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Short Communication

Growth Performance of Salt Range Lambs Fed Various Dietary Levels of Peanut Haulms in Pothwar Region of Pakistan

Muhammad Fiaz[1], Muhammad Farooq Hussain Faisal[1], Muhammad Imran Khan[1]*, Kashif Ishaq[1], Tanveer Ahmad[1] and Qazi Jamil Akbar[2]

[1]Deprtment of Livestock Production and Management, Faculty of Veterinary and Animal Sciences, PMAS-Arid Agriculture University Rawalpindi, Pakistan

[2]Department of Livestock and Poultry Production, University of Poonch, Rawalakot, Azad Jammu and Kashmir, Pakistan

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MF developed the overall study strategy and assisted in the composition of this article. MFHF conducted research trials and wrote the manuscript. MIK supervised the study. KI helped in analysis. TA assisted in the feed formulation. QJA assisted in data collecting.

Key words
Salt range lambs, Peanut haulms, Feed conversion ratio, Heart girth and economical roughage

ABSTRACT

Salt Range male lambs (n = 16; Age = 120±10 days) were used to study the effect of varying dietary levels of peanut haulms on growth performance. Animals were divided equally into 4 groups. Four iso-caloric diets were formulated. Animals in group 1, 2, 3 and 4 were fed diets with zero, 10, 20 and 30% peanut haulms, respectively over a period of 60 days. Data were analyzed through ANOVA technique using SAS 9.3 software. Results indicated that weight gain was higher ($P<0.05$) and feed conversion ratio was lower ($P<0.05$) in lambs fed diets with 20 and 30% peanut haulms than other two diets. Heart girth and body length were increased with increasing inclusion rate of peanut haulms from zero to 30%. It is concluded that peanut haulms might be potential and economical roughage source to be used as roughage ingredient up to 30% in preparing total mixed diet that support higher growth rate and lower FCR for lambs.

Fat tailed sheep are in salt range in northern part of Punjab province in Pakistan reared mainly for mutton production (Afzal and Naqvi, 2003). It's delicious meat, better carcass yield and well-adjusted habitat makes this breed quite popular among farmers and consumers (Qureshi *et al*., 2020). Salt Range is well liked in Pothwar region, because it has become an important source of livelihood for poor farmers in this region, where natural vegetation is available to fulfill the grazing requirements of this unique specie. It has been observed since last many years that farmers in Pothwar region like to raise young lambs of this breed not only for sacrificial purposes at higher rates but also fulfill the requirement of restaurants in big cities like Islamabad and Rawalpindi. Pothwar region is located in the north of Punjab including four districts; Attock, Jhelum, Chakwal and Rawalpindi. It significantly contributes about 15% in national meat production along with goat (GOP, 2020-21).

* Corresponding author: imran.khan@uaar.edu.pk
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Farmers usually face challenges like early lamb mortality, nutritional deficiency and limited feed resources. There is scarcity of forage for ruminant animals, particularly in tropical, dry, and semi-arid areas. As a result, sheep graze on low-quality natural pastures and stall-fed on crop residues including maize cob, wheat straw, and rice straw, with little or no concentrate supplementation. These low-quality forage-based diets diminish sheep production due to their low nutritional value, dry matter intake, and digestibility (Khan and Habib, 2012). Unfortunately, the price of wheat straw is rising gradually and touches at its peak during winter season due to its shortage. Therefore, it is now utmost needed to discover and explore some other novel, non-conventional and good quality feeding resources to sustain the productivity of sheep specifically in Pothwar region of Punjab.

Peanut haulms are largely available in Pothwar region as this region is quite popular for peanut or groundnut production. Plant material left after peanut harvesting (peanut haulms) are high in CP 11.4% and can serve as supplement (Yami, 2008; Etela and Dung, 2011) as feeding resource either fresh, dried or ensiled (Hill, 2002). It can be important feeding resource in mixed crop-livestock farming system, whereas if peanut haulms are included in total mixed ration, it may reduce the feeding cost and improve animal performance (Salisu *et al*., 2018). This

study was therefore designed with main aim to evaluate various dietary levels of peanut haulms in total mixed ration for optimum growth performance in Salt Range lambs raised under Pothwar environment conditions.

Materials and methods

The study was conducted at the University Research Farm Koont of PMAS-Arid Agriculture University Rawalpindi. Salt Range lambs (n= 16, Age= 120 ± 10 days and weight = 20 ± 3 kg) were used to study the effect of dietary peanut haulms on feed consumed, weight gain, feed conversion ratio, body measurements and feed cost was investigated. The lambs in the experiment were divided into four groups, each with the same number of lambs. All experimental animals were housed in the identical housing and management circumstances. For identification purposes, these lambs were tagged. Each lamb was fed separately. Peanut haulms were added to the ration in varying proportions; 0% peanut haulms (Control T1), 10% peanut haulms (T2), 20% peanut haulms (T3) and 30% peanut haulms (T4). All four diets were iso-caloric in nature. Wheat straw was used in TMR as roughage source in control diet (T1) up to 30%, whereas wheat straw was replaced with peanut haulms 10%, 20% and 30% in T2, T3 and T4, respectively. All of the diet's components were mixed to generate the overall mix ration (TMR). For 60 days, TMRs were fed *ad libitum*, with a 15-day adjustment period in between. Data on feed consumption, weight increase, and feed conversion ratio were collected weekly. The data were analyzed using the ANOVA technique in SAS 9.3 software under a Completely Randomized Design (Steel *et al*., 1997). The post hoc mean comparison was tested using Duncan multiple range test.

Results and discussion

Feed consumption and economics

The feed consumption by Salt range lambs increased with increasing rate of peanut haulms in diets. The feed consumption in Salt Range lambs was higher ($P<0.05$) in the diet with 30% peanut haulms than other diets and followed by diets with 20, 10 and zero % peanut haulms. A similar report was also published by Antwi *et al*. (2020) and similarly types of results were reported by Ayantunde *et al*. (2007) who showed that feed intake improved linearly with increase of peanut haulms offered. Improved feed consumption in diets with higher peanut haulms might be attributed to factors of lesser NDF, dustiness and palatability in leguminous peanut haulms as compared to that of wheat straw. Moreover, low fiber and high CP in peanut haulm might be reason of high feed consumption in lambs (Atsbha *et al*., 2021).

Peanut haulms are cheaper source of dry roughage which can be fed to small ruminants and specially sheep. The feed cost of roughage content in present study was reduced down to 50 percent as peanut haulms are used replacing wheat straw.

Average daily gain and live weight

Growth performance of Salt Range lambs in terms of weight gain and ADG was found higher ($P<0.05$) in diets with 20 and 30% peanut haulms than of those fed diets with zero and 10% peanut haulms, whereas gain was not different ($P>0.05$) among lambs fed 20 and 30% peanut haulm. Improved growth performance in Salt range lambs fed diets with higher content of peanut haulms might be attributed to factors of higher feed consumption due to palatable and better nutrient profile of peanut haulms than wheat straw. In a previous study by Ayantunde *et al*. (2007), dietary groundnut haulms improved daily gain in lambs, whereas Abdalla (2010) also reported ADG 264 g/day while feeding of peanut haulm pellets in Sudan desert lambs. Furthermore, he also elaborated that ADG of lambs was decreased as level of ground haulms was decreased in ration just as in this report, ADG in Salt Range lambs decreased with decreasing rate of peanut haulms in diets. In addition to above, few more studies highlighted the improved weight gain by feeding groundnut haulms as compared to tree leaves (IDRC, 2018) and Napier grass feed in Nellore lambs (Khan *et al*., 2015).

Feed conversion ratio

The optimum (lesser) feed conversion ratio (FCR) was found in those lambs fed diets with 20 and 30% peanut haulms. FCR in control diet with zero percent peanut haulm was higher ($P<0.05$) than all other diets, FCR in diet with 10% haulms was also higher ($P<0.05$) than that of 20 and 30% peanut haulm diets. However, optimum FCR in diet with 30% haulms was not different ($P>0.05$) with that of diet with 20% peanut haulms. The justification behind fetching optimum FCR in diets with 20 or and 30% peanut haulms might be attributed to factors of higher feed consumption and weight gain in Salt Range lambs fed higher peanut haulms. The other factor might be groundnut haulms was leguminous forage rich in crude protein (Babale *et al*., 2018). Results of this study regarding optimum FCR in diet with high level of peanuthaulms were also substantiated by previous workers. Etchu *et al*. (2014) reported 5.24 FCR even in rabbits fed diet with 40% groundnut haulms, whereas Fasae *et al*. (2016) reported differently that sheep fed sole groundnut haulms had worst FCR (11.9). The possible reason for this difference might be due to factor that sheep (age 9-12 m) was feeding only groundnut haulms in that study with varying levels of cassava foliage. Abdalla (2010)

Table I. Effect of various dietary levels of peanut haulms in total mixed ration on growth performance in Salt Range lambsunder Pothwar region of Pakistan.

Parameters	Dietary treatments (Mean±SE)			
	T-1: (Control) PH Zero %	T-2: PH 10%	T-3: PH 20%	T-4: PH 30%
Feed consumed (Kg)	69.8 ± 0.11^{d}	72.0 ± 0.44^{c}	77.0 ± 0.16^{b}	78.3 ± 0.21^{a}
Average daily gain (g/d)	152 ± 9.23^{c}	183 ± 3.40^{b}	252 ± 2.08^{a}	266 ± 4.81^{a}
Live weight gain (Kg)	9.1 ± 0.55^{c}	11.0 ± 0.20^{b}	15.1 ± 0.12^{a}	16.0 ± 0.28^{a}
Feed conversion ratio	7.7 ± 0.46^{a}	6.5 ± 0.11^{b}	5.0 ± 0.033^{c}	4.9 ± 0.08^{c}
Heart girth (inches)	38.6 ± 0.23^{c}	39.3 ± 0.23^{c}	41.6 ± 0.23^{b}	43.5 ± 0.28^{a}
Body length (inches)	29.6 ± 0.23^{b}	30.0 ± 0.20^{b}	32.7 ± 0.32^{a}	32.7 ± 0.14^{a}

*PH, Peanut haulms. * Values with different superscripts in a row are different (P<0.05).

reported that diet with 20% groundnut haulms was cheapest in cost with optimum FCR in Sudan desert lambs. Moreover, he also strengthened the finding of current study that FCR was decreased with decreasing dietary rate of groundnut haulms.

Body measurement

Body measurements at the end of feeding trial were found different in Salt Range lambs fed diet with varying levels of peanut haulms as depicted in Table I. Heart girth was higher (P<0.05) in lambs fed diet with 30% haulms than all other diets, whereas it was also higher (P<0.05) in diet with 20% peanut haulms than control diet and diet with 10% haulms. Heart girth was not different (P>0.05) between control diet and diet with 10% peanut haulms. The possible reason for higher heart girth measurement in Salt range lambs fed increased level of peanut haulms might be due to higher weight gain. Heart girth might act as determinant for live weight estimations of sheep and goats (Mahmud *et al*., 2014).

Body length of Salt Range lambs were not different (P>0.05) between diets with 30 and 20% peanut haulms but higher than control diet and diet with 10% dietary haulms level. The justification for improvement in body length of lambs fed higher peanut haulms might be also higher weight gain. Body length is also used as parameter for estimation of live weight of sheep along with other body measurement (Girma and Alemu, 2008).

Conclusions

It is concluded based on findings of present study that optimum growth performance can be achieved in Salt Range lambs fed total mixed ration with 30% roughage content based on peanut haulms. Peanut haulms might be potential and economical roughage source to be used as roughage ingredient up to 30% in preparing total mixed that support higher growth rate and lower FCR for lambs. It is recommended that peanut haulms should be evaluated in other species of livestock for optimum growth and production performance.

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Statement of conflict of interest

The authors have declared no conflict of interest.

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