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Short Communication

A Study on Comparison of Different Feeding Systems on Growth and Economic Performance of Goats Reared Under Semi-Arid Region

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Abstract

A study was conducted to compare the different feeding system in three month' s old weaned Salem Black kids in both the sexes. Animals were divided in to five treatment groups each contains six kids for male and female separately. All the animals were allowed for full day grazing. In addition to grazing group I kids were fed with concentrate feed @ 1% of body weight (BW), group II concentrate feed @ 1.5% of BW, group III ground maize grain @ 1% of BW, group IV Ground nut oil cake (GNC) @ 1% of BW and group V serve as a control reared only with grazing for the period of 9 months. The growth rate and Average daily gain (ADG) of goats were significantly (P<0.05) higher in concentrate feed/feed ingredients supplemented animals. In all the treatments male kids significantly (P<0.05) grew faster than female. The profit per group was significantly (P<0.05) lesser in non-supplemented group and significantly (P<0.05) higher in maize grain supplemented group. In conclusion, supplementation of concentrate feed/feed ingredients @ at 1 per cent BW satisfy nutrient requirement of grazing goats. Among the feeding systems, supplementation of maize grain was more profitable.

Keywords: Economics, Extensive Grazing System, Feeding System, Growth Performance

Introduction

Extensive method is commonly followed goat rearing system in India. Goats are mostly maintained by landless laborers (FAO, 1991) due to marginal or undulating lands not suitable for other types of animals like cow or buffalo, goat is the best alternative. These are being reared with little or no feed supplementation (Allegretti *et al.,* 2012). In extensive system of rearing animal getting inadequate quantity of forages leads poor growth performance as well as reproductive performance (Kawas, 2010). Protein and energy are the two most important constituents of animal diets having vital role in their growth, production and reproduction. Kabir *et al.* (2004) reported that concentrate feed and protein supplementation to goats enhances their performance in extensive system. An unscientific approach to animal feeding results low weight gain, abortion or neonatal death due to malnutrition (Chaturvedi *et al.,* 2008; Sahu *et al.,* 2013). The declining profitability of traditional extensive production system is a problem facing goat rearing rural farmers today. So, if scavenging type of rearing can be supplemented with minimum amount of nutrients then the level of production may be increase at minimum cost. Considering the above facts and due to little or no information on recently recognized promising Salem black goat breed, the present study was under taken to identify the economical way of feeding system for Salem black goat in dry land tract.

Materials and Methods

The study was conducted at Mecheri Sheep Research Station (MSRS), Tamil Nadu Veterinary and Animal Sciences University during the month of October 2017 to July 2018. Location of MSRS is at longitude of 77º 56'E, latitude of 11º45'N and altitude of about 650 feet above MSL. The local climate of the area is generally hot, semi-arid and tropical with an average rainfall of 831.4 mm.

Experimental Animals

A total of 60 (30 male and 30 female) three months old Salem black kids with average body weight of 9.36 ± 0.07 kg for male and 8.96 ± 0.09 kg for female were selected and allotted in to five treatment groups viz., I, II, III, IV and V each contains 12 animals (6 male and 6 female) in a completely randomized block design. All animals were allowed for grazing full day for 8 hours; 4 h in the morning and 4 h in the evening. In addition to grazing group I goats were fed with concentrate feed @ 1% of body weight (BW), group II concentrate feed @ 1.5% of BW, group III ground maize grain @ 1% of BW, group IV GNC (Expeller) @ 1% of BW in the evening and group V serve as a control reared only with grazing without any supplements. The chemical composition of the concentrate feed and feed ingredients are presented in Table 1. The animals were weighed individually at monthly interval before feeding and watering to observe the body weight changes for a period of 270 days. Goats were dewormed and vaccinated as per the schedule prescribed by the Animal Death Reporting Committee, Tamil Nadu Veterinary and Animal Sciences University.

Table 1: Chemical composition (%, dry matter basis) of feed and feed ingredients

Particulars	CP	CF	EE	Calcium	Phosphorus
Concentrate feed	18.05	6.03	2.49	1.2	1.08
Maize	8	4.15	7.71	0.08	0.2
Ground nut oil cake	40.9	22.06	10.42	0.36	0.25

Economic Analysis of Feeding Systems

To compare the economic profit of the different feeding systems, the gross return was calculated by the difference between total income and total input feed or feed ingredients costs. Income and feed/feed ingredient costs were individually calculated for each animal.

Statistical Analysis

The data was subjected to analysis of variance to observe the effect of treatment. The differences between the means were tested by significance using Duncan's multiple range test (Duncan, 1955) as per pprocedures as described by Snedecor and Cochran (1994).

Results and Discussion

Table 2 summarizes the results obtained in different feed/feed ingredient supplemented and non-supplemented groups in extensively managed goats with respect to growth performance. All the animals of different feeding groups grew linearly throughout the feeding trial.

Table 2: Growth performance of goat under different feeding systems

Particulars	Body weight changes (kg)				Total weight gain (kg)	ADG (g)
	Initial	Six months	Nine Months	Twelve Months		
Overall	9.16±0.06	16.24±0.32	18.91±0.42	21.34±0.46	12.14±0.44	44.96±1.63
Sex						
Male	9.36±0.07	17.04±0.44	19.99±0.58	22.25±0.66	12.89±0.65	47.74±2.41
Female	8.96±0.09	15.44±0.43	17.82±0.56	20.16±0.61	11.21±0.58	41.51±2.18
P-Value	0.007	0.001	0.001	0.001	0.001	0.001
Treatment						
I	9.22±0.19	17.43^{a} ±0.77	20.08^{a} ±0.88	22.76^{a} ±0.93	13.54^{a} ±0.76	50.15^{a} ±1.63
II	9.02±0.14	16.70 ^{a} ±0.40	20.26^{a} ±0.56	23.27^{a} ±0.61	14.25^{a}±0.55	52.77^{a} ±2.05
III	9.32±0.15	16.83^{a} ±0.31	19.68^{a} ± 0.36	22.43^{a} ±0.38	13.12^{a}±0.29	48.58^{a} ±1.08
IV	9.11±0.16	17.85^{a} ±0.34	20.79^{a} ±0.57	23.10^{a}±0.48	13.99^{a}±0.42	51.81^{a} ±1.41
V	9.14±0.05	12.39^{b}±0.32	13.73^{b}±0.39	15.15^{b}±0.29	6.01^{b}±0.27	22.25^{b}±1.14
SEM	0.066	0.325	0.424	0.469	0.449	1.662
P-Value	0.611	0.001	0.001	0.001	0.001	0.001

^{ab}*Means bearing different superscript in the same column differ significantly (P<0.05)*

The growth rate and ADG of goats were significantly (P<0.05) higher in concentrate feed and feed ingredients (maize grain or GNC) over no supplemented goats. The present results were in accordance with the findings of Paramasivam *et al.* (2002) in Barbari kids; Abdul Hakim *et al.* (2005) and Patil *et al.* (2014) in Osmanabadi kids. There was 225 per cent improvement in total weight gain (13.56 Vs 6.01 kg) and ADG (50.22 Vs 22.25 g) in supplemented group against non-supplemented group. The higher weight gain might be attributed to the supplementation of nutrients by increasing the fiber digestion, forage intake (Yue-ming *et al.*, 2005) and maximize the rumen fermentation (Schacht *et al.* 1992). Supplementation of nutrient can also provide a vehicle for carrying non-nutritive additives, antimicrobials and other compounds for the prevention of parasitism, and to facilitate good health and more feed conversion efficiency (Lusby, 1990). Male kids grew faster than female in the present study in all the feeding systems. This could be explained with the fact that the male foetus itself grows faster during prenatal development (Soundararajan and Sivakumar, 2011). This explains the higher birth weight in male kids. Significant influence of sex on growth performance was also reported by Browning *et al.* (2004) in Boer and Kiko kids and Urge *et al.* (2004) in Turkish Sannan kids. Male kids gained significantly higher weights than female at all the stages in all the feeding system which might be due to quantitative difference in the secretion of growth and sex hormone is two sexes (Dass, 2007).

It is confirmed with obtainable results that all groups allowed profits, in the studied period, looking for the several other factors related to the production system which are not considered in this research, but in function of the financial indicators input and output were worked out. The supplementation of ground maize grain @ 1 per cent of BW was the most profitable feeding system compared to others due to less ingredient cost with convincing productivity (Table 3). It was the most interesting from the economic point of view that the profit per group was lesser in animals which supplemented high proportions (1.5% BW) of concentrate feed and GNC (1% BW) supplemented group and much lesser (₹4550) in non- supplemented group compared to supplemented group (₹5478), fact that prove economic efficiency could be achieved by supplementation of ground maize grain @ 1 per cent BW followed by concentrate feed (1% BW), concentrate feed (1.5% BW) and GNC with these productions.

Table 3: Cost, income and gross return according to feeding system of goat rearing

Particulars	Input		Outcome** (₹)	Profit (₹)
	Total Feed/Feed ingredients intake (kg)	Feed/Feed ingredients cost* (₹)		
Overall	44.68±3.21	1337.4	6360	5290
Sex				
Male	46.89±4.71	1405.8	4660	5550
Female	42.47±4.41	1269	4430	5030
P-Vale	0.001	0.001	0.001	0.001
Treatment				
I	49.74^{b}±2.03	1144.0^{b}	6830^{a}	5680^{c}
II	74.22^{a}±1.70	1706.9^{a}	6840^{a}	5130^{b}
III	49.09^{b}±0.70	736.4^{c}	6730^{a}	5990^{a}
IV	50.35^{b}±1.20	1762.3^{a}	6880^{a}	5110^{b}
V	0.00^{C}	0.00^{d}	4550^{b}	4550^{c}
SEM	3.213	64.304	703.4	90.8
P-Value	0.001	0.001	0.001	0.001

*^{abcd} Means bearing different superscript in the same column differ significantly (P<0.05); *Market price of concentrate feed ₹ 23, Maize ₹ 15 and Ground nut cake ₹ 35 per kg; **Outcome by sale of live animal as per University price fixation committee = ₹ 300/kg live weight*

In summary supplementation of concentrate feed/feed ingredients (Maize or GNC) improved the weight gain in extensively managed goats. The supplementation of concentrate feed, ground maize grain and GNC @ 1% BW satisfy the nutrient requirement of grazing goats. Among the feeding systems, supplementation of ground maize grain @ 1% BW was the more profitable.

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Conflict of Interests

There is no conflict of interest.

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