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Study on comparative growth performance of Nellore Jodipi sheep in RKVY and Non-RKVY flocks under field conditions

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Abstract

Nellore sheep, one of the most famous mutton purpose sheep breeds of south India is mostly found in Andhra Pradesh, Telangana and the adjoining states. The present investigation was undertaken to compare the growth performance of Nellore Jodipi sheep in RKVY and non-RKVY flocks under field conditions in farmer's flocks. The data on body weights (kg) of 1115 Nellore Jodipi sheep at milk teeth, 2, 4, 6 and 8-teeth of age collected from Yerpedu and Srikalahasti mandals of Chittoor district of Andhra Pradesh was utilized for the present study. Significant effect of flocks ($P \leq 0.05$) was observed for body weights at all ages except at 8-teeth. Sex had significant ($P \leq 0.01$) influence on body weight at all ages except at 4 teeth age. The animals in RKVY flocks were heavier than those of non-RKVY flocks at all age groups studied.

Keywords: Sheep, body weights, Nellore Jodipi, growth performance, RKVY, farmer's flock

Introduction

India's livestock sector is one of the largest in the world. Since time immemorial, livestock have been an inseparable part of India's agricultural and rural economies, providing energy for crop production in the form of draught power and organic manure and deriving their own energy needs from crop by-products and residues. Among the livestock, small ruminants play an important role in livelihood security of farmers and in the rural economy of India. Sheep contributes 8.94% of India's overall meat production with 8.60 million tonnes in 2019-20 and Andhra Pradesh is the second largest mutton producing state (BAHFS, 2020) ^[1]. Nellore sheep, a meat type breed on the basis of colour is distinguished into white (Palla), white with black spots (Jodipi or Jodimpu) and red-brown (Dora or Brown) strains. Of these, Jodipi strain is selected for the present study, as it is the most commonly found variety in the state.

Among various schemes implemented by Government of India till date, Rashtriya Krishi Vikas Yojana (RKVY) scheme was established as a framework for assuring the holistic development of agricultural and allied sectors. Sri Venkateswara Veterinary University of Andhra Pradesh, as one of the nodal agencies has implemented the RKVY project at Livestock Research Station (LRS), Palamaner from 2009 -2010, which has been supplying superior germplasm of Nellore Rams to the needy farmers with the aim of genetic improvement in farmer's flocks and in turn to bring out improvement in socio-economic status of rural poor. Hence, the present investigation is framed to determine the impact of the RKVY Programme on the performance of Nellore Jodipi Sheep in the farmer's flocks under field conditions.

Materials and Methods

The current study was conducted on Nellore Jodipi sheep in the Chittoor district of Andhra Pradesh, covering eight villages in the Yerpedu and Srikalahasti mandals to compare their growth performance in RKVY and Non-RKVY flocks. Farmers flocks with the improved Nellore Jodipi rams received from LRS, Palamaner are referred to as RKVY flocks, while those without are referred to as non-RKVY flocks.

The body weights to assess the growth of sheep were measured using a circular hanging spring weighing balance at various ages and recorded in kg at the farmer's doorstep. Since the details of an animal's birth date are not readily available under field conditions, the eruption of permanent incisor teeth was used as a criterion for the animal's age (Bray *et al.*, 1989) [2]. Thus, animals with two permanent incisors were considered as one year old, those with four permanent incisors were regarded two years old, six permanent incisors as three years old, and eight permanent incisors (full mouth) were considered as four years or older. The live weight of sheep was determined using a circular hanging balance. Sheep were weighed before being sent for grazing in the morning to reduce postprandial gut variation. Pregnant ewes were excluded.

The data on body weights was subjected to least squares analysis (Harvey, 1987) [3] to know the significant differences between flocks (RKVY and Non-RKVY) and sexes.

Statistical Model:

$$Y_{ijk} = \mu + F_i + S_j + e_{ijk}$$

Where,

Y_{ijk} = is the record of k^{th} observation of j^{th} sex and i^{th} flock.

μ = Overall mean.

F_i = Effect of i^{th} Flock ($i= 1$ for RKVY flock and 2 for non-RKVY flock)

S_j = Effect of j^{th} sex. ($j=1$ for Male and 2 for Female)

e_{ijk} = Random error associated with each observation and assumed to be normally and independently distributed with mean zero and variance ($0, \sigma^2_e$).

Results and Discussion

The overall least squares mean body weights at milk teeth, 2 teeth, 4 teeth, 6 teeth and 8 teeth ages were 3.30 ± 0.10 , 27.07 ± 0.23 , 29.00 ± 0.39 , 30.04 ± 0.44 and 52.23 ± 0.28 kg, respectively. The average body weights increased with the advancement of age in Nellore Jodipi sheep under study.

The effect of flocks *viz.*, RKVY and Non-RKVY and sex on body weights at milk teeth, 2 teeth, 4 teeth, 6 teeth and 8 teeth ages were analyzed and the results of least squares means are presented in the following Table 1.

Significant effect of flocks ($P \leq 0.05$) was observed for body weights at all ages except at 8- teeth and means varied from 3.55 ± 0.14 to 52.54 ± 0.44 kg in RKVY and 3.04 ± 0.12 to 51.93 ± 0.35 kg in non-RKVY flocks from milk to 8 teeth age, respectively.

Table 1: Least squares means of body weights (kg) at various ages in Nellore Jodipi sheep

	Milk teeth			2 teeth			4 teeth			6 teeth			8 teeth		
	n	Mean	S.E.	n	Mean	S.E.	n	Mean	S.E.	n	Mean	S.E.	n	Mean	S.E.
Overall	257	3.30	0.10	207	27.07	0.23	228	29.00	0.39	234	30.04	0.44	189	52.23	0.28
Flocks	*			**			**			**			NS		
RKVY	110	3.55 ^a	0.14	118	28.09 ^a	0.32	137	30.38 ^a	0.55	108	34.74 ^a	0.69	78	52.54 ^a	0.44
Non-RKVY	147	3.04 ^b	0.12	89	26.05 ^b	0.32	91	27.63 ^b	0.54	126	31.34 ^b	0.55	111	51.93 ^b	0.35
Sex	**			**			NS			**			**		
Male	100	3.67 ^a	0.15	56	28.68 ^a	0.38	59	29.75 ^a	0.66	57	34.79 ^a	0.77	49	53.67 ^a	0.48
Female	157	2.92 ^b	0.12	151	25.46 ^b	0.24	169	28.26 ^b	0.41	177	31.29 ^b	0.42	140	50.79 ^b	0.28

* Significant at $P \leq 0.05$, ** Significant at $P \leq 0.01$, NS – Non significant
n = number of animals

Means with different superscripts in each effect within the same age group differ significantly.

Males are significantly ($P \leq 0.01$) heavier than females by 0.75, 3.22, 1.49, 3.50 and 2.88 kg at milk teeth, 2, 4, 6 and 8 teeth of ages, respectively. The mean body weights in males were 3.67 ± 0.15 , 28.68 ± 0.38 , 29.75 ± 0.66 , 34.79 ± 0.77 and 53.67 ± 0.48 kg, respectively at milk, 2, 4, 6 and 8-teeth of age and the body weights in females were 2.92 ± 0.12 , 25.46 ± 0.24 , 28.26 ± 0.41 , 31.29 ± 0.42 and 50.79 ± 0.28 kg, at the corresponding ages. The sex had significant ($P \leq 0.01$) influence on body weight at all ages except at 4 teeth age.

Sheep in RKVY flocks are heavier than sheep in non-RKVY flocks, which could be attributed to the use of superior germplasm rams in RKVY flocks, differences in the availability of grazing materials to the flocks and managerial strategies used. The diversity in body weight among flocks could be attributable to differences in physical environmental cues, feeding forage availability in different grazing locations, and ram selection. This could also be attributed to minor changes in feeding and management regimes implemented after weaning, which could have resulted in improved body growth and weight at a later age.

The effect of sex on body weights was highly significant ($P \leq 0.01$) at all ages except at 4 teeth age. Males are heavier than females in all age groups studied and the difference of 0.75, 3.22, 1.49, 3.50 and 2.88 kg in body weights were recorded at milk teeth, 2, 4, 6 and 8 teeth of ages, respectively. This disparity in body weights between male and

female sheep could be attributed to physiological and hormonal variances between the sexes. Males have showed superior performance than females due to the anabolic influence of hormones and further oestrogen hormone has a limited effect on the growth of long bones in females (Hafeez, 1993; Rashidi *et al.*, 2008) [4, 5].

The overall means recorded for body weight in Nellore Jodipi sheep of present study were similar to the findings of Ekambaram *et al.* (2013) [6] in Nellore sheep, Halil *et al.* (2020) [7] in Karakul sheep, but are higher than the values recorded by Acharya (1982) [8], Reddy *et al.* (2009) [9], Rathod and Sreedhar (2010) [10], Rani (2012) [11], Rajanna *et al.* (2013) [12] in Nellore sheep.

The present findings were lower when compared to the values reported by Rao (2012) [13] in Nellore, Rani *et al.* (2014) [14] in Nellore Jodipi, Harini *et al.* (2019) [15] in Nellore Palla and Sundaramoorthy *et al.* (2021) [16] in Pattanam adu sheep breeds.

Conclusion

One of the most essential considerations a modern breeder must make in an animal breeding programme is selecting for maximum productivity. Greater growth and wool production are features that have direct economic implications for sheep farmers, as heavier lambs with faster growth yield higher economic returns. Furthermore, growth performance is an important production performance indicator since it affects

sheep reproductive efficiency which in turn influence the economic status of rural sheep farmers.

In the present study, animals in RKVY flocks were heavier than those in non-RKVY flocks. Introduction of superior germplasm (breeding rams) in the farmers flocks has proven to be an important factor in improvement of productive and reproductive traits of the RKVY flocks than the non RKVY flocks. Significant variation was observed between RKVY and non RKVY flocks for Body weights and biometrical measurements which could be attributed to utilization of superior germplasm (breeding rams) in RKVY flocks. Sexual dimorphism was evident, where males recorded significantly higher means than females at all the stages of growth and also the body weights and biometrical measurements linearly increased with age.

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Conflict of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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