



## Effect of nutrient supplementation on growth performance and carcass characteristics of Nellore ram lambs – An on-farm evaluation study

P S GIRISH<sup>1</sup>, BASWA P REDDY<sup>2</sup>, C RAMAKRISHNA<sup>3</sup>, Y RAMANA REDDY<sup>4</sup>,  
SATISH CHAVA<sup>5</sup> and N KONDAIAH<sup>6</sup>

National Research Centre on Meat, Chengicherla, Hyderabad, Andhra Pradesh 500 092 India

Received: 10 October 2011; Accepted: 31 May 2012

**Key words:** Carcass characteristics, Nellore breed, Ram lambs, Semi-intensive system

Sheep (*Ovis aries*) meat is desirable for its juiciness, tenderness and flavor (Schonfeldt *et al.* 1993). India produced 0.25 million tonne of mutton by slaughtering 19.98 million sheep with average carcass yield of 12 kg/animal in 2009. This average yield is relatively low compared to world average of 15.6 kg. Major reason for this low yield is poor genetic makeup and the lack of awareness among traditional shepherds on balanced feeding to obtain optimal growth rates. Majority of farmers in India practice extensive method of rearing without any nutritional supplementation. Singh *et al.* (2004) also observed that major reason for low productivity of Indian sheep is inadequate grazing and poor feeding resources leading to low nutritional status. The main objective of the present study was to compare the relative growth data of Nellore (*jodipi*) ram lambs obtained from 2 different feeding systems and as a consequence, impact on carcass characteristics and meat yield.

The study involved 447 weaner ram lambs of about 4 months age belonging to 30 farmers from 11 villages of Nellore breeding tract in Andhra Pradesh. Ram lambs (30) were fed on traditional method of exclusive grazing for 8 h (control) and 417 lambs were kept on natural grazing along with compounded feed supplementation (treated) comprising of 40% maize, 32% rice bran, 25% de-oiled groundnut cake, 2% mineral mixture, 1% salt and 200g/tonne of Vitablend (vitamin mixture). The lambs were group fed based on fortnightly body weight changes. They were supplemented @ 100 g/lamb daily up to attaining 13 kg, 200 g per lamb up to 17 kg, 300g up to 21 kg, 400g up to 25 kg and 500g up to

25 kg and above for duration of 90 days. Quantity of daily nutrient supplement fed per lamb was calculated to meet the nutrient requirements as per the recommendations of ICAR (Ranjhan 1998). The chemical composition of the concentrate feed was protein (13.59%), fat (1.56%), moisture (6.67%), ash (1.68%), crude fibre (12.66%), neutral detergent fibre (41.90%), acid detergent fibre (19.16%), hemicelluloses (22.74%), lignin (5.325) and cellulose (10.92%). Carcass evaluation studies were performed on 20 ram lambs randomly selected from the lots, 10 from each group at the end of 90 day feeding at the experimental abattoir of National Research Centre on Meat, Hyderabad. Crude protein, fat and ash contents in the meat samples were determined as per AOAC (1990).

Average initial live weights of lambs in control and treated groups were 13.60±0.58 and 13.38±0.07 kg, respectively. Average daily gain (ADG) of lambs on supplementary feeding (108g) was significantly higher than those of control group (94g). ADG observed in the present study for both the groups was higher than those reported by Paul *et al.* (2003) in Nellore lambs reared under intensive management system fed with complete diet. This indicates that lambs grazing on a different fodder species have an advantage of getting balanced nutrition and better growth.

Lambs under treated group had significantly higher mean dressing percentage with 51.07±0.44% based on pre-slaughter weights (live weight), when compared to lambs in control group with 47.55±0.78% of dressing. The results are in accordance with higher dressing percentages obtained by Karim *et al.* (2007) in Kheri lambs which recorded 44.9% (on live weight) dressing percentage when reared on grazing and 48.8% (on live weight) when fed with *ad lib.* concentrate combined with grazing. The results are similar when individual organ weights were calculated as percentage of slaughter weight. Significantly (Pd<sup>0.01</sup>) heavier skin (2%) was obtained from lambs under treated group than those in control group which can also be attributed to better body conformation of lambs in treated group. Present results revealed that significantly (Pd<sup>0.01</sup>) higher yield in edible

Present address: <sup>1,2</sup>Scientist (Senior Scale), <sup>3</sup>Senior Scientist, National Research Centre on Meat, Chengicherla, Hyderabad, Andhra Pradesh 500 092 India (girishlpt@gmail.com, baswareddy@gmail.com, drcramakrishna@gmail.com). <sup>4</sup>Visiting Scientist, International Crop Research Institute for Semiarid Tropics (ICRISAT), Patancheru, Hyderabad, India (ramanayr19@yahoo.co.in). <sup>5</sup>Assistant Manager, Reddy's Lab, Ameerpet, Hyderabad, India (satish.chava@yahoo.co.in). <sup>6</sup>Principal Scientist, Project Directorate on Poultry, Rajendranagar, Hyderabad 500 030 India (k\_napa50@yahoo.com).

Table 1. Effect of concentrate supplementation on carcass characteristics as percentage of live weight (mean  $\pm$  SE) \*

Carcass characteristics	Control	Treated
Dressing percentage	47.55 $\pm$ 0.78 <sup>A</sup>	51.07 $\pm$ 0.45 <sup>B</sup>
Slaughter trimmings	0.66 $\pm$ 0.16	0.61 $\pm$ 0.07
Head and shank (includes 2 feet and 2 shanks)	9.17 $\pm$ 0.18 <sup>A</sup>	9.90 $\pm$ 0.18 <sup>B</sup>
Blood	2.87 $\pm$ 0.15	3.18 $\pm$ 0.13
Skin weight	10.10 $\pm$ 0.34 <sup>A</sup>	12.26 $\pm$ 0.37 <sup>B</sup>
Pluck	1.51 $\pm$ 0.05	1.52 $\pm$ 0.04
Gastro-intestinal tract	5.59 $\pm$ 0.46 <sup>a</sup>	7.01 $\pm$ 0.27 <sup>b</sup>
Liver	1.66 $\pm$ 0.05	1.64 $\pm$ 0.16
Spleen	0.47 $\pm$ 0.03	0.49 $\pm$ 0.02
Heart	0.53 $\pm$ 0.03 <sup>a</sup>	0.46 $\pm$ 0.01 <sup>b</sup>
Kidney	0.39 $\pm$ 0.01 <sup>A</sup>	0.30 $\pm$ 0.01 <sup>B</sup>
Testicles	0.58 $\pm$ 0.05	0.71 $\pm$ 0.06

\*Values with different superscripts in a row vary significantly; values with superscripts in capital letters have P value  $\leq$  0.01 (i.e. P $\leq$ 0.01) and values with superscripts in small letters have P value  $\leq$  0.05 (i.e. P $\leq$ 0.05).

by-products can be obtained from ram lambs reared under semi-intensive method by supplementing with good quality energy and protein sources in the form of concentrate mixture in addition to traditional grazing.

Lambs under treated group had higher mean weights in breast and shank, neck and shoulder, leg and loin and slightly lesser rack weight as compared to those under control group. Cut up parts when expressed as percentage of chilled carcass weights for breast and shank, neck and shoulder, leg, loin and rack, were 16.30 $\pm$ 0.48, 32.95 $\pm$ 0.72, 36.87 $\pm$ 0.72, 7.96 $\pm$ 0.26 and 5.65 $\pm$ 0.14%, respectively, for control group and 16.95 $\pm$ , 32.07 $\pm$ 1.18, 35.54 $\pm$ 0.8, 9.21 $\pm$ 0.45 and 4.71 $\pm$ 0.20%, respectively, for lambs under treated group. Lambs in treated group had significantly higher (P $\leq$ 0.01) mean loin percentage value (9.73%) than that of lambs in control group which recorded a mean loin percentage of 7.94%. Rack percentage was significantly high in lambs under control group than that of lambs under treated group. The mean percentages of neck and shoulder and leg were slightly lower in treated group but the difference in values was not significant. Likewise breast and shank had higher mean percent values as in lambs under treated group than those of control group, but were not significantly different.

Physico-chemical analysis of meat samples showed that the meat samples of lambs raised on extensive system had higher protein content and lesser fat content as compared to that of lambs reared on semi-intensive system. This observation is in conformity with the results of Karim *et al.* (2007) in Kheri breed of lambs who recorded protein and fat contents of 84.06 and 10.89% in meat of lambs reared under extensive and 78.01 and 17.01% in lambs reared under semi-intensive system of rearing on dry matter (DM) basis. Singh *et al.* (2004) reported positive correlation between carcass

fat content and quantity of concentrate offered to lambs as the nutrients available over and above the requirement for growth will get diverted towards fat deposition.

## SUMMARY

A field study was conducted in the Nellore sheep breeding tract on growth parameters of 447 Nellore (*jodipi*) ram lambs, out of which 30 lambs were fed on traditional grazing (control) and 417 lambs on natural grazing along with nutrient supplementation (treated) i.e. feeding of balanced concentrate feed. Average initial body weight of the lambs under control group and treated group were 13.60  $\pm$  0.58 kg and 13.38  $\pm$  0.07 kg, respectively. After 90 days of rearing, lambs under treated group showed better growth rates with significantly (P < 0.01) heavier final average body weight (23.11 $\pm$ 0.19 g) as compared to those of control group (22.05 $\pm$ 0.11 kg). Growth studies revealed that ram lambs fed on natural grazing along with nutrient supplementation (treated) showed significantly higher average daily gain. Carcass studies also revealed that dressing percentage, cut up parts yield and by-products yield were also better in lambs under treated group compared to those of control group due to better nutritional status in supplemented lambs. This study was part of field demonstration trials to farmers on benefits of growing ram lambs to optimum weight and nutritional intervention for getting higher growth rate.

## ACKNOWLEDGEMENTS

The authors thank the World Bank authorities and the Indian Council of Agricultural Research, New Delhi for funding the research project under National Agricultural Innovation Project, 'Value chain for clean meat production from sheep' operated at NRC on Meat, Hyderabad. Authors also thank Dr N. Krishna, Chairman, Consortia Advisory Committee for guidance in undertaking field trials.

## REFERENCES

- AOAC. 1990. *Official Methods of Analysis*. Washington DC: Association of Official Analytical Chemists.
- Karim S A, Porwal K, Kumar S and Singh V K. 2007. Carcass traits of Kheri lambs maintained on different systems of feeding management. *Meat Science* **76**: 395–401.
- Paul S S, Mandal A B, Kannan A and Pathak N N. 2003. Deriving nutrient requirements of growing Indian sheep under tropical condition using performance and intake data emanated from feeding trials conducted in different research institutes. *Small Ruminant Research* **50**: 97–107.
- Ranjhan S K. 1998. *Nutrient Requirements of Livestock and Poultry*. Indian Council of Agricultural Research, New Delhi.
- Singh N P, Sankhyan S K and Prasad V S S. 2004. Effect of supplementary concentrate on growth and carcass characteristics in crossbred sheep of dual purpose. *Indian Journal of Animal Sciences* **74**: 878–81.
- Schonfeldt H C, Naude R T, Bok W, Van Heerden S M, Sowden L and Boshoff E. 1993. Cooking and juiciness related quality characteristics of goat and sheep meat. *Meat Science* **34**: 381–94.