

## RELATIONS OF HYGIENE INDEX SCORES WITH MILK PRODUCTION IN ANATOLIAN BUFFALOES

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### ABSTRACT

The aim of the study was to determine the relations of hygienic status and milk production of Anatolian buffaloes. Fifty milking buffaloes reared in two farms in the Middle Black Sea region of Turkey were used as the study material. To record hygienic status of the animals, udder and flank hygiene scores (UHS and FHS) of the animal's bodies were evaluated using a scale with 1 to 4 points (1 = very clean, 2 = clean, 3 = dirty, 4 = very dirty). Hygiene index score (HIS) values were consisted of 60% UHS and 40% FHS. To eliminate environmental factors, two parity (1<sup>st</sup> and  $\geq 2^{\text{nd}}$ ) and stage of lactation (SL1<100d and SL2 $\geq$ 100d) subgroups were constituted. The buffalo cows with first parity and later SL had more udder dirtiness ( $P<0.05$ ) and, the buffalo cows those in SL1 had higher milk yield compared to the other subgroup. A negative and weak correlation ( $r = -0.227$ ) was estimated between HIS and test day milk yield (TDMY) of milking buffaloes. Confirming these relationships using more data and keeping buffaloes within more hygiene is advised as beneficial approaches.

**Keywords:** *Bubalus bubalis*, buffaloes, hygiene,

management, milk yield, raw milk, water buffalo

### INTRODUCTION

The importance of environmental factors on managing milk production from dairy animals has been well known. Multi factors such as climate, barn conditions, feeding applications, parity, stage of lactation and location have been described to be non-genetic factors in animal science. Eliminating each item separately may be seen as a beneficial approach to boost productivity in the herds. At this point, indoor condition that classified as one of the important environmental factors have to be regarded. Sufficient air circulation and light level are the main topics of the indoor design in addition to cleanliness. Hygienic and healthy raw milk has only produced from hygienic and clean animals. Huijps *et al.* (2010) revealed that ensuring proper udder cleaning is an effective process for preventing cows from the pathogens those causing the intra-mammary infection.

Many studies have confirmed that raw milk quality reflects dairy animal's health status (Hovinen and Pyörala, 2011; Atasever and Erdem, 2013; Tančin *et al.*, 2020). Srairi *et al.* (2008)

pointed out that the hygienic degree of raw milk affects its shelf- life and its acceptability level by the consumers. Also, Sant'Anna and Paranhos da Costa (2011) demonstrated that monitoring hygiene is useful in deciding dairy herd management programs to decrease problems with milk and boosting the animal welfare. The contamination of udder surface may be occurred by many non-genetic factors: barn design, area per animal, bedding structure and total time cows spend at the barns (Sandrucci *et al.*, 2014). However, there are rare studies on the association of hygienic status of body parts with milk yield in water buffaloes. That's why, conducting field studies on this relation will ensure new insights for dairy owners and milk producers.

The objective of this study was to reveal the relationships of hygienic scores with milk production in Anatolian buffaloes.

## MATERIALS AND METHODS

The present study was conducted in two private buffalo herds in Bafra district of Samsun province located in the Middle Black Sea region of Turkey. Fifty buffalo cows were visually scored by hygienic status after morning milking in the winter housing period included January and February of 2019. During the study period, the animals were automatically milked twice in a day and kept similar conditions. All buffalo cows were kept on straw bedded barns, those had loose housing system. The test day milk yield (TDMY) records were collected from the official records of the farms.

To calculate the hygienic status of the animals, udder hygiene score (UHS) and flank hygiene score (FHS) was scored using a 1 to 4

point scale (1 = very clean, 2 = clean, 3 = dirty and 4 = very dirty). To estimate hygiene index score (HIS) per animal, the following formula that reflects the weight rates (60% and 40%) of the hygiene parameters was performed:

$$\text{HIS} = 0.60 \times \text{UHS} + 0.40 \times \text{FHS}$$

To eliminate the effects of the parity, the animals were divided into two subgroups (1 = cows with 1<sup>st</sup> lactation; 2 = cows with  $\geq 2^{\text{nd}}$  lactation). To assess the effect of stage of lactation (SL) on the hygiene parameters and TDMY, two subgroups were constituted (SL1 = up to 100 d, and SL2 =  $\geq 100$  d). TDMY values were also evaluated by two HIS subgroups, those allocated according to the mean HIS of the study. To reveal the association of HIS with TDMY, Kendall's tau-b correlation coefficient was estimated. SPSS 17.0 for windows program was applied for statistical evaluation.

## RESULTS AND DISCUSSIONS

The means of hygiene parameters by two environmental factors in Anatolian buffaloes are given in Table 1. While the UHS mean of the primiparous buffaloes was found as higher than the cows with advanced parity ( $P < 0.05$ ), FHS and HIS means were not differed. This finding might be assessed as interesting, because of the statistical difference was only calculated for UHS and this case pointed out the effect of the milking process applied on these farms. In other words, this case might be associated with more attention of the milkers to buffalo cows with later parities during the milking time. Besides, the buffalo cows with later parities could be exposed to more dirtiness because of larger udder size when compared

to first parity buffaloes. Also, it is known that the older animals have more tendency to lying behavior when compared to younger ones and this case is expected to gain more dirtiness to them. Normally, first parity animals produce relatively lower milk when compared to the ones with later parities (Stadnik *et al.*, 2017). This concept is a basic physiologic mechanism of a milking animal. To achieve high and hygienic milk production, the milkers must be ensured udder cleaning on animals at the milking time. The findings founded here might be a possible reason of this processes those practicing at the buffalo farms. However, FHS means of two parity groups were not statistically different. In a general evaluation, FHS means of the Anatolian buffaloes scored for the study could be classified into “dirty category” according to the visual scale with 1 to 4 points.

The means of hygiene parameters by SL groups are presented in Table 1. As shown, the means of UHS up to first 100 d of lactation was lower ( $P<0.05$ ) when compared the mean of the advanced SL. This case reflects that the udders were more hygienic in buffalo cows in the first SL group. Normally, the first stage of the lactation known as the time that including peak milk yield in the total lactation period (Jingar *et al.*, 2014). In this period, the buffalo cows are freshening and the farmers more take care for the animals those producing relatively more milk. Actually, determined insignificant differences in the FHS means (Table 1) point out to positive and direct effects of the processes, including udder cleaning by the farmers on udder sanitary during the milking time. Managing 437 g/d more milk per milking buffalo cow clearly shows that farmers paid more attention to the animals in the first SL period.

In this study, HIS values were estimated for each animal using UHS and FHS values. As seen

in Table 1, no statistically significant difference was found in the parity or SL groups. Also, the change of TDMY according to two non-genetic factors is shown in Figure 1. As seen, no statistical difference was determined in TDMY means between first and later parity groups. Milking animals with later parities may be expected as relatively more milk producers (Erdem *et al.*, 2010). The buffaloes with  $\geq 2$  parities had 8.65% higher TDMY when compared to primiparous ones, but this difference was not found statistically significant. Besides, a milking animal within early lactation phase is expected to give more milk because of her lactation physiology. As parallel to this concept, buffaloes within  $<100$  d of the lactation had 14.87% more TDMY compared to the second group and the difference between two SL groups was found as significant ( $P<0.05$ ). This case might be explained by the high milk production of the milking buffaloes during the post-partum period to serve it to their calves (Kirkland and Gordon, 2001). Also, it is known that blood flow increases after pregnancy in large animals and epithelial cells those produce milk are highly rising in this period. At this point, the milk production tendency of the animals according to lactation phases should be regarded by the farm owners to ensure income-output balance throughout the production period.

As seen from Figure 2, TDMY values were evaluated by HIS values as subgroups, those allocated according to the mean HIS of the present study ( $HIS_1<2.48$  and  $HIS_2\geq 2.48$  points). Normally, relatively higher milk production is expected from hygienic and clean animals (Bekuma and Galmessa, 2018). As parallel to this concept, milking buffalo cows with relatively hygienic were produced 334 g/d higher milk per animal when compared to other ones, but this difference was not found to be statistically significant.

Table 1. The means ( $\bar{X} \pm S$ ) of hygiene parameters by environmental factors in Anatolian buffaloes.

Factor	n	UHS	FHS	HIS
<b>Parity</b>				
1	25	2.42±0.14 <sup>b</sup>	2.84±0.15	2.58±0.13
≥2	25	1.96±0.13 <sup>a</sup>	3.16±0.16	2.38±0.11
<b>SL</b>				
1 (<100d)	30	2.02±0.12 <sup>a</sup>	2.93±0.16	2.37±0.11
2 (≥100d)	20	2.45±0.14 <sup>b</sup>	3.10±0.14	2.66±0.14
Overall	50	2.19±0.10	3.00±0.11	2.48±0.88

a, b: P<0.05; SL: stage of lactation; UHS: udder hygiene score; FHS: flank hygiene score; HIS: hygiene index score.

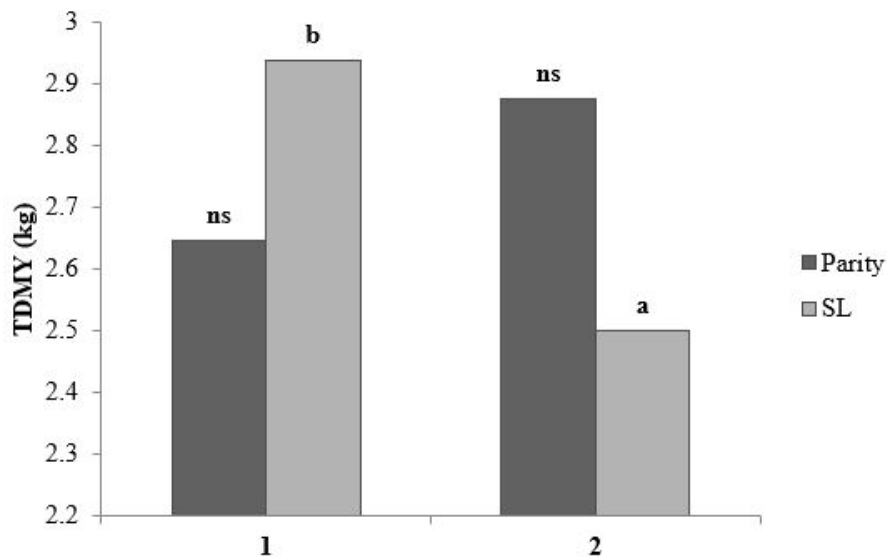


Figure 1. TDMY means by two environmental factors (TDMY: test day milk yield; SL: stage of lactation; ns: not significant, a/b: P<0.05).

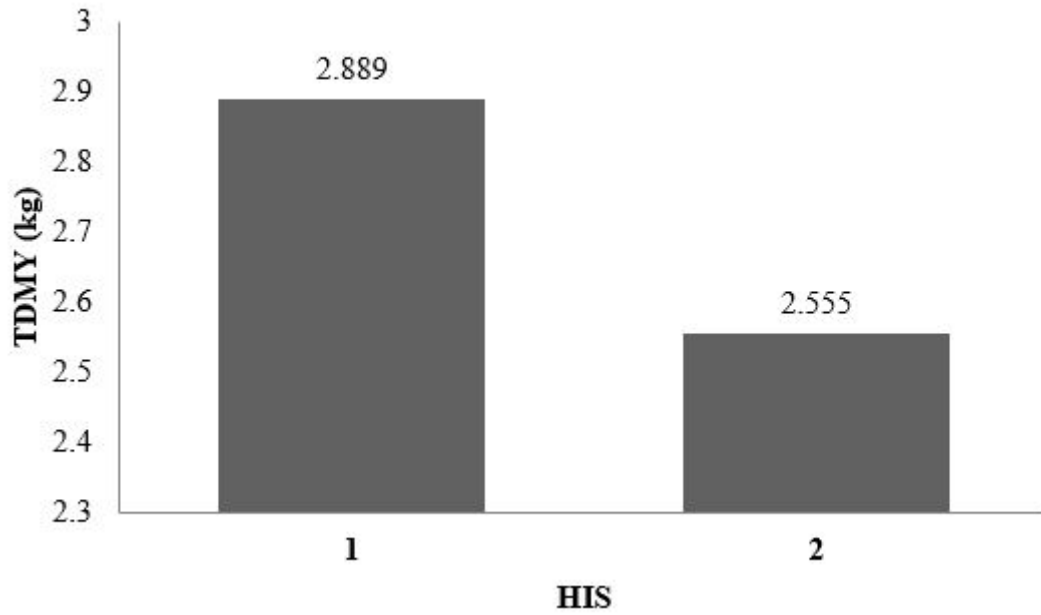


Figure 2. TDMY means HIS groups (TDMY: test day milk yield; HIS: hygiene index score; HIS1<2.48 (n: 31); HIS2≥2.48 (n: 19)).

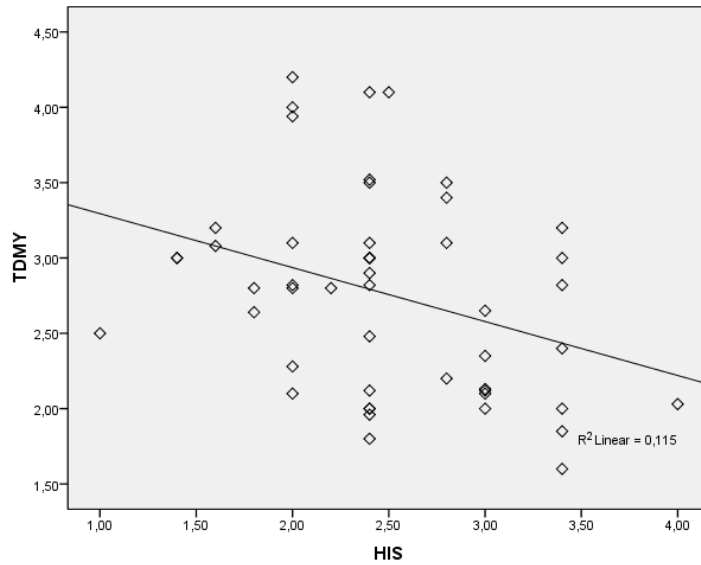


Figure 3. Relationships of TDMY by HIS (TDMY: test day milk yield; HIS: hygiene index score).

The relationship of HIS with TDMY is presented in Figure 3. Kendall's tau-b correlation coefficient of two parameters was estimated to be negative but weak ( $r = -0.227$ ). Really, reduction in milk production together with the deterioration in the hygienic status of animals might be commented as an expected result.

At this point, using more data in the advanced studies might be offered to confirm the obtained finding here.

## CONCLUSIONS

The associations of hygienic status and milk production of Anatolian buffaloes reared in the Middle Black Sea region of Turkey were investigated. It was determined that the buffalo cows with first parity and later lactation phase had high udder dirtiness. Also, the buffalo cows those in early lactation period had higher milk yield compared to the others. Finally, a negative and weak correlation ( $r = -0.227$ ) was estimated between HIS and TDMY of milking buffaloes evaluated here. Investigating these relationships using more data may be useful to confirm obtained findings of the present study. Keeping buffaloes within more hygiene is advised to herd owners to boost milk production levels of the animals.

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