Original Research Article

Comparative evaluation of the Abnormal behaviour (Stereotypy), Panting, Lamb mortality and Fleece cleanliness both in intensive and extensive Rearing systems under Welfare of Kenguri sheep

ABSTRACT

Aim: The important welfare issues of Kenguri sheep faced during first level group welfare assessment were executed during the study.

Study design: Total of 20 each intensive and extensive Kenguri sheep farms were sited in Yadgir (*i.e.,* Northern Eastern dry agro-climatic zone) district of Karnataka state, India.
Place and Duration of Study: Krishi Vigyan Kendra, Kawadimatti, Yadgir, UAS, Raichur. Here each selected herd raised up in both intensive and extensive rearing systems was assessed for 20 minutes, during the months of January and February of the year 2022.
Methodology: The group level welfare indicators such as abnormal behaviour (stereotypy), panting, lamb mortality and fleece cleanliness were evaluated as per Animal Welfare Indicators. The overall first group level welfare assessment was significant in between the intensive and extensive rearing systems.

Results: The comparative welfare study among total of 40 sheep farms revealed that, the stereotypy observed was 4.88 and 1.24%, panting was 1.71 and 3.66%, mild heat stress was 2.18 and 6.49%, lamb mortality was 30.06 and 26.47% in lambs born alive and 0.89 and 2.03%, in lambs born dead. Losses upto weaning was 3.40 and 4.45% and minimum ewes mated was 45.73 and 42.48%. Minimum lambs reared was 30.48 and 26.52%; Fleece cleanliness was very wet that is 2.19 and 3.47%, and filthiness is 0.14 and 1.11% of animals in both intensive and extensive rearing systems, respectively.
Conclusion: This study boosts the quality of animal products under the frame work of welfare status in farming community.

Keywords: Abnormal behaviour, animal Welfare Indicators, panting, fleece cleanliness, lamb mortality.

1. INTRODUCTION

Animal welfare has recently gained importance, not only in developed nations but also in developing nations like India, where land and labour are easily available to produce agricultural products affordably. Along with improved health and production, better animal welfare practices have also increased the trading market opportunities. India ranked third in

the sheep population in the world, with 74.26 million sheep as per the 2019 livestock census. The total percentage of sheep has increased during 2019 census compared to last livestock census 2012 by 14.13% (BAHS, 2023). In southern India in the state of Karnataka, the total population of Kenguri sheep is 6.7 lakhs, according to recent report (Gowane*et al*., 2020). The nutritional value of mutton has increased due to globalization and it is now necessary to improve the sheep's mutton quality in order to meet the growing demand (Kulkarni *et al*., 2008). Since consumers desire high quality livestock products obtained from good welfare accustomed production systems and they are willing to pay fairly for those products. Therefore, evaluating the welfare of animals is a key area for improving economic productivity.

According to science, animal welfare refers to an animal's capacity to adapt to its physiochemical and social environment, as well as the animal's subjective well-being (Scott *et al*., 2001). Prior to the development of management-based indicators by Mullan *et al*. (2009), on-farm welfare assessments primarily focused on evaluating farm resources (such as housing and feed), also known as resource-based indicators, or those that evaluated farmer policies and management techniques, also known as policy-based indicators (Capdeville and Veissier, 2001; FAWC, 2009). A "natural life" for sheep is possible with the help of large-scale sheep farming practices. Sheep have a great deal of independence and control over their behaviors, including grazing, exploring, ruminating, social contact and a maternal instinct (Dwyer, 2009). These characteristics of extensive systems are related to those found in the "five freedoms" - freedom to express typical behaviors - which is one of the three conceptual frameworks used to evaluate animal health (Fraser, 2003).

2. MATERIAL AND METHODS

2.1. Sheep Farm Visits:

Twenty each both intensive and extensive Kenguri sheep farms, having sample size ranging from 25 to 1486 were selected based on their availability in Yadgir district of Karnataka, the average annual rainfall ranges from 640 to 810 mm (Hallad*et al*., 2023). In order to prevent heat stress on the animals, all the sheep were examined at cooler times of the day (either in the morning or in the evening) when the farms were visited. This information was communicated to the sheep farmers via phone prior to the visits. All the data was gathered and entered into the annexure forms according to the Animal Welfare Indicators (AWIN) welfare evaluation of sheep (Dwyer *et al.,* 2015).

2.2. Assessment protocol:

Each herd was observed individually by live visit of assessor to the farms and spared about 20 minutes to evaluate each of the four first level group welfare indicators- abnormal behaviour (stereotypy), panting, lamb mortality and fleece cleanliness as defined by Dwyer *et al*. (2015). The detailed assessment criteria are presented in the Table 1 below.

Table 1: Assessment of first level group welfare indicators of sheep

Welfare indicators	Assessment criteria
a) Abnormal behaviour (stereotypy)	The flock is watched uninterruptedly for 20 minutes. Counted the number of animals that exhibit stereotypical behavior, such as repetitive pacing or circling while taking the same path back and forth or around the pen, repeatedly cocking the head back over the shoulders and gazing upward, or repeatedly pulling, biting, or plucking

	the wool from another ewe's back. Record the total number of animals showing stereotypy in the observed sub-group.
b) Panting	Scored on a 3-point scale- 1) Normal respiration- The pace of breathing is normal (around 20 breaths per minute), and it takes place with the closed mouth. 2) Mild heat stress- The rate of respiration is greater than 30 breaths per minute but lower than 40, and breathing is done with the mouth closed. Panting is not tallied for this condition. 3) Panting- The pace of breathing is greater than 40 breaths per minute and it happens while the mouth is open.
c) Lamb mortality	1) Lambing records available- Record: a) number of lambs born alive, b) number of lambs born dead, and c) losses due to weaning. 2) Minimal records available- Keep track of the following information: a) the number of ewes that mated with a breeding ram during the recent breeding season; b) the number of lambs raised (including all lambs produced: those sold for finishing, sold as store lambs, sold for breeding and maintained on the farm).
d) Fleece cleanliness	Scored on a 5-point scale- 1) Score 0- Clean and dry. Fleece shows no sign of dirt or contamination. 2) Score 1- Due to the weather at the moment, dry or just a little damp. A little dirt or filth on the body was caused by handling the animals that day or by their pens. 3) Score 2- Very damp or wet. Coat contaminated by mud or dung from field or hill. 4) Score 3- Very wet. Very heavily soiled with mud or dung. 5) Score 4- Animal is filthy, extremely wet, and covered with mud or faeces, which may be on the belly, flanks, legs, back, and face.

(Dwyer *et al*., 2015)

2.3. Statistical analysis:

The results were derived from the statistical tests and tools such as Mean (average), standard deviation, Chi-square test (P-value) by using IBM SPSS version 16.0 software.

3. RESULTS AND DISCUSSION

3.1. Abnormal Behaviour:

The mean percentage occurrence of stereotypic behaviour was more in intensive rearing system (4.88 ± 0.69) compared to extensive rearing system (1.24 ± 0.21), as the oral (licking, chewing) and locomotor (butting, weaving, wool biting) behaviours are commonly noticed in intensive system (Table 2). These findings are aligned with the results of Lauber *et al*. (2012).

3.2. Panting:

The occurrence of mild heat stress behaviour was more in extensive system (6.49 ± 0.77 %) of rearing when compared to intensive system of rearing (2.18 ± 0.55 %). Similarly, the incident of panting was more in extensive rearing system (3.66 ± 0.53 %) than in intensive rearing system (1.71 ± 0.30 %) (Table 2). The testimony on reliability of panting as a heat stress indicator, but the incidence of panting was too low for analysis. Panting can also occur in sheep under psychological stress, when stress-induced hyperthermia can arise, therefore this measure is only specific for heat stress when tested in undisturbed animals, but it can be an indicator of distress in other situations. The similar findings were reported by Pedernera-Romano *et al*. (2011) and Phythian *et al*. (2012).

3.3. Lamb Mortality:

The overall lamb survival rate was better in intensive rearing system as percentages of lambs born alive (30.06 ± 1.63), minimum ewes mated (45.73 ± 4.14) and lambs reared (30.48 ± 1.58) were more in intensive rearing system. In contrary lambs born dead (2.03 ± 0.54) and losses due to weaning (4.45 ± 0.09) percentages were more in extensive system of rearing (Table 2). Accurate farm record keeping is required to assess lamb mortality. Many farms fail to keep track of lamb mortality. However, even rudimentary farm records can be used to estimate lamb productivity and they do not distinguish between different causes of mortality, these outcomes are in line with the reports of Stott *et al.* (2012).

3.4. Fleece Cleanliness:

The sheep showed more dirtiness, might be due to frequent accessibility to pond water for drinking purposes, leading to more wetness (3.47 ± 0.48 and 2.19 ± 0.35 %) and filthiness(1.11 ± 0.25 and 0.14 ± 0.08 %) reared under extensive and intensive rearing systems, respectively (Table 2). Evaluating the cleanliness of housed sheep's coats and the hygiene of their lying areas, but did not report on the relationships between the two, these results are in agreement with outcomes of Stubsjøen*et al*. (2011).

S No	Particulars	Intensive (n=20)	Extensive (n=20)	(P-value)
	Abnormal behaviour			
1	Stereotypy (% of animals)	4.88±0.69[a]	1.24 ± 0.21[b]	0.005
	Panting			

1	Mild heat stress (% of animals)	2.18 ± 0.55[a]	6.49±0.77[b]	0.007
2	Panting (% of animals)	1.71±0.30[a]	3.66±0.53[b]	0.006
	Lamb mortality			
1	Lambs born alive (% of animals)	30.06±1.63[a]	26.47±2.27[b]	0.025
2	Lambs born dead (% of animals)	0.89±0.15[a]	2.03±0.54[b]	0.045
3	Losses to weaning (% of animals)	3.40±0.18[a]	4.45±0.09[b]	0.034
4	Minimum ewes mated (% of animals)	45.73±4.14[a]	42.48±4.68[b]	0.026
5	Minimum lambs reared (% of animals)	30.48±1.58[a]	26.52±2.27[b]	0.015
	Fleece cleanliness			
1	Very wet (% of animals)	2.19±0.35[a]	3.47±0.48[b]	0.011
2	Filthy (% of animals)	0.14±0.08[a]	1.11±0.25[b]	0.000

Table 2: First level group welfare indicators assessment of Kenguri sheep both in intensive and extensiverearing systems

Mean values with different superscripts (a, b) within the row differ significantly (P< 0.05)

4. CONCLUSION

By comparing the results of the current study with the intensive farming, we may draw the conclusion that the general welfare of sheep raised in extensive farming needs to be enhanced. Poor management practices result in a higher prevalence of welfare issues and these issues are more common in sheep farms that are extensively managed. In addition to disease outbreaks, sheep loss can occasionally be attributed to predation in ranges next to forest areas, where they are extensively grazed. Good management practices can overcome the overall welfare risks identified during the study.

REFERENCES

1. Basic Animal Husbandry Statistics, Annual Report. Animal Husbandry Statistics. Government of India, Ministry of Fisheries Animal Husbandry and Dairying, Department of Animal Husbandry and Dairying, Krishi Bhawan, New Delhi, 2023. https://dahd.nic.in/schemes/programmes/animal-husbandry-statistics
2. Capdeville J, Veissier I. A Method of Accessing Welfare in Loose House Dairy Cow at Farm Level, Focusing on Animal Observations. Acta Agriculturae Scandinavica-Section A- Animal Science. 2001; 51:62-68.
3. Dwyer CM. Welfare of sheep: Providing for welfare in an extensive environment. Small Ruminant Research. 2009; 86:14-21. https://doi.org/10.1016/j.smallrumres.2009.09.010

4. Dwyer CM, Ruiz R, Beltran De Heredia I, Canali E, Barbieri S, Zanella A. AWIN (Animal Welfare Indicators) Welfare assessment protocol for sheep. 2015. https://www.researchgate.net/publication/275887069_AWIN_Welfare_Assessment_Protocol_for_Sheep
5. Farm Animal Welfare Council (FAWC). Farm Animal Welfare in Great Britain: Past, Present and Future. 2009;44-47. Available: https://www.wellbeingintlstudiesrepository.org/cgi/viewcontent.cgi?article=1020&context=aw_welfare_gen
6. Fraser D. Assessing Animal Welfare at the Farm and Group Level: The Interplay of Science and Values. Animal Welfare. 2003; 12:433-443. Available: https://animalstudies repository.org/assawel/2
7. Gowane GR, Akram N, Misra SS, Chopra A, Sharma RC, Kumar A. The breeding structure for the small ruminant resources in India. Tropical Animal Health and Production. 2020;52(4):1717-1724.
8. Hallad SC, Reddy GV, Kumbar D. Studies on Variability of Rainfall over North-Eastern Dry Zone of Karnataka: A Statistical Analysis. International Journal of Environment and Climate Change. 2023;13(12):272-289.
9. Kulkarni MD, Khanvilkar AV, Yadav GB, Khasnis MW, Ambore BN. Sheep Management for Upliftment of Marginal Farmers. Veterinary World. 2008; 1:378-379.
10. Lauber M, Nash, JA, Gatt A, Hemsworth PH. Prevalence and incidence of abnormal behaviours in individually housed sheep. Animals. 2012;2(1):27-37.
11. Mullan S, Edwards SA, Butterworth A, Whay HR, Main, DCJ. Interdependence of welfare outcome measures and potential confounding factors on finishing pig farms. Applied Animal Behaviour Science. 2009; 121:25-31.
12. Pedernera-Romano C, Ruiz De La Torre JL, Badiella L, Manteca X. Associations between open-field behaviour and stress-induced hyperthermia in two breeds of sheep. Animal Welfare. 2011; 20:339-346.
13. Phythian CJ, Cripps PJ, Michalopoulou E, Jones PH, Grove-White D, Clarkson MJ. Reliability of indicators of sheep welfare assessed by a group observation method. Veterinary Journal. 2012; 193:257-263.
14. Scott EM, Nolan AM, Fitzpatrick JL. Conceptual and methodological issues related to welfare assessment: a framework for measurement. Acta Agriculturae Scandinavica - Section A - Animal Science. 2001; 51:5-10.
15. Stott A, Ahmadi BV, Dwyer CM, Kupiec B, Morgan-Davies C, Milne C. Interactions between profit and welfare on extensive sheep farms. Animal Welfare. 2012; 21:57-64.
16. Stubsjøen SM, Hektoen L, Valle PS, Janczak AM, Zanella A J. Assessment of sheep welfare using on-farm registrations and performance. Animal Welfare. 2011; 20:239-251.