Effect of Different Feeding Frequencies on the Digestibility Parameters of Lohi Lambs in Pakistan

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Abstract
Optimum growth of a healthy animal depends upon adequate nutrition and management. Increased weight gain and dry matter intake are well known factors that influence financial returns in sheep enterprise. This study was conducted to investigate the effect of different feeding frequencies on the digestibility performance of lambs. Weaned Lohi lambs (n=27) of same age and same weight (20-22 Kg) were randomly selected and divided into three groups (A, B and C). Each group was comprised of nine animals, which were further subdivided into three replicates with three lambs each. Two times daily green fodder (berseem) and concentrate was offered to group A (control), three times to group B and four times to group C. Feed was offered according to body weight and water was offered *ad libitum* to all groups. The data thus collected were analyzed by using analysis of variance technique (ANOVA). The highest digestible dry matter intake (DMI) was observed in-group C (78.73±0.49%) as compared to group A (77.08±0.59%). The mean (±S.E) values of digestible crude protein (CP) intake were similar for all groups. The mean (±S.E) values of digestible fat and crude fiber also followed a same trend, whereas, the digestible ash contents were highest under group C. Digestible NDF and ADF% were found to be highest for the groups A and C, respectively. The present study revealed for that frequent feeding positively affects the digestibility in Lohi lambs under feed lot fattening system.

Keywords: ADF, Digestibility, Feeding frequency, Lambs, NDF
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Introduction
Pakistan is blessed with 29.4 million heads of sheep, raised for mutton, milk and wool. These animals contribute 53,060 thousand skins and 671 thousand tons of meat, annually in the national economy (Anonymous, 2015). Lohi sheep represents the predominant breed of irrigated areas of central Punjab. It is one of the important sheep breeds for mutton production in Pakistan. Small ruminants play a vital role to up lift the life status of poor people. Conventional methods of feeding have less impact on growth performance of these animals. The weight of animal is economically important trait with respect to meat production which can be exploited with proper feeding and better management practices.

Optimum growth and development of a healthy animal depends upon adequate nutrition and management. Increased weight gain and dry matter intake are well known factors that influence financial returns in sheep enterprise. Balanced ration with correct feeding schedule are necessary for optimum growth responses and greater economic returns. Over feeding is however is wasteful and produces excess fat in the carcass, while underfeeding is equally unsatisfactory since it provides poor quality products and can prevent the animals from attaining its optimum weight. Due to high basal metabolic rate, the small ruminants need more frequent feeding than large ruminants. Therefore, increase in feeding frequencies may improve growth performance of Lohi lambs, thereby increasing the mutton production. However, to our knowledge, no report is available in published literature on the effects of feeding frequency on digestibility in Lohi lambs. Therefore, present experimental study was carried out to determine the effect of feeding frequency on the digestibility.

Materials and Methods
The experiment was conducted at Small Ruminants Training and Research Center, Pattoki Punjab, Pakistan. Weaned Lohi lambs (n=27) of nearly same age (170-180 days) and nearly same weight (20-22 Kg) were randomly selected from the flock and divided into three groups (A, B and C). Each group comprised of nine animals, were further subdivided into three replicates with three lambs per replicate. The animals were vaccinated against fatal diseases and drenched anthelmintic against gastrointestinal endoparasites before the start of experiment the treatments were randomly allotted to different groups. Group A was taken as control with two times feeding, whereas group B and C were fed the same ration thrice and four times daily, respectively. These animals were offered green fodder (berseem), concentrate mixture according

to body weight, water (*ad libitum*) for 12 weeks. The refusal was recorded for green fodder and concentrate. Weighing of the lambs was done at the start of the experiment and thereafter at weekly intervals. Proximate analysis of the collected fecal and urine samples were performed for crude protein, crude fiber, ether extract and ash content according to the standard procedure prescribed in AOAC (2001). Data thus collected were statistically analyzed using analysis of variance technique (ANOVA) under completely randomized design (Steel *et al.*, 1997). The difference between the treatments was compared using Duncan's Multiple Range Test.

Results and Discussion

The digestible dry matter intake (DMI) was significantly higher ($p<0.05$) in group C as compared to group A (Table I). Digestible crude protein (CP) intake was same for the all groups. Digestible fat % was recorded highest for group C. The mean value of digestible NDF% was highest in the control group. Furthermore the digestible ADF was greater in Group C as compared to other groups. It was found that digestible dry matter intake was significantly ($P<0.05$) different between the group A and C, while meal frequency had non- significant effect between group B and C. Whereas, the mean values of digestible crude protein intake, fat, crude fiber, ash, NDF and ADF varied non-significantly among all the groups. Statistically, digestible DMI showed significant differences between group A and C and non-significant difference between group A and B. Whereas, CP, Fat, CF, ash, NDF and ADF showed a non-significant difference among all the groups. The outcomes of Castro *et al.* (2002) are in line with current study in which eighteen mature Merino ewes have been used to study the effect of either once or twice daily concentrate supplementation with wheat straw digestibility. They observed that apparent dry matter digestibility was increased as frequency of feeding was increased. The findings of Kozloski *et al.* (2009) are also similar to our findings except digestibility of dry matter.

The findings of Abouheif *et al.* (2012) disagree with our results as far as digestibility of DM is concerned but are in line with respect to the digestibility of CP. Similarly, Van den Borne *et al.* (2006) found that neither feeding level nor feeding frequency affected apparent fecal nutrient digestibility. However increasing feeding frequency increased the efficiency of digestible protein utilized in calves.

Table 1: Mean (± S.E) digestible DM, CP, Fat, CF, Ash, NDF and ADF % in Lohi lambs fed different feeding frequencies

Parameters	Meal frequency (times/day)		
	2	3	4
Dry matter (DM)	77.08±0.59^{b}	78.37±0.54^{ab}	78.73±0.49^{a}
Crude protein (CP)	88.03±0.31	88.19±0.32	88.28±0.28
Fat	84.86±0.49	85.05±0.45	85.53±0.39
Crude fiber	67.61±0.91	68.43±0.82	68.10±0.70
Ash	68.69±0.94	69.94±0.77	70.26±0.68
Nutrient detergent fiber (NDF)	72.58±0.71	71.54±0.71	69.92±0.69
Acid detergent fiber (ADF)	67.37±0.851	68.42±0.79	69.73±0.69

Means having different superscript in row are significantly different ($P<0.05$)

Conclusion

The digestibility of animals fed concentrate four time daily showed significant difference than twice and thrice feeding considering daily DMI. However further studies are needed to generalize our findings in other indigenous breeds.

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