Effect of sugarcane trash in total mixed ration on performance of growing sheep

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Abstract

A study was conducted on eighteen growing sheep which were divided in three groups with six in each for ninety days. The total mixed rations (TMR) were prepared with sorghum dry fodder, green maize and concentrate mixture (50:20:30 ratio on DMB) and fed in (T_0) group. The inclusion of 50% sugarcane trash of total dry roughage in (T_1) group. The (T_2) group, with 50% of total dry roughage was replaced with enzyme treated (300 g/ton) sugarcane trash in TMR. The average final body weights were observed as non-significant among treatment groups, whereas significant change was observed in average daily gain in body weight (ADG) of (T_2) over (T_1) group. The data revealed non-significant difference in body weighs, ADG but significantly higher difference was observed in nutrient digestibility in treatment groups. Hence, the present study concludes that enzyme treated sugarcane trash in TMR can be used as alternative for dry sorghum fodder for raising the growing sheep.

Key words: sugarcane trash, performance, digestibility, sheep

Introduction

Agriculture and animal husbandry have played a crucial role in the rural part of India since civilization. Sheep are an important and vital to the livestock and agrarian economy of the nation. Sheep are raised mostly for meat purpose in many region of the nation, wool and sheep skin are also used as raw materials by numerous industries. The majority of developing nations currently face a severe scarcity of feed and fodder (20th Livestock Census (2019). Efforts are in progress to increase profitability of sheep farming in developing countries (Bhateshwar et al., 2022; Djimon et al., 2024) For animals to grow more quickly and produce more meat, they need to be fed an economical, balanced and sufficient amount of feed. Therefore, to meet the daily nutritional needs of ruminant animals, we need to search for more innovative, affordable and readily available agro-industrial feed sources such as sugarcane trash, which Indian farmers have not traditionally been used for livestock rearing.

The available dry sugarcane trash might serve as a supply of dry fodder for feeding ruminant animals to greatly reduce feed costs and increase weight gain (Jaishankar *et al.*, 2017). A limited number of research trials employing sugarcane trash in ruminant animals have been undertaken in India due to a lack of awareness and comprehension of application at the farm level, particularly for small ruminant animals. Since the literature available is very scanty and limited with sugarcane studies in small ruminants. Therefore, the present study was planned with decided objectives like dry matter intake, body weight changes and digestibility of nutrients.

Material and Methods

The experimental sheep were reared in winter season under an intensive system at Punya Shlok Ahilyadevi Sheep and Goat Development Corporation, Dahiwadi (17.7032° N, 74.5434° E), Dist. Satara (M.S.). Eighteen (18) growing sheeps (4-6 month of age) with similar body weight and sex ratio (3:3) were selected for the designed experimental study for 90 days. The selected sheep were randomly divided into three experimental groups (T_0, T_1 and T_2) with six growing sheep. The diets were as per ICAR (2013) for the control group (T0). The inclusion of 50% sugarcane trash of total dry roughage in (T_1) group and in (T_2) group, 50% of total dry roughage replaced with enzyme treated (300 g/ton) sugarcane trash in TMR. The enzymes like cellulase (340 EU/kg) and xylanase (1100 EU/kg) were procured from NIT, Nagpur (M.S.) at Rs.150/- per kg and used in this experiment. The enzymes used in this experiment are fibrolytic in nature and helps to breakdown the fibrolytic tough bonds present in sugarcane trash. The required quantity of enzymes were mixed in concentrate feed as top dressing and then mixed it with TMR. The total mixed rations (TMR) were prepared with of sorghum dry fodder, green maize and concentrate mixture (50:20:30 ratio on DMB) and fed in (T_0). The rationale behind replacing sorghum at 50 per cent level was to have a uniform ratio of TMR preparation at decided ratio and to meet the dry matter of experimental sheep through the dry fodder. During the experimental period, the observations pertaining to daily dry matter intake, body weights were recorded, ADG was calculated accordingly. A digestibility trial of seven days duration was conducted by adopting total collection method. The details of treatment groups are presented in table 1.

Statistical Analysis

Data obtained was subjected to a two-way ANOVA with repeated measures using SPSS statistics software version 20.

Results and Discussion

The average mean of total dry matter (TDMI) at 13th week are recorded as non-significant between the groups (T_0, T_1 and T_2). The TDMI values are similar to results reported by Tsega *et. al,* (2021), Hussain *et. al,* (2014) and Wahyuni *et. al,* (2012) in their respective studies.

Table 1: Details of experimental groups and dietary treatments

Group	Experimental Diet
T_0 (Control)	Total mixed ration formulated by Roughages (Dry - Jowar kadbi 50 parts of DM and Green maize 20 parts of DM) + Concentrate Mixture 30 parts of DM) (as per ICAR 2013)
T_1	Total mixed ration formulated by roughage Dry - Jowar kadbi 25 parts of DM + Sugarcane trash 25 parts of DM and Green maize 20 parts of DM + Concentrate mixture 30 parts of DM (as per ICAR 2013)
T_2	Total mixed ration formulated by roughage Dry - Jowar kadbi 25 parts of DM + enzyme treated Sugarcane trash 25 parts of DM @ (300 g/ton) and Green maize 20 parts of DM + Concentrate mixture 30 parts of DM (as per ICAR 2013)

Table 2: Dry matter intake, Body weights, ADG and Digestibility of experimental sheep

Parameters	Treatment Groups			
	T_0	T_1	T_2	P Value
Feed intake through TMR (gm/day)				
TDMI through TMR at 1st week	512.38±25.46	529.85±24.47	531.81±16.61	NS
TDMI through TMR at 13th week	756.06±26.47[l]	769.74±26.83[l]	788.06±21.98[l]	NS
TDMI (Mean ± SE)	638.37±11.23	653.50±10.88	669.33±10.41	NS
Body weights (kg) and ADG (gm)				
Initial avg. body weight on 1st Day of Trial	13.62±0.67[y]	13.76±0.63[y]	13.95±0.44[y]	NS
Final body weight at 90th Day of Trial	21.43±0.77[l]	21.28±0.74[l]	22.57±0.62[l]	NS
Average body weight at 90th Day of Trial	17.33±0.32	17.36±0.31	18.06±0.32	NS
Initial Avg. ADG in body weight at 1st week	71.67±2.43[q]	69.52±2.08[p]	75.71±2.27[q]	NS
Initial Avg. ADG in body weight at 13th week	96.19±2.57[l]	92.62±3.49[l]	104.29±4.78[l]	NS
Mean final Avg. ADG in body weight	85.82±1.18[ab]	82.66±1.08[b]	94.76±1.30[a]	P≤0.012
Nutrient Digestibility (%)				
Dry Matter Digestibility	64.93±0.26[ab]	63.83±0.23[b]	66.41±0.28[a]	P≤0.03
Organic Matter Digestibility	69.12±0.32[ab]	67.45±0.25[b]	71.04±0.28[a]	P≤0.01
Crude Protein Digestibility	72.36±0.38[ab]	70.11±0.35[b]	73.42±0.35[a]	P≤0.05
Ether Extract Digestibility	67.40±0.33	66.31±0.39	69.12±0.43	NS
Crude Fibre Digestibility	56.15±0.58[b]	54.80±0.60[b]	60.09±0.56[a]	P≤0.05
Nitrogen Free Extract Digestibility	74.18±0.34[ab]	72.91±0.37[b]	75.46±0.37[a]	P≤0.01

NS: Non-significant; **Note:** Different superscript within rows i.e (in between groups) significant difference (P≤0.05) and (P≤0.01).

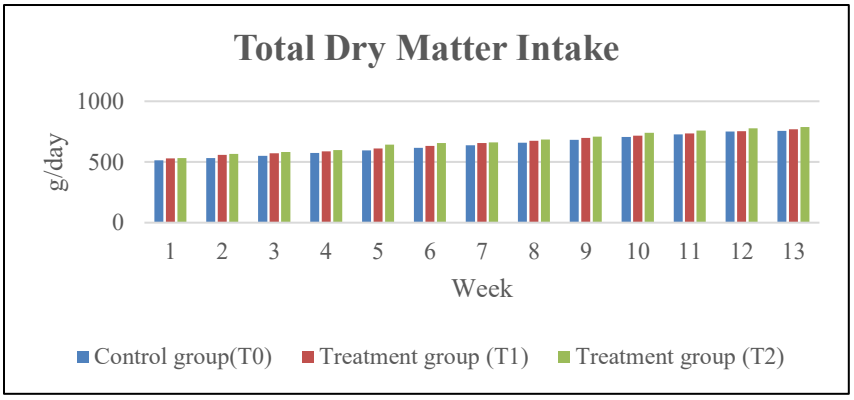

Fig 1: Weekly Dry Matter Intake through Total Mixed Ration (TMR)

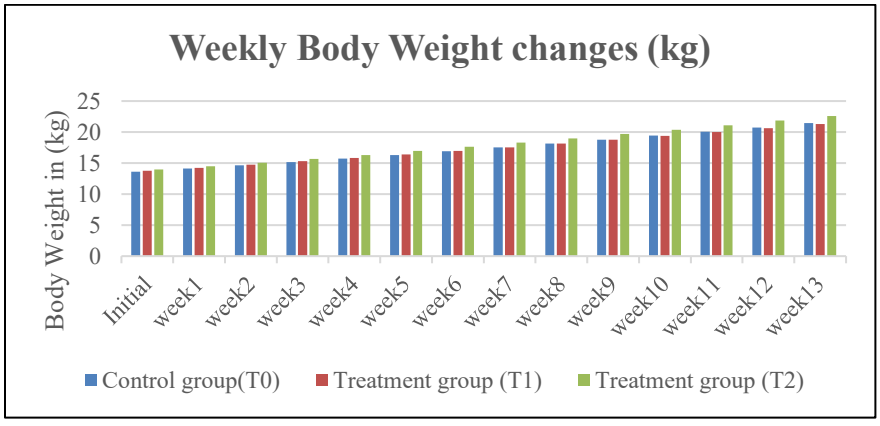

Fig 2: Weekly body weight changes (kg)

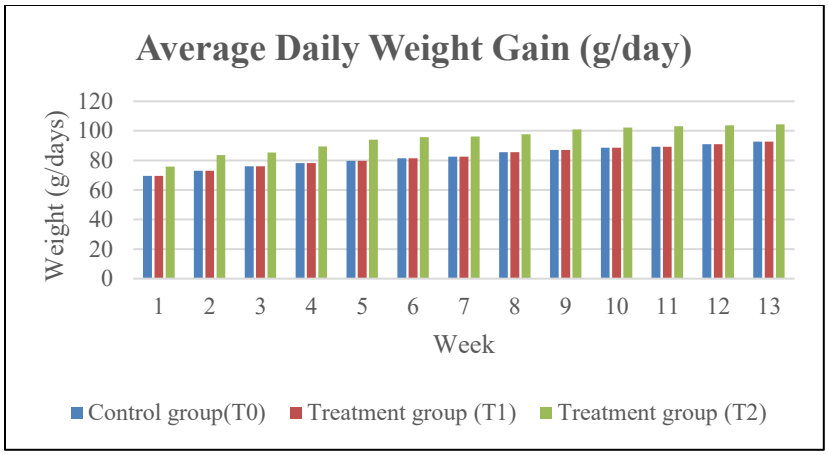

Fig 3: Average daily body weight gain (g/day)

The mean values of weekly body weights were found as non-significant (P>0.05) differences in all experimental groups (T_0, T_1 and T_2). At the same time, treatment (T_2) was found to be numerically superior over both the treatment (T_1) and control (T_0) groups. Similarly, the average daily gain in body weight, when compared statistically, was found to be non-significant (P>0.05) in all the treatment groups. Hence, from these results, it can be concluded that sugarcane trash can include up to 50% of dry roughage in the total mixed ration of sheep in scarce condition or for maintenance purposes without significantly hampering the body weight and average daily gain. Whereas exogenous fibrolytic enzyme (EFE) treated sugarcane trash can included up to 50% of total dry roughage in the TMR of growing sheep, with a numerically positive effect on body weight and a significantly positive effect of average daily gain. The present study reports are well supported and are in accordance with Jaishankar *et. al,* (2021), Tsega *et. al,* (2021) and NE *et. al,* (2017).

The average values of digestibility coefficient were compared among treatment groups and found that DM, OM, CP, and NFE were significantly higher (P<0.05) in treatment group (T_2) and treatment group (T_1). However, EE was found to be non-significant (P>0.05) and differed between all the groups. The digestibility coefficients of present study are well supported and are in accordance with Jaishankar *et. al,* (2021), Rao *et. al,* (2018), Ganai *et. al,* (2011) and Gado, *et. al,*(2011) found similar results with the present study.

Conclusions

The inclusion of untreated sugarcane trash (50%) and enzyme-treated sugarcane trash (50%) of total dry roughage in the Total Mixed Ration (TMR) can be used as alternative for dry sorghum fodder for raising the growing sheep.

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Disclaimers / Conflict of Interest:

The authors hereby declare that there is no conflict of interest regarding the experimental data and manuscript.

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