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Welfare assessment of dairy farms in Karnataka

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Abstract

This study was undertaken to compare the status of cattle welfare in dairy farms of different sizes and regions, in Karnataka, India. A total of 401 adult crossbred cattle in 60 dairy farms of Karnataka were considered. The mean housing component welfare score of small, medium, large, peri-urban and rural dairy farms, out of total score of 30, was 16.33 ± 0.671, 15.93 ± 0.719, 16.00 ± 0.429, 15.63 ± 0.398 and 16.53 ± 0.577, respectively; with no significant differences between groups. The mean feeding component welfare score of small, medium, large, peri-urban and rural dairy farms, out of total score of 30, was 18.23 ± 0.213, 18.80 ± 0.197, 19.53 ± 0.234, 19.03 ± 0.182 and 18.67 ± 0.670, respectively; Large dairy farms had significantly better scores. The mean animal health welfare score of small, medium, large, peri-urban and rural dairy farms, out of total score of 40, was 22.25 ± 0.801, 20.90 ± 0.839, 21.824 ± 0.206, 20.80 ± 0.592 and 21.97 ± 0.733, respectively; with no significant differences between groups. The overall mean welfare score of small, medium, large, peri-urban and rural dairy farms, out of total score of 100, was 56.80 ± 1.265, 55.63 ± 1.230, 56.53 ± 0.887, 55.47 ± 0.813 and 57.17 ± 1.005, respectively. In the overall rankings, 75% of the dairy farms had Average (40-59) ranking and 25% had Very Good (60-80) ranking. Among small, medium and large dairy farms, the predominant welfare ranking was Average with 70, 70 and 85 percent, respectively. In peri-urban region, 87% of the farms had Average welfare ranking and 13% of the farm had Very Good welfare ranking, while in rural region, 63% of the farms had Average and 37% had Very Good welfare ranking.

Keywords: Dairy cattle welfare, farm size, rural, peri-urban, Karnataka

Introduction

Animal husbandry is an integral component of Indian agriculture, supporting livelihood for more than two-third of the Indian rural population (Biradar and Kumar, 2013) [3]. Karnataka ranks eleventh in overall milk production in India with annual milk production of about 11 million metric tonnes (BAHS, 2019) [2]. Animal welfare is a broad term that involves the welfare of all species of animals. Initially, humans concentrated only on domesticated animal welfare. The term 'animal welfare' is defined as the ability of an animal to cope physiologically, behaviourally, cognitively, and emotionally with its physiochemical and social living environment, including the animal's subjective experience of its condition (Scott *et al*., 2001) [8]. According to the Farm Animal Welfare Council (FAWC, 1993) [5], Five Freedoms that are required to ensure that animals are in good welfare are (1) Freedom from hunger, thirst, and malnutrition by ready access to fresh water and a diet to maintain full health and vigour, (2) Freedom from thermal and physical discomfort by providing an appropriate environment including shelter and a comfortable resting area, (3) Freedom from pain, injury and disease by prevention or rapid diagnosis and treatment, (4) Freedom to express normal behaviour by providing sufficient space, proper facilities and company of the animal's own kind, and (5) Freedom from fear and distress by ensuring conditions and treatment which avoid mental suffering. Over time, animal welfare has become a global concern and there is widespread concern about this issue. India being a developing country needs to balance the needs of its livestock keepers with the welfare of its livestock. The advantages of improved livestock welfare in the form of better long-term animal productivity, compliance with international regulatory requirements, and meeting the needs of the discerning consumers within and outside India, are too many to be ignored.

Materials and Methods

Karnataka State stands sixth among the largest states in terms of geographical area. It lies on the western part of the Deccan plateau. Karnataka is one of the country's leading agricultural states, with a relatively high density of livestock population and livestock rearing is regarded as an important part of the rural economy. Bengaluru Rural and Kolar districts were purposively selected to represent peri-urban and rural regions of Karnataka, respectively. Both districts Bengaluru Rural (3,24,583) and Kolar (2,09,642) have a large population of crossbred cattle and are the leading milk producers in the state. Bengaluru Rural and Kolar are in the eastern dry agro-climatic zone in South Karnataka.

Selection of Farms: The purposive random sampling method was used for the selection of livestock farms households and to assess the dairy cattle welfare. A total of 60 dairy cattle farms, 30 from the peri-urban region of Bengaluru Rural district and 30 from rural region of Kolar district were considered for the present study. The farms were grouped into three different categories based on adult herd size i.e., small (1-2), medium (3-10) and large (>10) as per the prevailing dairy cattle holding in the region. The resource/environment-based indicators of animal welfare were assessed at the 60 dairy farms, comprising 401 adult crossbred dairy cows in which the animal-based indicators were evaluated. The farm owners were interviewed for assessment of attitude to dairy cattle welfare.

Data Collection: Relevant variables to study the management practices related to the welfare status of dairy cattle were selected based on the pilot survey conducted in a non-sampling area and discussion with experts. This formed the basis for developing the schedule of enquiry. The schedule of enquiry was pre-tested and appropriate modifications in the construction and sequence of questions were made. A personal interview with the farmer was conducted the day before the observation of the animals; the aim of the visit was to explain the details of the study and to get information about the farms and their status. The structured and pre-tested interview schedule was filled on the spot by personal observations and face-to-face interview with dairy farmers. Dimensions of the dairy shed, feeder and waterer were recorded using a measuring tape. Data regarding the dairy cattle was recorded by observing the animals, recording production data, collecting milk samples for mastitis detection and approaching the animals.

Assessment of Dairy Cattle Welfare: This was done by using the Dairy Cattle Welfare Scale (DCWS) developed by Kumar (2016) [6] with suitable modifications keeping in view the farming practices and local conditions of the study area. The basic components of the welfare scale were developed by Calamari and Bertoni (2009) [4] based on Integrated Diagnostic System Welfare (IDSW). This scale was modified by Kumar (2016) [6] according to Indian conditions to meet "Five Freedoms" of animal welfare and feasibility of their measurement under prevalent conditions. A total of 20 welfare indicators were identified and classified into three components:

Component A: Housing and other Facilities: Housing type and space availability, Type and height of roof, Type of floor, Microclimate protection measures, Feeding and watering space availability and Milking system.

Component B: Feeds and Feeding Practices: Availability of feeds and fodder, Feeding practices for different categories of animals, Availability of feed and fodder storage/preservation space and Colostrum and milk feeding.

Component C: Animal Health and Behaviour: Average productivity**,** Body Condition Score (BCS)**,** Cow Comfort Index (CCI)**,** Cow Cleanliness Score (CCS)**,** Hock Injury Score (HIS)**,** Human-Animal Relationship (HAR)**,** Lameness Score (LS)**,** Mastitis incidence**,** Reproductive efficiency and Abnormal behaviour

Each of these indicators was described by patterns depending upon the scientific recommendations and existing farm situations. The score given to all patterns of an index was pooled into a single score for that index. Thus, each farm was assessed based on these indicators and assigned a welfare score out of a maximum possible score of 100.

Welfare ranking criteria: Based on the overall score obtained in the welfare scale, the farms were classified into the following welfare categories: Total welfare score: More than 80 (Excellent), Between 60 to 80 (Very Good), Between 40 to 59 (Average) and Less than 40 (Poor)

Results and Discussion

Welfare Score in Farms of Different Size: The overall mean welfare score in dairy farms of different sizes and regions is presented in Table 1. The mean welfare score in small, medium and large dairy farms, out of total score of 100, was 56.80 ± 1.265, 55.63 ± 1.230 and 56.53 ± 0.887, respectively, with an overall score 56.32 ± 0.650. There were no significant (P<0.05) differences between the groups.

While there were many significant differences among the various sub-components of the welfare score, many of these cancelled each other out in the overall score. Large farms had significantly better flooring type, feeding and watering space availability, milking system, availability of feed and fodder, feeding practices, feed and fodder storage, average productivity and BCS, whereas small farms had significantly better housing type and space availability, lameness score and abnormal behaviour score.

In contrast, Kumar (2016) [6] (60.5 ± 2.74, 59.35 ± 2.17 and 68.1 ± 1.18), Mahla (2018) [7] (60.80 ± 2.77, 68.40 ± 2.27 and 74.60 ± 1.70), and Adhikari (2021) [1] (54.94 ± 0.06, 57.42 ± 0.04 & 66.71 ± 0.07) reported significantly higher overall welfare scores in large farms. Variations among the different studies could be due to minor differences in the dairy cattle welfare scoring pattern, the criteria used for categorization of farms, and the predominant cattle rearing practices in different regions.

Welfare Score in Farms of Different Regions: The overall mean welfare score in peri-urban and rural regions, out of total score of 100, was 55.47 ± 0.813 and 57.17 ± 1.005, respectively. No significant differences were observed among the dairy farms of different regions. Peri-urban dairy farms had significantly better micro-climate protection measures and feeding practices, whereas rural dairy farms had significantly better housing type and space availability, feeding and watering space availability, lameness score and mastitis incidence score. Similar non-significant differences in the welfare scores of peri-urban and rural dairy farms were reported by Kumar (2016) [6] (66.13 ± 4.75 and 62.10 ± 3.66).

Welfare Ranking: The overall mean welfare rankings of the 60 dairy farms of different sizes and regions are presented in Table 2. Overall, none of the dairy farms had Excellent (>80) and Poor (<40) welfare rankings, whereas 75% of the dairy farms had Average (40-59) ranking and 25% had Very Good (60-80) ranking. Among small,

medium and large dairy farms, the predominant welfare ranking was Average with 70, 70 and 85 per cent, respectively. In peri-urban region, 87% of the farms had Average welfare ranking and 13 per cent of the farms had Very Good welfare ranking, while in rural region, 63 per cent of the farms had Average and 37 per cent Very Good welfare ranking.

Table 1: Overall mean welfare score in dairy farms, based on their region and farm size

Region	Farm size			Overall	P-value
	Small	Medium	Large		
Peri-urban	56.65 ± 1.896	54.15 ± 1.148	55.60 ± 1.061	55.47 ± 0.813	0.468
Rural	56.95 ± 1.777	57.10 ± 2.142	57.45 ± 1.417	57.17 ± 1.005	0.979
Overall	56.80 ± 1.265	55.63 ± 1.230	56.53 ± 0.887	56.32 ± 0.650	0.749
P-value	0.887	0.141	0.203	0.194	

Table 2: Welfare ranking of dairy farms, based on their region and farm size

Welfare ranking	Farm size			Region		Overall
	Small	Medium	Large	Peri-urban	Rural	
Excellent (>80)	0	0	0	0	0	**0**
Very Good (60-80)	6 (30)	6 (30)	3 (15)	4 (13)	11 (37)	15 (25)
Average (40-59)	14 (70)	14 (70)	17 (85)	26 (87)	19 (63)	45 (75)
Poor (< 40)	0	0	0	0	0	0
Overall	20	20	20	30	30	60

Note: Figures within brackets indicate percentages.

Conclusion

The overall welfare scores of dairy farms in Karnataka showed no significant differences across farm sizes or regions, averaging around 56 out of 100. While large farms excelled in infrastructure and productivity-related indicators, small farms performed better in space, lameness, and behaviour scores. Similarly, rural farms had better housing and animal health scores, whereas peri-urban farms showed better climate control and feeding practices. Most farms (75%) were ranked as Average in welfare, with only 25% rated Very Good, and none classified as Excellent or Poor. These findings highlight the need for targeted improvements in both management and infrastructure across farm types.

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