INTERNATIONAL JOURNAL OF PLANT, ANIMAL AND ENVIRONMENTAL SCIENCES

IJPAES

Volume-5, Issue-1, Jan-Mar-2015 Coden: IJPAJX-USA, Copyrights@2015 ISSN-2231-4490

Received: 11th Oct-2014 Revised: 26th Oct-2014 Accepted: 03rd Nov-2014

Research article

PHYSIOLOGICAL RESPONSES TO INTENSIFICATION IN DECCANI SHEEP

Venkata Raju.N[1], P.K. Pankaj[2*], D.B.V. Ramana[3], Rita Rani[4], M. Nikhila[5] and D. Sudheer[6]

[1]M.Sc. (Biotechnology) Scholar, [2]Senior Scientist (LPM), [3]Principal Scientist (LPM), [4]Research Associate, [5]Senior Research Fellow, [6]Subject Matter Specialist (Vety. Sci.), Krishi Vigyan Kendra, CRIDA

Central Research Institute for Dryland Agriculture, Santoshnagar, Saidabad, Hyderabad-500 059 (Telangana)

*Corresponding author: Mob. +91-9949633987, dr.prabhatkumarpankaj@gmail.com

ABSTRACT: Present investigation has been carried out on eighteen growing lambs (Deccani breed) with an average body weight of 12 to 16 Kg at Livestock Farm, Hayathnagar Research Farm (17°27′N latitude and 78°35′E longitude and about 515 m above sea level), Central Research Institute for Dryland Agriculture (CRIDA) to study physiological response of sheep under various managemental conditions. The animals were divided randomly into three groups (three males and females in each) taking into consideration the group averages of body weights in all 3 groups were as uniform as possible as extensive (without stall supplements), semi-intensive (restricted concentrate offering in stall) and intensive (stall feeding). Animals under experiment were observed regularly for physiological parameters like body weight, respiratory rate per minute, body temperature, faecal egg count, etc. Animals kept under intensive system of rearing could achieve superior body weight as compared to extensive and semi-intensive system of rearing. The animals kept under intensive system of rearing were found to be less susceptible to parasitic infections. Also, there was increase in profitability by 6 per cent and 3.94 per cent in intensive and semi-intensive system of rearing, respectively over extensive system of rearing. Thus, it can be suggested that intensive system of rearing is better than other systems in terms of profitability as well as health status too.

Key Words: Growth, productivity, profitability, small ruminants, system of rearing, intensive, extensive, worm load

INTRODUCTION

Under neoliberal schemes like consumer demands born of concerns about food safety, the environment and animal welfare are theoretically poised to influence agricultural production systems [3,4]. The intensification of animal production is practiced in industrialized countries; however, sheep and goats continue to be raised in traditional, non-confinement systems [5,7]. Sheep keeping in India is different from that in developed countries. In developed countries, sheep farming is on a large scale within fenced area, whereas in India it is not so, due to the existing migratory flocks. On the other hand, there is a consistent decrease of grazing land, forest and pressure for grazing from unproductive cattle and excessive increase of population of wild ruminants in certain areas are all exerting negative pressure on the growth of sheep. This demand for reorganized flocks to semi-migratory or stationary flock requires some kind of housing for sheep. In India, there is scarce work on intensification and its physiological effect in sheep. Keeping in view of above points, the present investigation has been carried out to study the physiological response of Deccani sheep under intensified rearing system.

METHODOLOGY

Present study was undertaken on eighteen growing lambs (Deccani breed) with an average body weight of 12 to 16 Kg at Livestock Farm, Hayathnagar Research Farm (17°27′N latitude and 78°35′E longitude and about 515 m above sea level), Central Research Institute for Dryland Agriculture (CRIDA) to study physiological response of sheep under various managemental conditions. The animals were divided randomly into three groups (three males and females in each) taking into consideration the group averages of body weights in all 3 groups were as uniform as possible. The climate in the region is semi-arid with hot summers and mild winters (mean maximum air temperature during summer 35.6 to 38.6°C and in winter 13.5 to 16.8 °C with annual long-term rainfall 746.2 mm. Each group of animals was kept in a pen size of 10ft x 10ft on concrete floor with orientation of east-west direction through its long axis. Animals had free access to clean drinking water throughout the day.

Feeds offered as concentrate mixture, dry fodder and green fodder offered to sheep were tested for nutrient analysis. The leafy samples were initially air dried and then oven dried at 60 ± 5°C. They were analysed for organic matter (OM) and crude protein (CP) contents [2]. Neutral detergent fibre (NDF) [10] and acid detergent fibre (ADF) [2] were also estimated. Animals under experiment were observed regularly for physiological parameters like body weight, respiratory rate per minute, body temperature, etc. Faecal samples were collected to observe the faecal egg count as per method described by Maxwell [11].

Following management protocols was followed for different groups of animals:

System of rearing	Avg. B.Wt. (Kg)	Management	Concentrate	Roughage	Dry fodder
Extensive (C)	14.46 ±0.93	Animals were not offered anything in the shed and kept in pen only during night hours	No Concentrate offered	Full grazing (9AM to 12 PM & 2 PM to 5 PM)	1 Kg/day
Semi-intensive (T_1)	14.55 ±1.31	Restricted grazing followed by offering restricted concentrate in the pen	100 gms per day (Restricted)	Restricted grazing (9AM to 11.30AM)	1 Kg/day
Intensive (T_2)	14.37 ±0.96	No grazing, both conc. and roughages were offered in the pen only	150 gms per day (*ad lib*)	No grazing, roughage offered on DM Basis-200gms per sheep in the stall	1 Kg/day

Results were statistically evaluated using descriptive statistic. The data obtained was analysed using Students ‘t’ test as per Snedecor and Cochran [9].

RESULTS

The chemical compositions of feed offered to various groups of sheep during experiment are exhibited in table-1, whose values suggested that ground nut cake was superior protein source than cotton seed cake. Horse gram grain was found to be at par with the quality of cotton seed cake in terms of protein content. Among the concentrate ingredient, maximum lignin content was observed in cotton seed cake. Sorghum stover was found to be nutritionally superior to paddy straw both in terms of protein as well as lignin content. Among fodder varieties, Sorghum (multicut) was of superior quality than other fodders. The animals under study exhibited different body weight at weekly intervals of time which is shown in Fig-1. Animals kept under intensive system of rearing could achieve superior body weight as compared to extensive and semi-intensive system of rearing. All the physiological values under three different system of management was within physiological limits (Fig-2 and 3) and there was no significant difference between the groups. However, the animals kept under intensive system of rearing showed least fluctuations in the rectal temperature as compared to those kept under extensive and semi-intensive system of rearing. Nutrient-growth dynamics suggested maximum growth under intensive system of rearing as compared to semi-intensive and extensive system (Fig-4). The animals kept under intensive system of rearing were found to be less susceptible to parasitic infections as shown in Table-2 where egg per gram was least at the end of the experiment. There was an increase of profitability by 3.94% and 6% respectively in semi-intensive and intensive system of rearing as compared to extensive system (Table-3).

Table-1. Chemical composition of feed offered to sheep during study period

Feed	OM	EE	CP	NFE	NDF	ADF	Cellulose	Lignin
Concentrate ingredient								
Maize grain	97.5±0.22	3.11±0.07	7.88±0.13	81.1±0.09	17.6±0.11	6.18±0.13	6.12±0.08	2.62±0.07
Rice bran	88.0±0.31	13.1±0.27	13.2±0.21	47.1±0.15	39.8±0.44	19.8±0.41	11.3±0.22	4.38±0.08
GNC	93.8±0.26	9.28±0.18	42.1±0.31	38.8±0.19	26.8±0.13	22.3±0.16	14.6±0.08	5.86±0.05
CS cake	93.2±0.48	9.13±0.11	26.1±0.22	39.4±0.21	34.6±0.09	20.2±0.21	15.4±0.19	9.82±0.09
Red gram chuni	94.6±0.51	4.12±0.07	14.3±0.14	47.3±0.23	18.6±0.08	15.7±0.18	10.2±0.13	2.31±0.16
HG grain	94.4±0.26	2.12±0.08	24.1±0.09	61.6±0.09	22.3±0.05	12.6±0.07	10.8±0.07	7.36±0.06
Dry Fodder								
Paddy straw	87.1±0.41	1.48±0.11	2.98±0.05	45.6±0.61	72.4±0.50	51.1±0.71	33.6±0.46	6.11±0.09
Sorghum Stover	88.3±0.56	1.58±0.09	4.38±0.09	46.2±0.56	68.7±0.68	42.3±0.86	36.1±0.74	5.96±0.18
Green Fodder								
Para grass	89.0±0.58	2.45±0.13	4.96±0.21	50.8±0.41	60.3±0.36	39.1±0.61	35.8±0.51	4.62±0.11
Hybrid Napier	89.9±0.71	1.98±0.09	5.12±0.18	46.3±0.64	62.4±0.47	42.6±0.52	31.3±0.29	5.18±0.15
Sorghum (multi)	89.8±0.41	2.98±0.26	9.26±0.33	44.2±0.27	65.3±0.52	43.1±0.21	22.4±0.11	6.76±0.07

Table-2. Faecal egg count in different system of management

System	EPG-0 day	EPG-30 day	EPG-60 day
Extensive system	100.00	105.00	12.00
Semi-intensive system	95.00	88.00	6.00
Intensive system	23.00	27.00	2.00

* Deworming using Oral Fentas Plus @ 3 ml per animal on day 30.

Table-3. Economic analysis of rearing systems

S.No.	Particulars	System of rearing		
		Extensive (C)	Semi-intensive (T_1)	Intensive (T_2)
1	Initial B.Wt. (Kg)	14.46	14.55	14.37
2	Final B.Wt. (Kg)	15.02	15.46	15.68
3	Gain in weight (Kg) (1-2)	0.56	0.91	1.31
4	Cost of dry fodder (Rs.)	720	720	720
5	Cost of Concentrate (Rs.) @ Rs. 18 per Kg	0	648	972
6	Medicinal charges	300	150	50
7	Labour charges @ Rs. 200 per 8 hrs	1440	720	360
8	Total Expenses (Rs.) (4+5+6+7)	2460	2238	2102
9	Net expense per sheep (Rs.)	410	373	350
10	Income (Rs.) (Mutton @ Rs. 350 per Kg) per sheep	5257	5411	5488
11	Net Profit (Rs.) per sheep (9-8)	4847	5038	5138
12	% improvement in income over Control	-	3.94	6.00

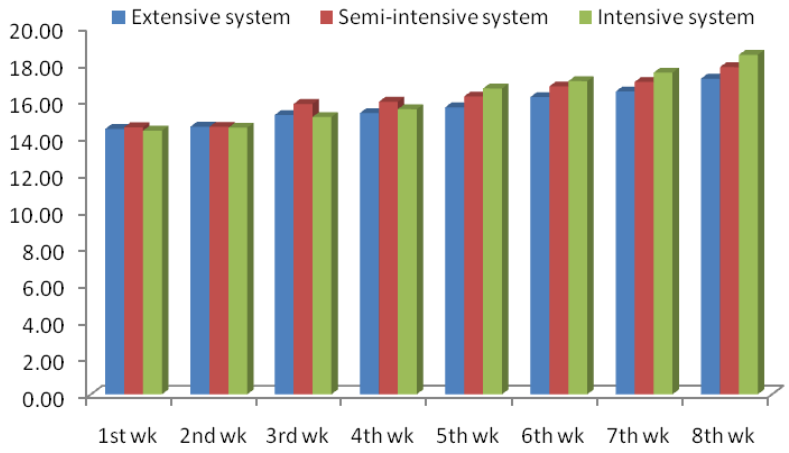

Fig-1. Changes in body weight at weekly intervals under different rearing systems

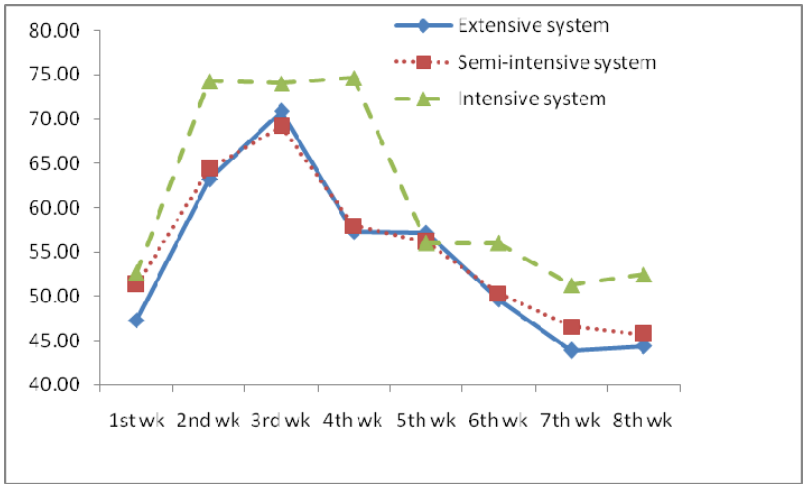

Fig-2. Respiratory rate at weekly intervals under different rearing systems

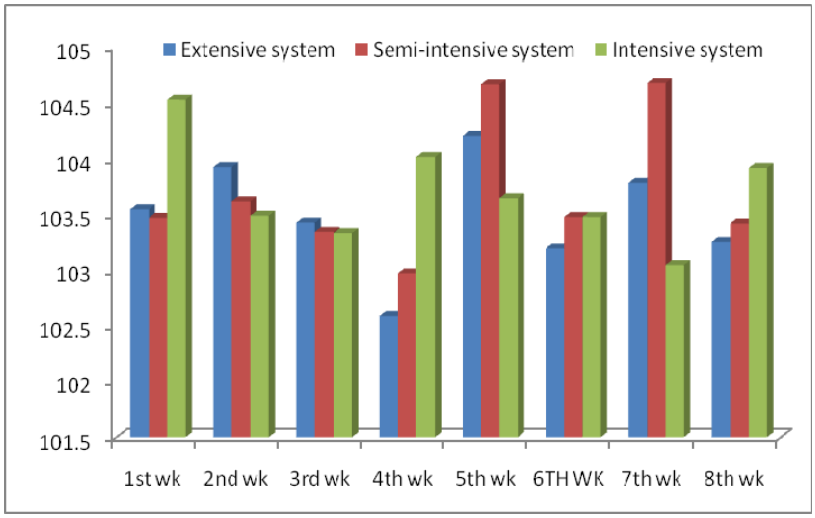

Fig-3. Changes in body temperature at weekly intervals under different rearing systems

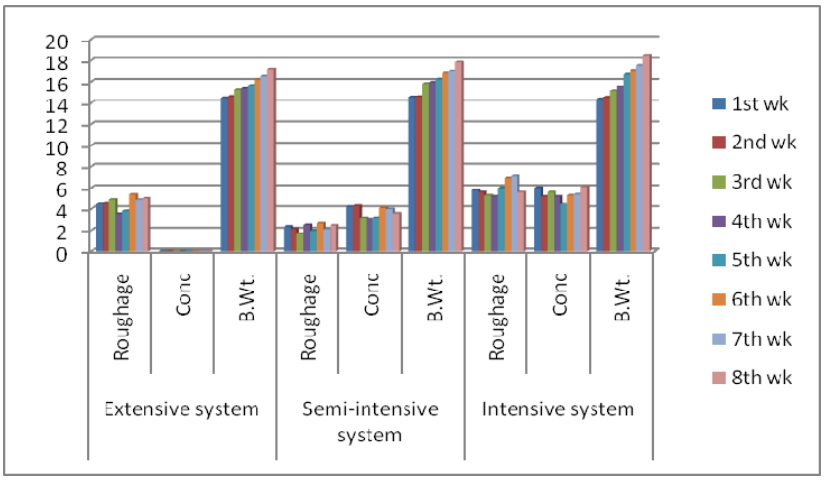

Fig-4. Nutrition-growth dynamics in sheep

DISCUSSION

The chemical compositions of feed offered to various groups of sheep during experiment are similar as reported by various researchers in Andhra Pradesh, India (Mishra *et* al. 2009; Vijay Bhasker *et al*. 2013). The differential rate of body weight attainment under different system of rearing may be attributed to superior management and nutrition conditions prevailing under intensive system of rearing. The respiratory rate is manifestation of adoption system which under different system of rearing. The values were the maximum in third week owing to heat waves prevailing at that point of time. Body temperature is the exhibition of homeostasis phenomenon as a reflex to *internal milieu*. The animals kept under intensive system of rearing showed least fluctuations in the rectal temperature as compared to those kept under extensive and semi-intensive system of rearing. This suggests better adaptability of the Deccani sheep to intensive system of rearing. Superior nutrient-growth dynamics (feed consumed/maximum growth rate) was exhibited under intensive system of rearing as compared to semi-intensive and extensive system which may be attributed to better management, superior health, more rest, etc. The susceptibility to various infections and infestations are indirect measure for declaring the animal relatively immune or susceptible. The animals kept under intensive system of rearing were found to be less susceptible to parasitic infections which may be attributed to the fact that animals under extensive system are exposed to the extreme weather conditions more and also they get more opportunity to receive eggs during grazing. So, in terms of bio-security measures of the farm, intensive system was found to be superior which was in similar lines as reported by Ridler (2008).

Increased of profitability in semi-intensive and intensive system of rearing as compared to extensive system may be attributed to more expenses over labour charges and medicinal charges, however, cost of feeding was reduced.

CONCLUSION

In Deccani sheep, superior nutrient-growth dynamics, superior overall growth rate, increased resistance to parasitic diseases and improved profitability suggests intensive system of rearing to be better as compared to semi-intensive and extensive system.

RECOMMENDATIONS

The study was undertaken in semi-arid dryland agricultural system where frequent droughts and dependency on community pasture by small ruminants is more. Under this system, improved profitability with cut and carry system of fodder with less disease burden found under intensive system of sheep rearing can be recommended for farmers. This factor becomes more important in the era where common property resources (CPR) on whom most of our rural livestock production system is depending, is constantly depleting with urbanization, globalization and industrialization.

ACKNOWLEDGEMENT

The authors acknowledges the help rendered by Farm Superintendent, HRF and then Director, Dr. B. Venkateshwarlu for supporting this work to carry out with ease.

REFERENCES

[1] Vijay Bhasker T, Nagalakshmi D, Srinivasa Rao D, Raghunandan T 2013. Nutrient utilization in sheep fed sorghum stover-based diets supplemented with cellulase and xylanase. Ind J Small Ruminants, 19(1): 45-49.

[2] AOAC 1997. Official Methods of Analysis, 16th edn. Association of Official Analytical Chemistry, Maryland, USA.

[3] Campbell H, Le Heron, R 2007. Supermarkets, producers and audit technologies: the constitutive micro-politics of food, legitimacy and governance. In Lawrence, G. and Burch, D. (eds.) Supermarkets and Agri-food Supply Chains: Transformations in the Production and Consumption of Foods. Edward Elgars, London, pp.131-153.

[4] Haggerty J, Campbell H, Morris C 2009. Keeping the stress off the sheep? Agricultural intensification, neoliberalism, and 'good' farming in New Zealand. Geoforum, 40(5): 767–777.

[5] Fraser MC, Bergeron JA, Mays A, Aiello SE 1991. The Merk Veterinary Manual. 7th ed., Merk and Co. Inc., Rahway, N.J., U.S.A.

[6] Misra AK, Chauhan V, Yadav SK, Maruthi Sankar GR 2009. Nutritive value of commonly used feed resources in telangana region of Andhra Pradesh. Indian J. Anim. Nutr, 26(1): 23-28.

[7] Orskov ER 1982. Protein nutrition in ruminants. Academic Press Inc., London. Pp-155.

[8] Ridler A 2008. Disease threats to sheep associated with intensification of pastoral farming. N Z Vet J, 56(6): 270-273.

[9] Snedecor GW, Cochran WG 1994. Statistical methods. Iowa State University Press, Ames.

[10] Van Soest PJ, Robertson JB, Lewis BA 1991. Methods for dietary fibre, neutral detergent fiber and non-starch polysaccharides in relation to animal nutrition. J Dairy Sci, 74: 3583-3597.

[11] Maxwell D 2008. Internal Parasite Control in Sheep - Reference Manual, Western Institute of TAFE sheep, CRC Australian wool Innovation, Queensland Australia. Pp- 32.