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Comparative Study on Performance of Kenguri Sheep under Intensive and Extensive Rearing System

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Abstract: A field study was undertaken to compare the grazing system and stall feeding system in Kenguri rams in Raichur district, Karnataka state. The district Raichur lies in arid region of peninsular India and hence sustenance from agriculture in combination with animal husbandry is a practical solution to the farmers of this region. In this study, 20 Kenguri rams were divided into two groups; stall feeding group and grazing group each containing 10 kenguri rams. The experiment was carried out for 150 days, overall weight gain was significantly higher in the kenguri rams of stall fed group ($18.35 \text{ kgs} \pm 0.16$) compared to kenguri rams of grazing group ($7.90 \text{ kgs} \pm 0.08$). Blood parameters (average Hb (g/dl), PCV (%) and RBC ($10^6/\text{cmm}$) count) were higher in the kenguri rams of stall feed group (9.16 ± 0.68 , 25.09 ± 0.43 and 10.75 ± 0.37 respectively) compared to the kenguri rams in grazing group (8.64 ± 0.52 , 22.97 ± 0.16 and 8.97 ± 0.42 respectively). Upon DLC analysis, different leukocytes were in the normal range in the stall fed group compared to the grazing group. Fecal examination on start of the experiment showed Strongyle eggs in the kenguri rams of both the groups. In the beginning of the experiment all sheep were dewormed using albendazole & niclozamide. At the end of the study, no Strongyle eggs were observed in the kenguri rams of both the groups. On economic analysis, after five months of experimental period for 10 kenguri rams the profit was calculated to be ₹ 56,500/- in stall fed group as compared to ₹ 40,800/- in grazing group. So, the difference in the profit was ₹ 15,700/- in stall fed groups as compared to grazing group. It can be concluded that, kenguri rams grow healthier, gain better body weight and are safer on health grounds and farmers gain more profit in stall feeding system of kenguri ram rearing compared to grazing system.

Keywords: Stall feeding system; Grazing system; Growth; Blood parameters; Economics and Kenguri sheep

I. INTRODUCTION

In India, small ruminants play an important role in the food and nutritional security of millions of rural people especially the landless, marginal and small farmers. The socio-economic value of small ruminant rearing for poor and marginalized farmers is immense compared to other livestock species. They provide a variety of products (meat, milk, skin, wool and manure) and thrive well in the semi-arid and arid regions with sparse vegetation and extreme climatic conditions. The rural poor people who cannot afford to maintain a cow or a buffalo find sheep keeping as the best alternative source of supplementary income. It has been realized that the potential opportunities to expand and benefit from integrating small ruminants into annual and perennial cropping systems remain largely unexplored [1]. The rearing practice is gradually transformed from trans humane and extensive production system to semi-intensive and intensive (stall feeding) type involving greater input to meet the deficit and to harness profit as well.

The small ruminant husbandry sector in India is not an organized sector like poultry, however, now a-days many young entrepreneurs are setting up sheep units using scientific rearing practices. Improving economic status, need for quality meat products, floating population of metropolis cities and changing family concept to go for animal protein are likely to increase the requirement of mutton in the future. The intensive feeding of small ruminants is a challenging job to the nutritionists and this sector is coming up very fast to meet the increasing demand of protein of animal origin in the Indian sub-continent. To increase the production potential of sheep/goats in terms of meat, milk, wool, skin, manure etc., it is necessary to incorporate proper feeding schedule under intensive or semi-intensive system of production to achieve optimum animal productivity and economic sustainability. The meat from small ruminants is highly preferred in major export destinations mainly on account of its leanness and organic nature of production [2] [3]. The export of small ruminant meat has grown faster than the population growth to the extent that the incremental export was over and above the incremental production which demands a dynamic population to meet the concurrent deficit. This is feasible only at commercial venture that adopts stall feeding of the targeted population for marketing by achieving the finished weight at the earliest with better feed conversion ratio. The sheep feeds on variety of fodder for that reason, sheep rearing is followed as an occupation by a large section of small holders and landless laborers in rural areas. Marginal or undulating lands unsuitable for other types of animals like cow or buffalo, sheep are the best alternative. Sheep provide a

dependable source of income to 40 percent of the rural population below the poverty line in India [4]. With very low investments sheep rearing can be made in to a profitable venture for small and marginal farmers. Sheep rearing by grazing method (extensive method) is commonly followed throughout the Karnataka state. But, due to non availability of grazing land, intensive method of sheep rearing has its own significance. According to CSWRI, Avikanagar, desired grazing area is 1.3 hectre /ACU, but availability is 0.77 hectre/ACU. So shepherds have to search for alternatives for sustained production in sheep rearing and stall feeding with minimal inputs is one such promising option [5]. In recent days intensive system of rearing in small ruminants is one of the option due to the scarcity of grazing land. In southern peninsular zone most sheep breeds are of meat type and they are reared mainly for mutton production [6]. Kenguri or Tenguri is a popular indigenous mutton breed of Koppal and Raichur districts of north eastern region of Karnataka state. The breed is named after its dark red colour (Kenguri) or the colour resembling coconut husk (Tenguri). They have medium sized droopy ears and short tail. Body size is higher than that reported for the other breeds of the state viz. Bellary, Hassan and Mandya [7]. Therefore the present study was undertaken to compare the grazing system and stall feeding system in kenguri ram lambs with the objectives to educate and provide technical inputs to farmers regarding intensive system of kenguri ram lambs rearing, to supply essential nutrients to kenguri ram lambs in intensive farming system thereby helping in attaining better growth of animals as compared to grazing system, to do economic analysis of the intensive farming system of kenguri ram lambs in comparison with grazing system and to appraise the farmers on prospects and economics of rearing animals under intensive method.

II. MATERIALS AND METHODS

A. Experimental design: The study was carried out in a commercial organized sheep farm with twenty weaned Kenguri ram lamb of uniform morphological characters and body weight for a period of 150 days. The twenty lambs were randomly allocated to two treatments (Group A and Group B) of ten each and were reared under different types of rearing systems from 4th month to 8th month of age. The lambs in Group B (extensive system) were considered as control group and were on grazing for 8 hours daily from 9.00 am to 5.00 pm. Group A stall feeding system (intensive system) group were fed commercial concentrated feed from four to eight months. The animals were provided concentrate feed based on age of the animal @ 50 g, 100g ,150g, 200g and 250g in 4th, 5th, 6th, 7th and 8th month respectively. The green grass like hybrid Napier, multicut sorghum and hedge lucerne were also provided ad libitum along with clean, potable drinking water in the stall.

The Group A farmer was educated about scientific method of raising kenguri ram lambs through intensive system by training and method demonstration. Then he was given 10 kenguri ram lambs. The Group B farmer was given 10 kenguri ram lambs which were maintained under extensive system as he was well versed with kenguri ram lambs rearing by grazing.

The kenguri ram lambs were administered with albendazole and niclosamide solution for deworming on the 1st day of the experiment. The body weight of all the kenguri ram lambs at 0 day (on the day of purchase-3 month old), 1 month, 2 month, 3 month, 4 month & 5 month of the experiment were recorded. The blood samples of all the kenguri ram lambs of the two groups were collected in EDTA vials on 0th, 60th, 120th and 150th day of the experiment and analyzed for hemoglobin concentration, packed cell volume (PCV), RBC count, WBC count and DLC [8]. The fecal samples of all the kenguri ram lambs of the two groups were collected 0th, 60th, 120th and 150th day of the experiment and analyzed for parasitic eggs and oocysts. The economic analysis was done after the 5 month experiment, Gross returns of the farmers were worked out and comparative analysis was done with stall feeding system and grazing method.

B. Statistical analysis: In the present study, mean as a measure of central tendency and the standard error as a measure of random error were employed for the statistical analysis [9]. The two sample test with *P* value of 0.05 was used to know the significant variation between the two groups.

III. RESULT

- 1) Body Weight:** The average body weights of kenguri ram lambs are illustrated in Table 1. The average weight of the kenguri ram lambs significantly increased from 13.65 ± 0.22 to 32.00 ± 0.38 with 18.35 ± 0.16 kg body weight gain at the end of 5 month experimental period in stall feeding group (Group A). While it increased from 13.64 ± 0.27 to 21.55 ± 0.19 kg with 7.90 ± 0.08 kg body weight gain in grazing group (Group B).
- 2) Blood Analysis:** The measure of various blood parameters is presented in the Table 2. The average Hb (g/dl), PCV (%) and RBC (10^6 /cmm) count were higher in the kenguri ram lambs of Stall feeding group (9.16 ± 0.68 , 25.09 ± 0.43 and 10.75 ± 0.37 respectively) compared to the kenguri ram lambs in grazing group (8.64 ± 0.52 , 22.97 ± 0.16 and 8.97 ± 0.42 respectively).
- 3) Fecal Examination:** Based on fecal examination on 0th day the Strongyle eggs were observed in the kenguri rams of both the groups. The kenguri ram lambs were administered with albendazole and niclosamide solution for deworming on the 1st day of the experiment. Later on, no Strongyle eggs were observed in the kenguri ram lambs of both the groups.

Table -1: Body weight gain in stall fed kenguri rams in comparison to grazing kenguri rams

Parameter	Stall fed system (Group A)				Grazing system (Group B)			
	0 th day	60 th day	120 th day	150 th day	0 th day	60 th day	120 th day	150 th day
Average body weight (Kg) (mean ± SE)	13.65 ±0.22	19.00 ±0.32	25.20 ±0.19	32.00 ±0.38	13.65 ±0.27	16.77 ±0.21	19.92 ±0.03	21.55 ±0.19
Overall average weight gain (Kg) (mean ± SE)	18.35 ± 0.16				7.90 ± 0.08			

Table – 2: Hematological examination install fed kenguri rams in comparison to grazing kenguri rams

Parameter	Stall fed system (Group A)					Grazing system (Group B)				
	0 th day	60 th day	120 th day	150 th day	Average	0 th day	60 th day	120 th day	150 th day	Average
Blood - Hb (g/dl) (mean±SE)	9.68 ±0.19	8.06 ±0.90	9.4 ±0.22	8.96 ±0.03	9.16 ±0.68	8.96 ±0.45	8.02 ±0.13	8.78 ±0.32	8.8 ±0.21	8.64 ±0.52
PCV (%) (mean±SE)	22.0 ±0.17	20.1 ±0.80	28.28± 0.19	30.0 ±0.67	25.09 ±0.43	20.8 ±0.38	19.34 ±0.71	26.0 ±0.26	25.76 ±0.62	22.97 ±0.16
RBC (10 ⁶ /μL) (mean±SE)	8.8 ±0.89	7.9 ±0.75	12.1 ±0.81	14.2 ±0.19	10.75 ±0.37	8.1 ±0.63	7.8 ±0.60	10.2 ±0.27	9.8 ±0.66	8.97 ±0.42
WBC (10 ³ /μL) (mean±SE)	12.46 ±0.11	16.14 ±0.35	16.22 ±0.09	16.82 ±0.38	15.41 ±0.22	12.82 ±0.78	16.76 ±0.91	16.28 ±0.15	16.08 ±0.49	15.48 ±0.54
DLC- Lymphocyte (%) (mean±SE)	73.4 ±0.21	82 ±0.47	68 ±0.72	56 ±0.69	69.85 ±0.34	83.2 ±0.18	80.4 ±0.33	80 ±0.57	57.8 ±0.63	75.35 ±0.38
Neutrophil (%) (mean±SE)	20.4 ±0.09	17.6 ±0.23	30.6 ±0.61	42.8 ±0.33	27.85 ±0.20	25 ±0.43	19.4 ±0.69	18.2 ±0.81	40.8 ±0.35	25.85 ±0.62
Eosinophil (%) (mean±SE)	1.0 ±0.23	0.8 ±0.18	1.4 ±0.46	1.2 ±0.71	0.96 ±0.80	0	0.2 ±0.09	1.8 ±0.31	1.4 ±0.44	0.85 ±0.16

4) *Economic Analysis:* The cost and benefit analysis is depicted in the Table 3. The dressing percentage of 50 % and ₹. 400/- per kg meat as the current market price of the kenguri ram lambs meat in Raichur district are taken for calculation propose. The gross returns of the farmers, after five months of experimental period for a unit of 10 kenguri ram lambs the net profit was ₹ 56,500/- in stall fed group (Group A) as compared to the grazing group (₹ 40,800 /-) (Group B). The comparative economics of both the groups was worked out by comparing the expenditure incurred on total amount of concentrate and fodder consumed by lambs in different rearing systems from income obtained after their selling. The average live weight obtained in Group A was significantly higher than Group B. The respective output price, net profit and cost- benefit ratio was higher in Group A compared to Group B. Thus the Kenguri lambs can be reared in intensive system with better income in semi-arid conditions of Karnataka.

Table -3: Economic analysis of Stall fed system over Grazing system

* Dressing % = 50%

Stall fed system (Group A)			Grazing system (Group B)			Difference in the profit between stall feeding and grazing system
Input cost	Income	Net Profit	Input cost	Income	Net Profit	
<p>₹ . 150/- per ram for 1 month.</p> <p>For 5 month ₹. 150 x 5 = ₹. 750/-</p> <p>For 10 rams 750 x 10 = 7500/-</p>	<p>Average weight at 8 months is 32 kg.</p> <p>Dressed meat weight* is 16 kg.</p> <p>For each ram income** is 16 x ₹. 400 = ₹ 6400 /-</p> <p>For 10 rams ₹ 6400 x 10 = ₹ 64,000 /-</p>	<p>64000-7500 =56,500/-</p>	<p>₹. 60/- per ram for 1 month.</p> <p>For 5 month ₹ 60x 5 = ₹. 300/-</p> <p>For 10 rams 300 x 10 = 3000/-</p>	<p>Average weight at 8 months is 21.55 kg.</p> <p>Dressed meat weight* is 10.77 kg.</p> <p>For each ram income** is 10.77 x ₹.400 = ₹ 4308 /-</p> <p>For 10 rams ₹ 4308 x 10= ₹ 43080 /-</p>	<p>₹. 43080 - 3000 = ₹. 40800 /-</p>	<p>₹. 56,500 – ₹. 40800 = ₹15,700</p>

** Market price for meat = ₹. 400/- per kg

IV. DISCUSSION

The average body weight gain of kenguri ram lambs under stall feeding system was observed to be significantly higher than that in grazing system. [10] also reported numerical increase in body weight of kenguri ram lambs under intensive system compared to semi-intensive system. The blood parameters; the average Hb (g/dl), PCV (%) and RBC (10^6 /cmm) count were higher in the kenguri ram lambs of Stall feeding group compared to the kenguri ram lambs in Grazing group which indicates healthy growth in Stall fed kenguri ram lambs. Based upon DLC analysis, different leukocytes were in the normal range in the stall fed group compared to the Grazing group. This indicates the safety in terms of nutrition and against adverse climatic conditions which supports better development of immune system, growth and body weight gain in stall feeding. Statistical analysis, clearly says that there is significantly higher profit in stall fed groups (₹ 15,700/-) as compared to grazing group for a unit of 10 kenguri ram lambs.

V. CONCLUSION

It can be concluded that in stall feeding system of kenguri ram lambs rearing, kenguri ram lambs grow healthier, gain better body weight, and are safer on health grounds. By adopting intensive farming system of kenguri ram lambs rearing progressive farmers have a large potential for gaining more economic benefit with positive net returns compared to grazing system in arid region. This is important because of shrinking resources for extensive grazing threat of adverse climatic conditions. The result obtained in this study can be adopted as a base for large scale commercial kenguri ram lambs ram lambs farming .



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