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Relationship of Temperament during Milking with Milking Behavioural Features, Milk Yield and Udder Health of Crossbred Jersey Cows in Tropical Climate

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ABSTRACT

Background: Milking behaviour of milch cows has notable impacts on their production efficiency. The present investigation is designed to explore the relationship of temperament while milking with other milking behavioural features, milk yield and udder health in crossbred Jersey cows.

Methods: The study was done on crossbred Jersey cows (N=94) kept at ICAR-National Dairy Research Institute, Eastern Regional Station, Kalyani, West Bengal. The cows' temperament score (TS) was judged on 5 points scale (1-docile, 5-aggressive). Calmer cows (TS-1 and 2) covered relatively higher (75.24%) proportions and no observation had shown for TS-5.

Result: The temperament score was positively associated (P<0.01) with stepping/milking (0.72), flight speed (0.43) and exit score (0.33), while it was negatively associated (P<0.01) with milk yield (-0.64), milking duration (-0.61) and milk flow rate (-0.65). It was concluded from the above study that milking behavioural features are directly correlated with each other and production parameters. Dairy animals of calmer temperament were significantly high-yielders. The temperament of dairy animals did not significantly impact udder health as assessed through MCMT and somatic cell counts in milk.

Key words: Jersey crossbred cow, Milk yield, Milking temperament.

INTRODUCTION

Temperament may be well-defined as the nature and degree of response of the animal in its overall surrounding environments (Herve *et al.,* 2007; Kumar *et al.,* 2019; Kumar and Mandal, 2022). The temperament of cattle has been of interest since the time of their domestication. For many eras, natural selection for docile animals has been shown (Dickson *et al.,* 1969). In the past decades, a substantial increase in the normal size of herds for milk production has been perceived in many parts of the world, which demands farmers invest less time in individual animals (Cziszter *et al.,* 2016). Milking speediness and temperament are the qualities that have a key effect on the period required to serve the individual animal and therefore, they are enormously vital in large farms. In addition, very nervous and sluggishly milked cows are unmasked to a bigger risk of early rejection compared to calm and medium counterparts (Berry *et al.,* 2005; Sewalem *et al.,* 2010). *Bos indicus* milch cows with unfriendly temperament scores produced low amounts of milk and the ability to release milk within those cows was the worst compared to cows with healthier temperaments (Gupta and Mishra, 1979). Moreover, cows highly sensitive to handling demonstrate poor adaptation to environments (Cziszter *et al.,* 2016). Studies on temperament during the milking of crossbred cattle are of great importance because selection and improvement in this character can further improve milk yield and production efficiency in dairy cows. Crossbred cattle cover a major portion (27.68%) of total cows' milk production in the country (DAHD, 2020). However, information on temperament scores of crossbred Jersey cows kept under tropical climates is inadequate. Presently, there is an increasing interest in improving animal temperament at the farm level due to elevated awareness of its rapport with productivity and animal health (Cziszter *et al.,* 2016). The milking behaviour of cattle and buffaloes is a significant aspect of animal ethology because it has an enormous impact on the milk yield of animals, milk flow rate throughout the milking, milking duration, ease of milking, selection of animals and eventually farm economics

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(Gergovska *et al.,* 2012; Haskell *et al.,* 2014; Bharti and Kamboj, 2019).

Keeping in view the above background, the present study was designed to investigate the relationship between temperament score with milking behavioural features, milk yield and udder health in crossbred Jersey cows.

MATERIALS AND METHODS

Site of the study

The current experiment was carried out on crossbred Jersey cows(N=94) kept at an organized dairy farm at ICAR-National Dairy Research Institute, Eastern Regional Station, Kalyani, West Bengal, India, from 2017 to 2018. The weather of Kalyani is hot and humid and the extreme ambient temperature in summer months goes up to 39°C and the minimum temperature in winter months falls to about 8°C.

Management of cows during the experimental period

All trial animals were kept under a loose housing system. The feeding management practices and feed ingredients were alike for the whole lactating herd. Concentrate mixture, seasonal green fodder (*ad libitum*) and chaffed paddy straw as dry fodder were offered to complete the nutrient prerequisite of all lactating animals. The amount of concentrate was measured for each animal as per their body weight and milk production level. The concentrate was offered @1.5 kg/day as the maintenance ration around 8 A.M and the rest of the remaining amount was offered during milking time.

Recording of parameters

Milking of all the animals was done at the cattle yard of ERS (Eastern Regional Station)- NDRI by semi-automatic machine milking (DeLaval India), twice a day *i.e.*, during the morning from 5.00 to 7.00 AM and evening from 2.30 to 4.00 PM. The milk collected was measured in kg and noted down for every individual cow. Before milking, the animals were cleaned and groomed properly. Udders of cows were meticulously cleaned with clean water before starting the milking procedure. Towels drenched with the antiseptic solution were used for the smearing of teats and udder just before attaching the teat cups within the teats. The milking parlour behavioural features of cows were noted down during milking operations from a 1 m distance away from behind the animals without disturbing them. All the behavioural parameters were observed at the weekly period of intervals by a single observer during the whole study period to evade personal error disparity.

Temperament score (TS)

The temperament of all the animals was observed during the milking time and scoring of temperament was done as per the score given by Prasad and Jayalaxmi (2014).

Milk yield

Milk production at each time *i.e.*, the morning milk yield and the evening milk yield was carefully noted down at the

Table 1: Pearson correlation coefficient between different milking behavioural parameters, milk yield and milkability.

Parameters	Temperament score (1-5)	No. of stepping/ milking	No. of defecation/ milking	No. of urination/ milking	No. of vocalization/ milking	Exit score (1-3)	Flight speed (m/s)	Milking duration (seconds)	Milk flow rate (g/minute)	Morning milk yield (Kg)	Evening milk yield (Kg)
Temperament score (1-5)	1.000										
No. of stepping/milking	0.723**	1.000									
No. of defecation/milking	0.334**	0.306**	1.000								
No. of urination/milking	0.219**	0.256**	-0.028	1.000							
No. of vocalization/milking	0.069**	-0.026	0.029	-0.053*	1.000						
Exit score (1-3)	0.331**	0.344**	0.225**	0.116**	0.019	1.000					
Flight speed (m/s)	0.430**	0.472**	0.246**	0.165**	-0.083**	0.578**	1.000				
Milking duration (seconds)	-0.612**	-0.453**	-0.210**	-0.081**	-0.064**	-0.179**	-0.258**	1.000			
Milk flow rate (g/minute)	-0.652**	-0.482**	-0.293**	-0.088**	-0.037	-0.225**	-0.331**	0.543**	1.000		
Morning milk yield (Kg)	-0.641**	-0.517**	-0.258**	-0.092**	0.042	-0.236**	-0.372**	0.685**	0.716**	1.000	
Evening milk yield (Kg)	-0.602**	-0.486**	-0.230**	-0.081**	0.068**	-0.232**	-0.352**	0.634**	0.670**	0.909**	1.000
Total milk yield (Kg)	-0.641**	-0.519**	-0.254**	-0.090**	0.052*	-0.241**	-0.373**	0.683**	0.716**	0.989**	0.959**

**Correlation is significant at the 0.01 level (2-tailed); *Correlation is significant at the 0.05 level (2-tailed).

cattle yard, at ERS-NDRI. Milk yield recording continued for 9 months (morning and evening) following a complete let-down for each cow.

Parlour leaving speed or flight speed (m/s)

It is the period engaged by cows to cross a certain specified distance in the milking parlour afterwards their release from milking byre once the milking operation is over. The period to cover the measured fixed distance was noted down employing a stopwatch. The parlour leaving speed was evaluated as the distance covered divided by the period taken by them to cover that specified distance and it was denoted as meter per second (m/s).

Exit score

Exit score stated patterns of movement of cows after liberation from the parlour *i.e*., how animals are approaching out of milk parlour after milking procedures got over. It was judged on a scale of 1 to 3 as defined by Lanier and Grandin (2002).

Statement of animal rights (Ethical approval)

The usage of cattle in this trial (experiment) was permitted by the local institutional animal ethical committee vide institute approved project-NDRI/IRC Project code B-40 and it is an observational study.

Statistical analysis

The data obtained were analysed using SPSS software (SPSS Inc, 2007). The statistical method employed to analyse the obtained data was the Pearson correlation coefficient to examine the relationship between the temperament score of milch cows with milking behaviour parameters, milk yield and udder health. The significant difference levels were set at 5% (P<0.05) and 1% (P<0.01).

RESULTS AND DISCUSSION

Association of temperament score with milking behaviour, milk yield and udder health

Data analysis (Table 1) revealed that there was a positive association between temperament score with number of stepping/milking, number of defecation/milking, number of urination/milking, number of vocalizations/milking, exit score and flight speed, but negatively associated with milking durations, milk yield and milk flow rate (MFR). Our present findings indicated that as the temperament score rises production level and production efficiency of dairy animals start declining.

Similar to our findings, Kumar *et al*. (2019, 2020) and Kumar and Mandal (2022) found that the milking temperament was negatively associated with the milk yield. Mishra *et al.* (1975) and Arave and Kilgour (1982) reported that higher temperament scores had a negative effect on milk production. During the current investigation, we found that negative relationship between temperament score and total milk yield in crossbred Jersey cows, however, a contradiction was also reported by Purcell *et al.* (1988) and Khanna and Sharma (1998).

Milking speed was negatively interrelated (-0.652) with the temperament of cows in the present study, which was in accordance with the observations reported by Cziszter *et al.* (2016) (r= -0.18). In anxious cows, milk ejection was sluggish as reported by Szentleleki *et al.* (2015) in a comparative research trial shown on Holstein primiparous and multiparous cows. A negative relationship existed between the temperament score and the average daily milk yield of crossbred Jersey cows, which was further corroborated by Nayak and Mishra (1984) and Prasad and Jayalaxmi (2014) in Red Sindhi and Murrah buffaloes, respectively.

Data analysis (Table 2) revealed that temperament score was negatively correlated with udder health *i.e*., Modified California Mastitis Test (MCMT) scores which indicated that as the temperament scores rise udder health starts deteriorating. Also, entry order was positively associated with side preference, meaning the entry order of animals into the milking byre was linked to which side (left or right) of the milking byre was preferred by animals.

Orban *et al.* (2011) stated that somatic cell count in milk showed a significant, medium rapport with the temperament score; the docile cows had lower somatic cell count, however, our study showed a non-significant association between somatic cell count in milk and temperament score, which is further corroborated to our findings. Conflicting reports on the relationship between temperament and somatic cell count were also reported (Haskell *et al.,* 2014). Broucek *et al.* (2013) reported that the correlation between milking/ entry order and side choice in the milking byre was positive and significant (0.747**), which was in accordance with our present findings (0.117**).

Table 2: Pearson Correlation between temperament, entry order, side preference and udder health.

Parameters	Temperament score (1-5)	Entry order	Side preference (Left or right)	Somatic cell count/ml (Log 10 value)	Modified california mastitis test (0-4)
Temperament score (1-5)	1.000				
Entry order	-0.057	1.000			
Side preference (Left or right)	-0.021	0.117**	1.000		
Somatic cell count/ml (Log 10 value)	-0.066	-0.003	0.033	1.000	
Modified california mastitis test (0-4)	-0.105**	-0.006	0.013	0.890**	1.000

**Correlation is significant at the 0.01 level (2-tailed).

CONCLUSION

This investigation revealed that milking behavioural features are correlated with each other along with udder health and production parameters. The temperament of dairy animals did not significantly impact udder health as evaluated through somatic cell counts in milk. Dairy animals of calmer temperament were significantly high-yielders.

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Conflict of interest

All authors declare that they have no confllict of interest.

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