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Impact of farm size on dairy animal health and behaviour welfare scores in Karnataka

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Abstract

This study was undertaken to compare the impact of farm size on dairy farm feeding welfare scores in Karnataka, India. A total of 401 adult crossbred cattle in 60 dairy farms of Karnataka were considered. The farms were grouped into three different categories based on adult herd size i.e., small, medium and large as per the prevailing dairy cattle holding in the region. The mean scores of the welfare indicator 'Average productivity' in small, medium and large dairy farms, out of total score of 8, was 5.60, 4.75 and 5.70, respectively. The mean scores of the welfare indicator 'Body Condition Score' and 'Cow Cleanliness Score' in small, medium and large dairy farms, out of total score of 4, was, 1.00, 2.25 and 2.85, and 0.90, 0.25 and 0.50, respectively. The mean scores of the welfare indicator 'Cow Comfort Index' in small, medium and large dairy farms, out of total score of 5, was 3.55, 3.05 and 3.05, respectively. The mean scores of the welfare indicator 'Hock Injury Score' and 'Human-Animal Relationship' in small, medium and large dairy farms, out of total score of 3, was 0.05, 0.00 and 0.1, and 1.30, 1.60 and 1.35, respectively. The mean scores of the welfare indicator 'Lameness Score' and 'Mastitis incidence' in small, medium and large dairy farms, out of total score of 4, was 3.90, 3.75 and 3.45, and 1.60, 1.45 and 1.20, respectively. The overall mean animal health welfare score of small, medium, large, dairy farms, out of total score of 40, was 22.25 ± 0.801 , 20.90 ± 0.839 , 21.824 ± 0.206 , respectively, with no significant differences between groups.

Keywords: Dairy cattle welfare, farm size, health, behaviour, Karnataka

Introduction

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) ^[1]. According to the Farm Animal Welfare Council (FAWC, 1993) ^[3], Five Freedoms that are required to ensure that animals are in good welfare are (1) Freedom from hunger, thirst, and malnutrition, (2) Freedom from thermal and physical discomfort, (3) Freedom from pain, injury and disease, (4) Freedom to express normal behaviour, and (5) Freedom from fear and distress.

In the year 2015, the Animal Welfare Board of India (AWBI), the statutory body of the Government of India, has issued an advisory to all state governments recommending the National Code of Practices for Management of Dairy Animals in India. The AWBI has specified that all cattle premises in the state must be registered according to the Registration of Cattle Premises Rules, 1978 under Prevention of Cruelty to Animals Act 1960. While registering and during inspections, the "National Code of Practices of Management of Dairy Animals in India" should be used a guideline to ensure welfare of dairy animals (ICAR, 2014) ^[5].

Growing consumer awareness about animal welfare has boosted the demand for livestock products sourced from farms that maintain high welfare standards, potentially leading to increased market value and profits. However, the absence of comprehensive data on the welfare status of dairy cattle in Karnataka poses a significant obstacle to developing effective animal welfare policies. Hence the present study was undertaken to study the impact of farm size on animal health and behaviour welfare scores in Karnataka.

Materials and methods

The purposive random sampling method was used for the selection of livestock farm households and to assess dairy cattle welfare. A total of 60 dairy cattle farms were grouped into three different categories based on prevailing adult herd size in the region i.e., small (1-2), medium (3-10) and large (>10). Animal welfare was assessed at the dairy farms, comprising 401 adult crossbred dairy cows, by evaluating the animal-based indicators.

The welfare score of the component "Animal Health and Behaviour" with a total score of 40, comprised: Average productivity (8), Body Condition Score (4) as per Ferguson *et al.* (1994) ^[4], Cow Comfort Index (5) as per Nelson (1996) ^[8], Cow Cleanliness Score (4) as per Whay *et al.*

(2003)^[13], Hock Injury Score (3) as per Cook *et al.* (2004)^[2], Human-Animal Relationship (3) as per Waiblinger *et al.* (2003)^[12], Lameness Score (4) as per Sprecher *et al.* (1997)^[10], Mastitis incidence (4), Reproductive efficiency (3) and Abnormal behaviour (2).

Results and Discussion

The overall mean scores of the welfare indicator 'animal health and behaviour' in dairy farms of different sizes is presented in Table 1. The mean welfare score in small, medium and large dairy farms, out of total score of 40, was 22.25 ± 0.801 , 20.90 ± 0.839 and 21.000 ± 0.824 , respectively, with an overall mean welfare score of 21.38 ± 0.473 . There were no significant differences between the groups, as the higher productivity and Body Condition Score in large farms was compensated by the better Cow Comfort Index, Cow Cleanliness Score, Lameness Score, Mastitis incidence, Reproductive efficiency and Abnormal behaviour in small farms. Higher scores were reported by Kumar (2016)^[6] and Adhikari (2021)^[1]. In contrast, Mahla (2018)^[7] reported significant difference among farms of different herd sizes.

Average productivity: The mean welfare score in small, medium and large dairy farms, out of total score of 8, was 5.60 ± 0.294 , 4.75 ± 0.362 and 5.70 ± 0.206 , respectively, with an overall welfare score of 5.35 ± 0.176 . There were no significant differences between farms of different sizes, due to selection of high yielding dairy cattle with good genetic potential and provision of good care with similar housing and feeding. The findings are comparable with Kumar (2016)^[6]. In contrast, Mahla (2018)^[7], Rajpoot (2019)^[9] and Adhikari (2021)^[1] found significantly better productivity in large farms.

Body Condition Score (BCS): The mean welfare score in small, medium and large dairy farms, out of total score of 4, was, 1.00 ± 0.397 , 2.25 ± 0.228 and 2.85 ± 0.221 , respectively, with an overall welfare score of 2.03 ± 0.195 . Large dairy farms had significantly ($P < 0.05$) better welfare than small and medium dairy farms in this indicator, possibly due to better availability of balanced feed and better feeding practices. Similar findings were recorded by Mahla (2018)^[7], Rajpoot (2019)^[9], Kumar (2016)^[6], with much higher figures being recorded by Adhikari (2021)^[1] in Odisha.

Cow Comfort Index (CCI): The mean welfare score in small, medium and large dairy farms, out of total score of 5, was 3.55 ± 0.320 , 3.05 ± 0.276 and 3.05 ± 0.211 , respectively, with an overall welfare score of 3.22 ± 0.158 . There were no significant differences between the groups. However, small farms had higher scores, possibly due to better covered area availability, open area hygiene and ventilation, leading to more number of cows lying in the stall. Similar non-significant differences were reported by Kumar (2016)^[6], Mahla (2018)^[7] and Adhikari (2021)^[1].

Cow Cleanliness Score (CCS): The mean welfare score in small, medium and large dairy farms, out of total score of 4, was 0.90 ± 0.340 , 0.25 ± 0.160 and 0.50 ± 0.199 , respectively, with an overall welfare score of 0.55 ± 0.143 .

There was no significant difference among farms of different sizes, but small farms had higher scores as compared to other farms. The extremely low scores in all the groups indicates that, on average, less than 40 percent cows in the herd were very clean. The likely causes for poor cow cleanliness were lack of bedding material, poor drainage, lack of adequate floor space and infrequent shed cleaning. Similar, non-significant differences were reported by Mahla (2018)^[7] and Adhikari (2021)^[1]. In contrast, Kumar (2016)^[6] reported significantly better CCS values in small farms.

Hock Injury Score (HIS): The mean welfare score in small, medium and large dairy farms, out of total score of 3, was 0.05 ± 0.050 , 0.00 ± 0.00 and 0.1 ± 0.069 , respectively, with an overall welfare score of 0.05 ± 0.028 . There was no significant difference among farms of different sizes, but large farms had higher scores as compared to other farms. The extremely low scores in all the groups indicates that, on average, less than 40 percent cows in the herd had no hock damage. The likely causes for low HIS scores were lack of bedding material/cow mats, granite stone flooring, poor drainage and infrequent shed cleaning. Similar, non-significant differences were reported by Kumar (2016)^[6] and Adhikari (2021)^[1], while significant differences were reported by Mahla (2018)^[7].

Human-Animal Relationship (HAR): The mean welfare score in small, medium and large dairy farms, out of total score of 3, was 1.30 ± 0.300 , 1.60 ± 0.222 and 1.35 ± 0.182 , respectively, with an overall welfare score of 1.42 ± 0.137 . There were no significant differences between the groups. The low scores in all the groups indicates that, on average, more than 80 percent of the animals can be approached to within 50-100 cm. The likely causes for low HAR scores in small farms could be lack of contact with multiple handlers as compared to animals in large farms. Similar non-significant differences were reported by Mahla (2018)^[7], Kumar (2016)^[6] and Adhikari (2021)^[1].

Lameness Score (LS): The mean welfare score in small, medium and large dairy farms, out of total score of 4, was 3.90 ± 0.100 , 3.75 ± 0.099 and 3.45 ± 0.114 , respectively, with an overall welfare score of 3.70 ± 0.064 . Small dairy farms had significantly ($P < 0.05$) better welfare scores than medium and large-sized dairy farms in this indicator. The high scores in all the groups indicates that, on average, more than 80 percent of the animals were normal or mildly lame. The likely causes for lower LS in large farms could be due to irregular flooring, improper feeding practices (i.e starch rich diet), restricted movement of animals in the tie stalls, and less concern towards individual animal cleanliness and hygiene. Similar findings, but with non-significant differences, were reported by Kumar (2016)^[6] and Adhikari (2021)^[1], whereas Mahla (2018)^[7] reported contrast findings.

Mastitis incidence: The mean welfare score in small, medium and large dairy farms, out of total score of 4, was 1.60 ± 0.450 , 1.45 ± 0.432 and 1.20 ± 0.258 , respectively, with an overall welfare score of 1.42 ± 0.222 . There were no significant differences between farms of different sizes. The

low scores in all the groups indicates that, on average, the incidence of mastitis was 15-20 per cent. The likely causes for lower Mastitis incidence welfare scores in large farms could be due to lack of individual animal care, poor floor hygiene, rapid spread of infections in large herds due to close contact and common milkers, and poor milking machine hygiene and maintenance. None of the farmers practiced post-milking teat dipping. Similar non-significant differences were reported by Adhikari (2021) ^[1] in Odisha, while Mahla (2018) ^[7] and Kumar (2016) ^[6] reported significantly better welfare in large farms.

Reproductive efficiency: The mean welfare score in small, medium and large dairy farms, out of total score of 3, was 2.55 ± 0.246 , 2.20 ± 0.296 and 1.75 ± 0.250 , respectively, with an overall welfare score of 2.17 ± 0.156 . There were no significant differences between the groups. The scores indicate that, on average, around 75 percent of the animals were in milk. The likely causes for low welfare scores in large farms could be lack of individual care and

breeding management; and the greater spread of communicable diseases in larger herds. Similar non-significant differences were reported by Kumar (2016) ^[6] and Adhikari (2021) ^[1], while contrasting findings with significant differences were reported by Mahla (2018) ^[7].

Abnormal behaviour: The mean welfare score of small, medium and large dairy farms, out of total score of 2, was 1.80 ± 0.138 , 1.60 ± 0.184 and 1.05 ± 0.185 , respectively, with an overall welfare score of 1.48 ± 0.105 . Mean welfare score of small and medium dairy farms was significantly ($P < 0.05$) better than the large dairy farms in this indicator. The overall scores indicate that, on average, 5-10 per cent of the cows showed abnormal behaviour. The likely causes for lower welfare scores in large farms could be restricted movement in tie stalls, over-crowding, improper feeding regimen and undesirable interactions with the farmer. In contrast, Mahla (2018) ^[7] reported no significant differences among farms of different sizes, and Kumar (2016) ^[6] reported significantly better welfare in large farms.

Table 1: Mean welfare score of 'animal health and behaviour' component in dairy farms of different size

Welfare indicator	Max Score	Farm size			Overall	P-value
		Small	Medium	Large		
Average productivity	8	5.60 ± 0.294	4.75 ± 0.362	5.70 ± 0.206	5.35 ± 0.176	0.051
Body Condition Score	4	$1.00^a \pm 0.397$	$2.25^b \pm 0.228$	$2.85^b \pm 0.221$	2.03 ± 0.195	0.000
Cow Comfort Index	5	3.55 ± 0.320	3.05 ± 0.276	3.05 ± 0.211	3.22 ± 0.158	0.333
Cow Cleanliness Score	4	0.90 ± 0.340	0.25 ± 0.160	0.50 ± 0.199	0.55 ± 0.143	0.177
Hock Injury Score	3	0.05 ± 0.050	0 ± 0	0.10 ± 0.069	0.05 ± 0.028	0.361
Human-Animal Relationship	3	1.30 ± 0.300	1.60 ± 0.222	1.35 ± 0.182	1.42 ± 0.137	0.640
Lameness Score	4	$3.90^a \pm 0.100$	$3.75^a \pm 0.099$	$3.45^b \pm 0.114$	3.70 ± 0.064	0.012
Mastitis incidence	4	1.60 ± 0.450	1.45 ± 0.432	1.20 ± 0.258	1.42 ± 0.222	0.765
Reproductive efficiency	3	2.55 ± 0.246	2.20 ± 0.296	1.75 ± 0.250	2.17 ± 0.156	0.110
Abnormal behaviour	2	$1.80^a \pm 0.138$	$1.60^a \pm 0.184$	$1.05^b \pm 0.185$	1.48 ± 0.105	0.008
Total score	40	22.25 ± 0.801	20.90 ± 0.839	21.00 ± 0.824	21.38 ± 0.473	0.438

Note: Means within a row bearing different superscripts differ significantly ($P < 0.05$).

Conclusion

No significant differences were noticed in the overall welfare scores of dairy farms of different sizes in the welfare indicator 'animal health and behaviour'. However, small farms had significantly lower Body Condition Score and higher lameness score and abnormal behaviour score as compared to large dairy farms. Overall, the mean welfare score of 21.38 out of 40, was on the lower side, indicating significant scope for improvement in dairy cattle welfare in the region.

References

- Adhikari S. Qualitative behavioural assessment for evaluating on-farm welfare of dairy cows in Odisha. MVSc thesis. Bhubaneswar: Odisha University of Agriculture and Technology; 2021.
- Cook NB, Bennett TB, Nordlund KV. Effect of free stall surface on daily activity patterns in dairy cows with relevance to lameness prevalence. *J Dairy Sci.* 2004;87(9):2912-2922.
- Farm Animal Welfare Council (FAWC). Second report on priorities for research and development in the farm animal welfare. London (UK): MAFF Publications, Tolworth; 1993.
- Ferguson JD, Galligan DT, Thomsen N. Principal descriptors of body condition score in Holstein cows. *J Dairy Sci.* 1994;77(9):2695-2703.
- Indian Council of Agricultural Research (ICAR). NDRI report. Karnal: ICAR-National Dairy Research Institute; 2014.
- Kumar C. Assessment of dairy cattle welfare in different types of dairy farms in Haryana. PhD thesis. Karnal: National Dairy Research Institute (NDRI); 2016.
- Mahla V. Study on performance and welfare of dairy cattle in Punjab. PhD dissertation. Karnal: National Dairy Research Institute; 2018.
- Nelson AJ. On-farm nutrition diagnostics. In: Proceedings of the 29th Annual Conference of the American Association of Bovine Practitioners; 1996; San Diego, CA. Rome (GA): AABP; p. 76-85.
- Rajpoot V. Studies on management practices, performance, and welfare status of dairy animals in Muzaffarnagar district of Uttar Pradesh. PhD dissertation. Karnal: ICAR-National Dairy Research Institute; 2019.
- Sprecher D, Hostetler D, Kaneene J. A lameness scoring system that uses posture and gait to predict dairy cattle reproductive performance. *Theriogenology.* 1997;47:1179-1187.

11. Scott EM, Nolan AM, Fitzpatrick JL. Conceptual and methodological issues related to welfare assessment: a framework for measurement. *Acta Agric Scand A Anim Sci.* 2001;30(Suppl):5-10.
12. Waiblinger S, Menke C, Fölsch DW. Influences on the avoidance and approach behaviour of dairy cows towards humans on 35 farms. *Appl Anim Behav Sci.* 2003;84(1):23-39.
13. Whay HR, Main DCJ, Green LE, Webster AJF. Assessment of the welfare of dairy cattle using animal-based measurements: direct observations and investigation of farm records. *Vet Rec.* 2003;153:197-202.