milk yield of ewe is the main factor affecting lamb growth during the first few weeks of life and are highly correlated during the 4-6 weeks of age (Owen, 1976). Several researchers like Susin *et al.* (1995) for Polypay ewes, El-Shakhretet *et al.* (1996) for Jordanian Awassi ewes, Shams al-dain *et al.* (2003) for Iraqi Awassi ewes Aziz and Al-Dabbagh (2008) for Hamandi ewes and Ahmed *et al.*, (2017) in native Bengal ewes, were also reported that milk yield was affected by plane of nutritional before and after lambing. In supporting the above findings by different authors, the present study observed a strong positive linear relationship (Fig. 1, Fig. 2, Fig. 3) between lamb weaning weight and

weaning weight and weight gain of lambs until weaning were observed in T₂ treatment group. The result suggested that supplementation of concentrate enhances the performances of ewes and lambs. The higher weaning weight of lamb depends on birth weight and daily milk yield of ewes i.e. the pre and post-natal nutrition of ewes (Ahmed *et al.*, 2017). Although, ewes post-partum heat period did not significantly affect by different plane of nutrition but it reduced with the increased supplementation of concentrate that helps to reduce kidding interval (Ahmed *et al.*, 2017).

Post weaning performances of lambs

The regression correlation among lambs weaning weight with different post weaning growth performances are presented in Figure 4. The results showed a strong positive linear relationship with lambs weaning weight and post weaning growth performances at different ages. Higher weaning weight of

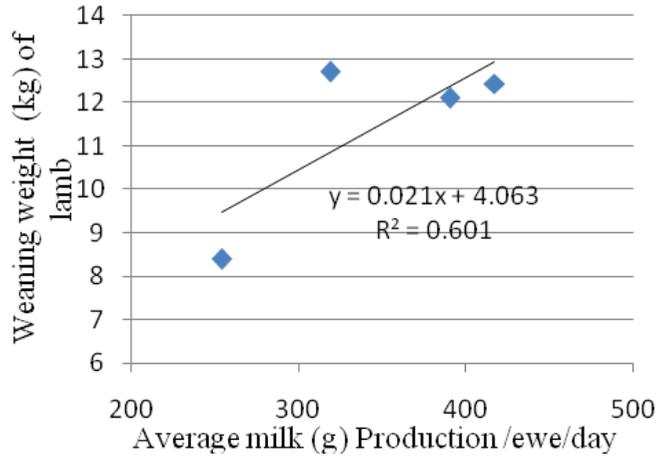


Fig.1. Relationship lambs weaning weight and between ewe milk production

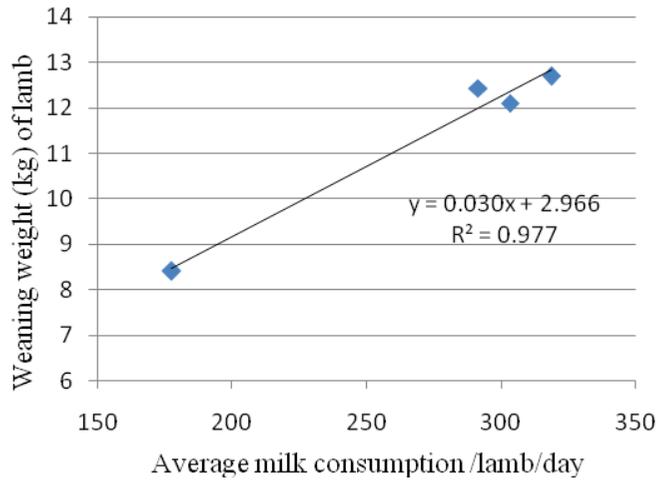


Fig.2. Relationship between lambs weaning weight and lamb milk consumption

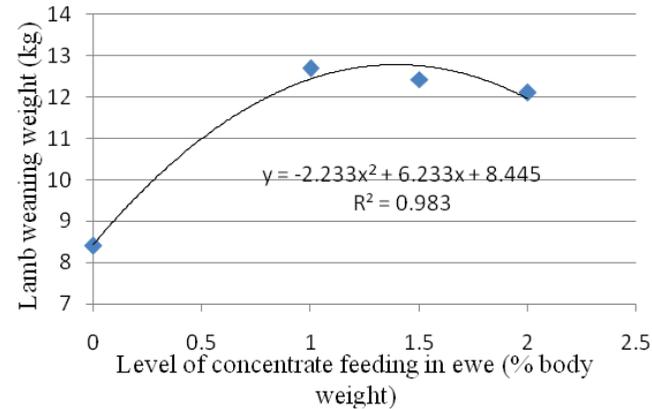


Fig.3. Relationship between lambs weaning weight and ewe nutrition

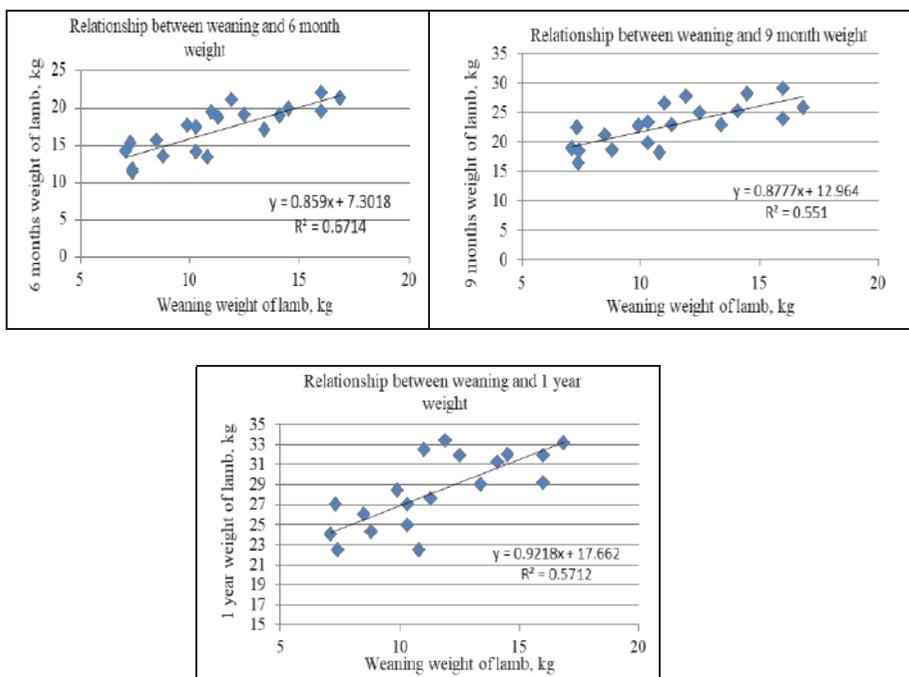
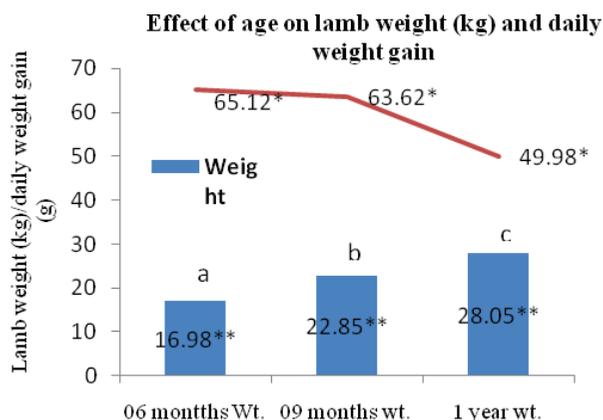


Fig.4. The relationship among lambs weaning weight (kg) with different post weaning growth performances

lamb depends on pre and post-natal nutrition of ewes. Thus, maternal nutrition strongly influenced the post weaning growth of lambs. Ahmed *et al.*, (2017) also found similar relationship in Bengal lambs reared in intensive management system.

Figure-5 shows the lamb weight at different age and corresponding daily weight gain. Lambs weight at 06, 09, and 01 year of age differ significantly ($P < 0.01$) along with corresponding daily weight gain ($P < 0.05$). Although during 06 months and 09 months



* $p < 0.05$, ** $p < 0.01$; a, b, differs significantly

Fig.5. Effect of age on lamb weight (kg) and daily weight gain (g).

stages daily weight gain did not differ significantly but from 09 months to 01 year age, it reduced significantly ($P < 0.05$) that suggested that native Bengal lambs should be slaughtered before 09 months of age to get more profit in semi-intensive rearing system as feeding regime same for all treatment groups during weaning to 01 year of age. In this regards, in case of intensive rearing system Ahmed *et.al.*, (2017) also suggest 06 to 09 are the more profitable slaughter age for native Bengal lambs.

Conclusion

In conclusion, it can be stated that lamb production under semi-intensive management, with a concentrated supplementation at 1.5% body weight of ewe during late pregnancy to lactation is more efficient to get maximum performances from ewes and lambs. On the other hand, Native Bengal lamb may be slaughtered /marketed between 06 to 09 months age to get maximum return..

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