

Research Article

Comparative effect of feeding various concentrations of sugar beet pulp to estimate the increase in live body weight and their economic values in Damani goats

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Abstract

The present study was designed for the determination of the comparative effect of feeding various concentrations of sugar beet pulp (SBP) and to estimate the increase in live body weight and their economic values, in Damani goats maintained at Livestock Research and Development Station, Paharpur, Dera Ismail Khan. The feeding trial was conducted on 20 numbers of Damani kids of 6 months age and average weight of 28 ± 0.5 Kg. The animals were randomly distributed into four different groups, viz Group A, B, C and Group D, comprising 05 animals each. The animals of each group were fed with untreated sugar beet pulp, 2% urea treated SBP, 4% urea treated SBP and control group, respectively. The trial was conducted for the period of 35 days post adaptation period of 10 days. Average feed intake of various groups, A, B, C and D was 1005.4 ± 3.034 , 1116 ± 3.069 , 1048.5 ± 3.085 and 1034.2 ± 3.024 , per day respectively. Average weight gain of the animals of different groups was 123.736 ± 0.543 , 138.99 ± 3.22 , 145.865 ± 3.022 and 113.977 ± 3.468 , per day respectively. As per statistical tools, it was found from the study that the animals of group C, fed with 4% urea treated SBP showed significantly higher weight gain ($P < 0.05$) compared to other groups (Group A, B and D). The feed conversion ratio of all the groups was also estimated, and found 9.084 ± 0.0446 , 8.66 ± 0.0378 , 7.37 ± 0.0408 and 9.825 ± 0.029 , per day respectively, regarding which the group A showed higher feed conversion ratio. Therefore, in this study, it has been concluded that the animals of Group C, fed with 4% urea treated SBP showed maximum weight gain. It reveals that the animals raised by the farmers for fattening purposes would show improved weight gain if their feeding ration is supplemented with sugar beet pulp treated with urea @ 4%.

Keywords: Damani Goat; Feed Conversion Ratio; Sugar Beet Pulp; Urea.

Introduction

Livestock population has a vital role in the economy of Pakistan and goat is one of the important livestock species. Goat commonly referred as poor man's cow, is multipurpose animal, reared for meat, milk, hide, fiber and manure purpose. Damani goat belongs to District Dera Ismail Khan, Bannu and Kohat (Khyber Pakhtunkhwa province of Pakistan). It is small sized breed of goats, with convex facial features, screw or spiral shaped horns. Horn color is black with little brown percentage, straight ears and straight medium sized hair on the body. The average body weight is 29-35 Kg, patchy colored body coat of black and tan color[1].

Beta vulgaris, sugar beet plant, grown commercially for the production of sugar, is rich in sucrose concentration, contained in its roots. Roots of the sugar beet comprises 75% water level, 20% sugar level and 5% pulp, as by-product after sugar processing. This pulp is insoluble in water and largely comprises of cellulose, hemicellulose, pectin, lignin and widely used in the animal feed. But sugar beet pulp lacks vitamins, therefore, extra forage consumption is necessary to fulfill the nutritional requirements of the animals [2]. Sugar beet exclusively grows in temperate zone. Its foliage is rich, brilliant green colored and attains a height of 35 cm or 14 inches. Numerous broad leaves grow in the form of tuft from the crown of the beet, usually leveled with ground or slightly above the ground level. Sugar beet pulp comprises 9.1% crude proteins, 0.5% ether extract, 6% sucrose and 3-4% soluble ash [3].

Sugar beet pulp is palatable, highly digested fiber source of ration, used in the animal feed. It gives cooling effect in the animals and gives their skin bloom and healthy appearance. It is succulent, gives firmness to feces and boost feed intake, ultimately weight gain and high energy yield in ruminal fermentation. It can be used as energy supplement and finishing ration in beef

animals, as a rich source of digestibility [4, 5]. It contains high content of glucans and pectin (soluble fibers), which are fermented to acetates in ruminants. It is low cost by-product of sugar industries, sold in the form of meal and pellet and can be included as high-quality animal as well as poultry feed [6].

The main objectives of the study were to investigate and analyze the feeding of various concentrations of untreated and urea treated sugar beet pulp in Damani Goats and to determine the weight gain of animals fed with sugar beet pulp.

Materials and methods

The experimental trial was conducted on Damani Goats maintained at Livestock Development and Research Station, Paharpur, District Dera Ismail Khan and the chemical analysis of experimental feed was performed at the Department of Animal Nutrition, The University of Agriculture, Peshawar.

The ration was iso-caloric and iso-nitrogenous according to National Research Council (NRC) recommendations, 2007. The required quantity of sugar beet pulp (SBP) was collected commercially from Al-Moiz Sugar Mill, District Dera Ismail Khan. Sugar beet pulp was treated with 2-4% urea solution. The solution was sprinkled on SBP, followed by air tight covering of the sugar beet pulp to accomplish anaerobic conditions for one week time. Thereafter, the ration was opened for two hours to eliminate ammonia gas for prevention of ammonia toxicity and the experimental ration was ready for feeding of the animals (Damani Goats).

The animals were randomly distributed in four different groups, viz Group A, B, C and Group D, comprising 05 animals each, fed with untreated sugar beet pulp (SBP), 2% urea treated SBP, 4% urea treated SBP and control group, respectively (Table 1). The ration was offered as a supplement with basal

ration as stall feeding, for a period of 10 days for adaptation, followed by 35 days of experimental phase. The basal diet comprised chopped berseem, having 30% dry matter.

The proximate analysis of the SBP samples including analysis of dry matter, ether extract, crude fiber and crude protein, was

done at the Department of Animal Nutrition, The University of Agriculture, Peshawar. The total feed intake per day of each group, weekly weight gain of the animals using weight scale, feed conversion ratio and cost of feed consumed was determined in this study.

Table 1. Experimental layout

Ration	Group	Damani Kid Tag No.
Untreated Sugar Beet pulp	A	A1, A2, A3, A4, A5
2% Urea treated sugar beet pulp	B	B1, B2, B3, B4, B5
4% Urea treated sugar beet pulp	C	C1, C2, C3, C4, C5
Control Group	D	D1, D2, D3, D4, D5

Results and discussion

The animals of Group A, B, C and Group D were fed with untreated sugar beet pulp (SBP), 2% urea treated SBP, 4% urea treated SBP and control group, respectively and weekly average feed intake was calculated for first 05 weeks. The results revealed that the animals of group B, fed with 2% urea treated SBP showed significantly higher feed intake ($P < 0.05$), throughout the trial, from the 1st week to 5th week, compared to the animals of rest of the groups (Table 2). Weekly average weight gain (in grams) at different dietary feed from week 1 to 5th, was also determined and the results revealed that the average weekly weight gain of the animals of Group C, fed with 4% urea treated SBP, was significantly higher ($P < 0.05$) than the other groups except animals of Group B, fed with 2% urea treated SBP in the 2nd week showed higher average weight gain of 141 ± 3.02 grams than Group C with 132.45 ± 2.67 (Table 3). Our results are in agreement with the study in which it was reported that inclusion of sugar beet pulp at the rate of 5% and 10%, in the diet of Gimizah Chicken resulted in the increased feed intake of hens. Whereas, the weight gain of the hens, was significantly ($P \leq 0.001$) increased since 9th to 19th week of feeding the experimental

ration [6]. In other study 3% urea treated sugar beet pulp was highly recommended in the ewes feeding for improvement of feed intake as well as boosting the body weight in growing stage [7]. Similar studies were conducted in which the dried sugar beet pulp was used as 50% replacement ration in Angora Goat kids, which are also in agreement with our research [8]. It was revealed from a research study on fattening of animals that the SBP, produced as by-product from the sugar processing industries represented a highly valuable energy rich diet, of superior nutritious quality can be utilized as supplement ration in the feed of productive cows and for intensive farming of the rams and bulls [9].

The FCR of all groups was calculated in terms of feed intake and weight gain on weekly basis, as mentioned in (Table 4). The results revealed significantly higher FCR value ($P < 0.05$) for Group B, fed with 2% urea treated SBP than the other groups fed with various concentration of urea treated SBP as well as control group fed on routine ration lacking SBP supplementation. Our results coincide with the results of different studies conducted in the determination of FCR values affected with the supplementation of SBP. In this regard it was

revealed that the feed conversion ratio of the chickens was significantly improved by the

supplementation of SBP in their routine feeding [10, 11].

Table 2. Weekly average feed intake (gram) at different dietary feed from week 1 to 5th

Groups	Wk. 1 st	Wk. 2 nd	Wk. 3 rd	Wk. 4 th	Wk. 5 th	Average
	Mean \pm S. E					
A (Untreated SBP)	920 \pm 3.23	1027 \pm 3.16	950 \pm 3.9	1070 \pm 2.76	1060 \pm 2.12	1005.4 \pm 3.034
B (2% urea treated SBP)	977 \pm 2.83	1060 \pm 2.977	1028 \pm 2.81	1176 \pm 3.97	1200 \pm 2.76	1116 \pm 3.069
C (4% urea treated SBP)	940 \pm 2.10	986 \pm 3.776	1022 \pm 2.81	1060 \pm 3.98	1126 \pm 2.76	1048.5 \pm 3.085
D (Control)	935 \pm 3.67	977 \pm 3.26	1014 \pm 2.98	1020 \pm 3.0	1100 \pm 2.21	1034.2 \pm 3.024

Table 3. Weekly average weight gain (grams) at different dietary feed from week 1 to 5th

Groups	Wk. 1 st	Wk. 2 nd	Wk. 3 rd	Wk. 4 th	Wk. 5 th	Average
	Mean \pm S. E					
A (Untreated SBP)	120.2 \pm 5.77	139.9 \pm 3.12	121.2 \pm 5.42	109.28 \pm 3.33	128.1 \pm 3.23	123.736 \pm 0.543
B (2% urea treated SBP)	130.23 \pm 3.12	141 \pm 3.02	132.5 \pm 3.91	138.36 \pm 2.92	142.1 \pm 3.13	138.99 \pm 3.22
C (4% urea treated SBP)	141.93 \pm 2.65	132.45 \pm 2.67	149.19 \pm 3.87	143.22 \pm 3.19	158.6 \pm 2.73	145.865 \pm 3.022
D (Control)	117.55 \pm 3.29	127.98 \pm 3.88	102 \pm 2.93	106.17 \pm 3.60	119.7 \pm 3.64	113.977 \pm 3.468

Table 4. Average Feed conversion ratio FCR at different dietary feed from week 1 to 5

Groups	Wk. 1 st	Wk. 2 nd	Wk. 3 rd	Wk. 4 th	Wk. 5 th	Average
	Mean \pm S. E					
A (Untreated SBP)	9.1 \pm 0.059	9.2 \pm 0.067	8.94 \pm 0.032	8.98 \pm 0.020	9.20 \pm 0.045	9.084 \pm 0.044 6
B (2% urea treated SBP)	8.99 \pm 0.023	9.1 \pm 0.076	8.23 \pm 0.034	8.64 \pm 0.037	8.67 \pm 0.019	8.66 \pm 0.0378
C (4% urea treated SBP)	8.21 \pm 0.047	7.15 \pm 0.0390	7.36 \pm 0.0189	7.87 \pm 0.0501	7.1 \pm 0.049	7.37 \pm 0.0408
D (Control)	9.57 \pm 0.019	10.25 \pm 0.016	9.94 \pm 0.027	9.39 \pm 0.049	9.87 \pm 0.0341	9.825 \pm 0.029

Conclusion

It has been concluded from this study that the animals fed with urea treated sugar beet pulp at the rate of 2-4%, showed maximum FCR and improved weight gain. Moreover, the sugar beet pulp is very economical and low cost by-product of sugar industries, sold in the form of meal and pellet and can be included as high-quality and low cost animal feed, particularly by the farmers who raise the animals for fattening purpose.

Authors' contributions

Conceived and designed the experiments: A Khan, IU Din, A Ali, A Ali, M Jamil, Sfiullah & MF Ullah, Performed the experiments: A Khan, IU Din, A Ali, A Ali, M Jamil, Sfiullah & MF Ullah, Analyzed the data: A Khan, IU Din, A Ali, A Ali, M Jamil, Sfiullah & MF Ullah, Contributed materials/ analysis/ tools: A Khan, IU Din, A Ali, A Ali, M Jamil, Sfiullah & MF Ullah, Wrote the paper: A Khan, IU Din, A Ali, A Ali, M Jamil, Sfiullah & MF Ullah.

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