

GROWTH PERFORMANCE AND CARCASS TRAITS OF NELLORE BROWN RAM LAMBS KEPT ON GRAZING WITH OR WITHOUT CONCENTRATE SUPPLEMENTATION

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Abstract: Present study was carried out to investigate the effect of concentrate supplementation on growth performance and carcass traits of Nellore Brown ram lambs maintained on grazing with or without supplementation. 750 ramlambs were supplied with concentrate feed @ 1% of its body weight continuously for 120 days (Group II) and in each formers flock 5ram lambswere kept only on grazing which act as control (Group I). Concentrate supplemented group shown significantly ($P<0.01$) higher growth rates. The average daily gain in supplemental group was 96.7g grams compared to 46.8 g in control group. The cost benefit ratio was 1:3.12 between control and supplemental group. In carcass studies, carcass weight ($P<0.01$), dressing percentage ($P<0.05$) and edible portion ($P<0.01$) was significantly improved in supplemental ram lambs. Significant improvements was also observed in wholesale cuts like neck and shoulder ($P<0.01$), leg ($P<0.01$), rack and loin ($P<0.05$) in group II ram lambs. No significant improvement was observed in meat to bone ratio and meat quality of lambs in Group II. Based on the results it is could be concluded that growing lambs maintained on grazing landswith supplementation of concentrate at 1% of their body weight performed better in terms of weight gain carcass characteristics and cost economics.

Keywords: Supplementation, sheep, performance cost economics, carcass traits.

INTRODUCTION

Sheep and goats are the species of economic value to the small and marginal farmers and landless laborers in tropical countries which are traditionally managed on grazing lands. Under the existing conditions sheep are mostly grazed on roadsides and marginal lands where most grasses grazed are of lower quantity and quality. These feed resources cannot adequately support the production and grazing alone may not be sufficient for optimizing live weight gain and wool production. The male lambs under field condition have poor growth rate and during active phase of growth (3-6 months) attain only 60-70 g average daily gain (Balasubramanyam and Kumaraswamy, 2011) while the same lambs under intensive feeding

management are able to attain 150 g average daily gain (Karim and Rawat, 1996) indicating that the feeding management has to be optimized for enhancing mutton production. It is generally to increase intake and supply of nutrients and there by growth performance of lambs through supplementation.

Supplementation with concentrate is reported to increase production performance (Venkataraman et.al., 2015). To educate the farmer about the positive effects of supplementation under National Agricultural Innovative Project (NAIP) facilitated by NRC-Meat, Hyderabad and Department of Animal Nutrition, Hyderabad jointly organized trainings to the sheep farmers and provided concentrate to the farmers of Annatapur district to demonstrate the economic benefits of supplementation to growing ram lambs.

MATERIALS AND METHODS:

Experimental diets and animal rearing

Under this project 750 ram lambs belongs to 30 farmers distributed in 10 different villages in Anantapur district which are maintained under natural grazing were identified with ear tags and supplemented with concentrate feed @ 1% of their body weight continuously during experimental period (120 days). In each farmer herd 5 ram lambs were kept as control group also maintained with each farmer in which the lambs were maintained grazing alone without supplementation.

Live weight recording and cost economics:

The lambs were fed experimental diet for 120 days during which body weights of lambs were recorded fortnightly for calculation of concentrate supplementation at the rate of 1% of its body weight. The difference of body weight gained between two groups and additional income gained were compared.

Carcass studies

Three representative animals from each group were randomly selected for carcass studies. The lambs were fasted for 18 hrs with free access to water and slaughtered as per the standard procedures by Halal method. The live weights before slaughter were recorded. Stripping, legging, dressing and evisceration were performed by adopting the standard procedures described by Gerrand (1964). Carcass, edible (testicles, spleen, pancreas, kidney, heart, liver) and non-edible (head, skin fore and hind canons, lungs with trachea, gall bladder, penis, empty GI tract) offal weights were recorded immediately after slaughter. Lungs, trachea and heart were weighed as one piece and designated as pluck. Weight of ingesta was determined as the difference between full and empty digestive tract. The empty live weight was

computed as the difference between pre slaughter weight and weight of digestive content. The hot carcass was then split into fore and hind quarters. The fore and hind quarters were further split along the mid line and the left half was disjointed as per ISI (1963) specifications to standard wholesale cuts viz. leg, loin, rack, neck and shoulder and breast and fore shank. The samples were analyzed for moisture, protein, fat and ash (AOAC, 1997).

Statistical Analysis

The data was subjected to one way analysis of variance. The differences between the means were tested by significance using Duncan's multiple range test (Duncan, 1955). All the statistical procedures were carried out as per the procedures of Snedecor and Cochran (1994) by programming and processing in computer.

Results and Discussion

The data regarding total weight gain, average daily gain and cost benefit ratio was presented in Table 1. The initial live body weight of lambs was similar in the two groups, but concentrate supplementation significantly ($P<0.01$) increased the final body weight and total weight gain of ram lambs compared to the ram lambs fed grazing alone. The average daily live weight gain recorded in the supplemented group during 120 days of the trial was significantly ($P<0.01$) higher (60.2 vs. 92.0 g/d) by 52.9 per cent than that observed in the group on grazing alone. This might be due to nutritional insufficiency of animals which reared on grazing alone (De *et al.*, 2015). Concentrate supplementation improves the nutrient digestibility (Mc Donald, 2002), thereby improves the weight gain, this might be another reason for higher weight gains in concentrate supplemented animals. Several authors (Chaturvedi *et al.*, 2003; Sankhyan *et al.*, 2007) concluded that overall nutrient digestibility could be improved by additional concentrate supplementation to sheep which reared only on grazing. As well as, additional concentrate supplementation might be provided additional nutrients to the lambs. Similarly, Bosing *et al.* (2014), Sahu *et al.* (2013) and Chaturvedi *et al.* (2010) also stated that additional concentrate supplementation to the animal reared on grazing only could improve the animal performance. Further, higher growth rate in concentrate fed lambs was due to better plane of nutrition which was also observed by Santra *et al.* (2002). Similarly, Girish *et al.* (2012), Karim *et al.* (2007) observed significant ($P<0.01$) improvement in average daily gain of ram lambs with nutrient supplementation which were on natural grazing only.

In Group II, each ram lamb consumed an average 23.42 kg concentrate in 120 days of growth trail in addition to grazing. The difference of weight gained in Group II was 5.98 kg

during trail period, which earned an additional income of Rs.1316 (Rs.220/kg live weight), compared to Group I. The cost benefit ratio of Group II is 1:3.12. This feeding strategy will considerably increase profitability.

The recorded pre slaughter weight and empty body weight were non-significantly different between the groups, but reflected increased trend in the weights of Group II ram lambs (Table 2). The hot carcass weight ($P<0.01$) and dressing percentage of pre slaughter weight ($P<0.05$) were significantly higher in Group II compared to Group I. The dressing percentage of empty body weight, although statistically similar in the two groups, was generally higher in Group II. The range of dressing yield of the lambs observed in the study was similar to earlier reports on Indian sheep (Sen *et al.*, 2004, Karim *et al.*, 2002). The significant ($P<0.01$) increase in total weight gain might be the reason for above trend in results.

The data on wholesale cuts was presented in Table 3. The wholesale cut weights reflected the trend of carcass weight and dressing percentage and were significantly higher in Group II except breast and fore shank cut. The total edible weight expressed in terms of pre slaughter weight of Group II was significantly ($P<0.01$) differed from Group I and inedible weight expressed in terms of pre slaughter weight was similar between two groups. The ratio of edible and inedible portions was comparable between the two groups. It was evident from the results that with improvement in plane of nutrition in Group II, the higher tissue accretion in this group was on cuts. Similar trends in wholesale cuts was also noted by Sen *et al.*, (2004) and Karim *et al.* (2002) by slaughtering finisher lambs maintained on free grazing with concentrate supplementation.

The meat, bone and fat content of the wholesale cuts and whole carcass were presented in Table 4. The meat, bone, fat and meat and bone ratio were comparable between the two groups, but the meat content of whole carcass of Group II was 8.79 per cent higher than the Group I. Bone and fat contents of whole carcass of Group II were numerically lower than Group I, The yield of visceral organs was given in Table 5. The yield of visceral organs of percent pre-slaughter weight was comparable between the two groups.

The nutrient composition of *Longissimusdorsi* muscle was presented in Table 6. The composition in terms of moisture, protein, fat and ash was comparable between the groups fed supplementation of concentrate in addition to grazing and grazing alone.

From the findings of the present work it is concluded that, supplementation of concentrate mixture to growing ram lambs maintained on grazing lands at 1% of their body

weight is economical and profitable to the sheep farmers through better performance of growing sheep.

REFERENCES

- [1] AOAC. (1997). Association of Official Analytical Chemists. 16th ed. Official Methods of Analysis, Washington, DC.
- [2] Balasubramanyam, D. and Kumarasamy, P. 2011. Performance of Madras red sheep in Kancheepuram district. *Indian J. Fundam. Appl. Life Sci*, **1(2)**: 133-137.
- [3] Bosing, B.M., Susenbeth, A., Hao, J., Ahnert, S., Ohm, M. and Dickhoefer, U. 2014. Effect of concentrate supplementation on herbage intake and live weight gain of sheep grazing a semi-arid grassland steppe of North-Eastern Asia in response to different grazing management systems and intensities. *Livestock Sci.*, **165**: 157-166.
- [4] Chaturvedi, O.H., Mann, J.S., & Karim, S.A. 2010. Effect of concentrate supplementation to ewes grazing on community rangeland during late gestation and early lactation. *The Indian J. Small Rumi.*, **16(1)**: 97-100.
- [5] Chaturvedi, O.H., Bhatta, R., Santra, A., Mishra, A.S., and Mann, J.S. 2003. Effect of supplementary feeding of concentrate on nutrient utilization and production performance of ewes grazing on community rangeland during late gestation and early lactation. *Asian Australasian J. Anim. Sci.* **16(7)**: 983-987.
- [6] De. K., Kumar, D., Kumar, K., Sahoo, a. and Naqvi, S.M.K. 2015. Effect of different types of housing on behavior of Malpura lambs during winter in semi-arid tropical environment. *J. Vet. Behavior: Clinic. Applic. Res.* **10 (3)**: 237-242.
- [7] Duncan, D.B. 1955. Multiple range and multiple F tests. *Biometrics*, **11(1)**: 1-42.
- Gerrand, F. 1964. Meat Rechnology. 3rd edition Leonard Hell Limited, London.
- [8] Girish, P.S., Baswa Reddy, P., Ramakrishna, C., Ramana Reddy, Y., Satish, C, and Kondaiah, N. 2012. Effect of nutrient supplementation on growth performance and carcass characteristics of Nellore ram lambs – An on-farm evaluation study. *Indian J. Anim. Sci.* **82(12)**: 1601.
- [9] ISI 1963. Indian standard specifications for mutton and goat flesh: fresh, chilled and frozen (IS 2536), *Bureau of Indian Standards*, New Delhi.
- [10] Karim, S.A., and Rawat, P.S. 1966. Growth performance of native and crossbred weaner lambs under intensive feeding. *Indian J. Anim. Sci.* **66**: 830-832.

- [11] Karim, S.A., Santra, A. and Verma, D.L. 2002. Growth, feed conversion efficiency and carcass characteristics of Malpura and Malpura X Awassi crossbred lambs in a hot semiarid environment. *Asian-Australasian J. Anim. Sci.* **15**:377-381.
- [12] Karim, S.A., Tripathi, M.K. and Singh, V.K. 2007. Effect of varying levels of concentrate supplementation on growth performance and carcass traits of finisher lambs, *Livestock Res, Rural Develop.* **19(11)**:173-176.
- [13] Malisetty, V.(2013). Effect of supplementation of concentrate mixture on growth rate and carcass characteristics in grazing ram lambs. *Int. J. Agrl. Sci. Vet. Med.* 1:34-38.
- [14] Mc Donald, P., Edwards R.A. and Greenhalgh, J.F.D. 2002. Animal Nutrition. 7thEdn. Longman Scientific and Technical, Group UK Limited, Longman House, Burnt Mill, Harlow, Essex CM20 2JE, England.
- [15] Sahu, S., Babu, L.K., Karna, D.K., Behera, K., Kanungo, S., Kaswan, S., Biswas, P. and Patra, J.K. 2013. Effect of different level of concentrate supplementation on the periparturient growth performance of Ganjam goat in extensive system. *Vet. World***6(7)**: 428-432.
- [16] Sankhyan, S.K., Shinde, A.K., Singh, N.P. and Verma, D.L. 2007. Effect of concentrate supplementation on nutrient intake, utilization and performance of pregnant sheep maintained on community grazing land of semiarid Rajasthan. *The Indian J. Anim. Sci.* **77(6)**: 477-480.
- [17] Santra, A., Karim, S.A. and Chaturvedi, O.H. 2002. Effect of concentrate supplementation on nutrient intake and performance of lambs of two genotypes grazing a semiarid rangeland. *Small Rumin. Res.* **44(1)**:37-45.
- [18] Sen, A.R., Karim, S.A. and Santra, A. 2000. Carcass characteristics of finisher lambs maintained on grazing with supplementation. *Indian J. Anim. Sci.* **70**: 988-900
- [19] Se, A.R., Karim, S.A. and Santra, A. 2004. Carcass yield, composition and meat quality attributes of sheep and goat under semiarid conditions. *Meat Sci.* **66**: 757-763.
- Snedecor, G.W., Cochran, W.G. 1994. Statistical Methods. 8th ed. Iowa State University Press, Ames, Iowa, USA.
- [20] Venkataramanan, R., Sreekumar, C., Manonmani, G., Balasubramanyam, D. and Gopi, H. 2015 Effect of supplementary feeding of concentrate feed on Madras Red lambs under field conditions. *Indian J. Small Rumin.* **21(1)**: 124-125.

Table 1. Effect on performance and cost economics in growing Nellore Brown ram lambs maintained on grazing with or without supplementation.

Parameter	Group I	Group II	SEM
Initial body weight (kg)	14.61	14.78	0.86
Final body weight (kg)*	20.22	26.39	0.51
Total weight gain (kg)*	5.61	11.59	0.51
Average daily gain (g)*	46.75	96.65	3.58
Difference in wt. gain (kg)	-	5.98	-
Concentrate consumed/animal (kg)	-	23.42	-
Additional cost incurred on concentrate/animal (Rs.)	-	422	-
Additional income earned/animal (Rs.)	-	1316	-
Cost benefit ratio	-	1:3.12	-

Each value is the average of 150 observations in Group I & 750 observations in Group II
 Values bearing different superscripts in a row differ significantly (*P<0.01)

Cost of concentrate feed per kg =Rs.18/-

Cost of live weight per kg = Rs.220/-

Table 2. Effect on carcass traits in grazing Nellore Brown ram lambs with or without supplementation.

Parameter	Group I	Group II	SEM
Pre slaughter wt. (kg)	20.68	28.32	1.02
Empty body wt.(kg)	15.61	23.22	0.96
Carcass wt. (kg)**	8.48	13.68	0.78
Dressing percentage (% SW)*	41.97	48.37	0.98
Dressing percentage (%EBW)	54.32	58.92	0.72

Each value is the average of three observations.

Values bearing different superscripts in a row differ significantly, **P<0.01; *P, 0.05.

Table 4. Effect on percent yield and ratio of bone and meat in various cuts and whole carcass in grazing Nellore brown ram lambs with or without supplementation.

Parameter	Group I	Group II	SEM
Breast and Shank			
Meat	54.01	55.33	0.87
Bone	36.32	37.23	1.21
Fat	9.67	7.44	0.98
B-M ratio	1.49	1.50	0.09
Neck and shoulder			
Meat	53.92	50.52	1.85
Bone	37.47	37.83	1.45
Fat	8.61	11.65	1.05
B-M ratio	1.44	1.35	0.12
Rack			
Meat	50.98	49.03	1.35
Bone	38.47	41.30	1.22
Fat	10.55	9.67	1.30
B-M ratio	1.33	1.19	0.15
Loin			
Meat	54.46	53.42	1.35
Bone	31.98	33.49	1.21
Fat	13.56	13.09	1.98
B-M ratio	1.70	1.59	0.10
Leg			
Meat	67.75	70.98	1.01
Bone	29.31	24.70	0.96
Fat	2.94	4.32	0.79
B-M ratio	2.33	2.89	0.15
Whole carcass			
Meat	53.61	58.12	3.12
Bone	36.01	33.60	1.87
Fat	9.38	8.28	1.32
B-M ratio	1.52	1.73	0.21

Each value is the average of three observations

Table 5. Effect on yield of visceral organs (% pre slaughter weight) in grazing Nellore Brown ram lambs with or without supplementation.

Organ	Group I	Group II	SEM
Pluck	3.17 ± 0.08	3.57± 0.07	0.10
Liver	1.47±0.04	1.56±0.04	0.03
Kidney	0.32	0.27±0.01	0.01
Heart	0.52±0.02	0.46±0.01	0.02
Testes	0.40±0.01	0.56±0.02	0.04
GIT (full)	32.59±0.63	26.80 ±1.14	1.42
GIT (empty)	7.40 ±0.10	7.14±0.17	0.11
Spleen	0.32±0.02	0.35±0.01	0.01
Lungs with trachea	1.32±0.03	1.64±0.10	0.08
Leaf fat	0.75±0.03	0.59±0.02	0.04
Skin	10.94±0.21	11.14±0.15	0.12
Blood	2.78±0.05	3.12 ±0.08	0.09
Head	6.56±0.10	6.24±0.06	0.09
Skin kg	2.62±0.09	3.04±0.04	0.10

Head kg	1.29 \pm 0.03	1.67 \pm 0.05	0.09
Blood kg	0.57 \pm 0.04	0.82 \pm 0.02	0.08

Each value is the average of three observations.

Table 6. Effect on *Longissimusdorsi* muscle composition in grazing Nellore Brown ram lambs with or without supplementation.

Nutrient %	Group I	Group II	SEM
Dry matter	74.14	75.05	0.73
Protein	18.05	18.25	0.67
Fat	2.08	2.17	0.08
Ash	4.48	4.51	0.12

Each value is the average of three observations