



## Associations of Some Milking Traits with Milk Production in Anatolian Buffaloes: A Case of Bafra District of Samsun Province

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### ABSTRACT

This study was conducted to determine the associations of some milking traits and milk yield in water buffalo farms located in Bafra district of Samsun province. In total, 37 Anatolian Buffalo farms enrolled to Buffalo Breeders Association (BBA) were evaluated by applying face to face survey on the current milking practices and farm characteristics in February 2020. Number of milking cows (NM), number of workers (NW), age of the milker (AM), experience of the milker (EM), education of the farm owner (EO) and hygiene score of the milking parlor (HM) were evaluated as the farm traits affecting daily milk yield (dMY). Milking type (MT), milking frequency (MF), udder cleaning pre-milking (UC1), udder cleaning post-milking (UC2), giving feed after milking (GF) and milking duration (MD) were selected as the milking practices affecting dMY. It was concluded that dMY was significantly affected by AM, EM, EO and MD.

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### Introduction

Animal husbandry serves financial gain and ensures job opportunities to the today's national economies of the countries. In addition to selecting suitable animals, farm management, barn design, personnel and feeding techniques are the main factors to success in husbandry. However, structural problems of the farms, insufficient organization of the breeders and failure in the marketing may be seen as the major problems of the enterprises (Kumar, 2010; Amin and Palash, 2020). To eliminate the current problems in herd basis, regularly checking the applications practicing in the farms has been advised to the herd owners (Atasever et al., 2015).

In Turkey, water buffalo is one of the important production sources of the country. Anatolian buffalo is the main breed and this animal is especially reared in the small sized farms in different locations. Lactation milk yield (LMY) has been reported as 1223 kg by a field study (Soysal et al., 2018). Besides, daily milk yield was revealed to be 2.782 kg by Bayram and Atasever (2020) in Samsun province conditions. Sahin and Ulutas (2014) revealed some non-genetic factors affecting milk yield of Anatolian buffalo cows. Soysal et al. (2018) emphasized that the

factors affecting milk yield and fertility traits of Anatolian buffaloes must be considered in a selection program. As seen, many field studies have been carried out the production characteristics of Anatolian buffaloes according to the literature. Although, no sufficient report has been informed about the relationships between milking applications and milk yield of Anatolian buffaloes reared in Turkey conditions. Evaluating these relations will ensure an important guide to the breeders and researchers who will conduct in depth investigations on the water buffaloes.

The aim of the present study was to reveal the associations of some milking processes with milk production in Anatolian buffalo cows reared in Bafra district of Samsun province.

### Materials and Methods

Information on the milking characteristics and daily milk yield (dMY) records of Anatolian buffalo farms enrolled to Buffalo Breeders Association (BBA) in Bafra district of Samsun province of Turkey was constituted as

the study materials. To record data, the farms of two location in the region (Doğanca, n=32 and Sarıköy, n=8) were included in the study and face to face surveys were applied with buffalo breeders in February 2020. One farm was removed from the study because of lack of the information on the milk records. Number of milking cows (NM), number of workers (NW), age of the milker (AM), experience of the milker (EM), education of the farm owner (EO) and hygiene score of the milking parlor (HM) were evaluated to be the farm characteristics affecting dMY. Milking type (MT), milking frequency (MF), udder cleaning pre-milking (UC1), udder cleaning post-milking (UC2), giving feed after milking (GF) and milking duration (MD) were selected as the milking applications. To evaluate dMY, test day milk yield records those routinely noted at farm level by farm staff were ensured from BBA official records. The factors were divided into two or three subgroups by the means of the traits for statistical analyses and evaluated by Independent Sample *t-test* or One-way Anova. The following model was used to analyze the effects of farm traits on dMY:

$$Y_{ij} = \mu + \alpha_i + e_{ij}$$

where;  $Y_{ij}$  is the observation value,  $\mu$  is the overall mean,  $\alpha_i$  is effect of the farm trait on dMY and  $e_{ij}$  is random error. The group means were compared using Duncan's Multiple Range test. All statistical analyses were performed using SPSS 17 for Windows at the significance level of 5%.

## Results and Discussion

The effects of farm traits on dMY of the milking buffaloes are given in Table 1. Of these traits, number of milking cows (NM) was not shown a significant effect on dMY, statistically. According to Table 1, the ratio of the farms those had  $\leq 15$  milking buffalo ( $\bar{x}=15.54 \pm 1.82$ ) is

62.1% and the ratio of the other ones is 37.9%. Besides, the second group had 0.543 kg more milk per cow when compared to the first group. This amount could be regarded as attractive, but no statistical difference was determined between two groups. Normally, more attention in husbandry activities may be expected on feeding, care and hygiene in large farms. Göncü et al. (2016) informed a close relation of herd size and farm staff with animal welfare issues those play an important role in milk production. Results obtained in this section were contrary to the findings of Galiç et al. (2004) but, harmonic with the results of Keskin and Dellal (2011).

The effect of NW on dMY is seen in Table 1. While the ratio of the farms with one staff was 51.3%, the ratio of the farms with two staff was 49.7%. As seen, the ratio of the farm groups of the total farms those evaluated was similar. Actually, it may be expected that more workers who deal with routine farm processes get an important advantage to dairy farms. However, farms with NW=1 had 0.346 kg more dMY per cow when compared to farms with NW=2, but the dMY was not affected by NW, statistically. For two groups, hand milking ratios were 57.89% and 72.22%, respectively. Interestingly, NM means of two groups were calculated to be  $11.52 \pm 1.96$  head and  $19.77 \pm 2.84$  head, respectively. This case pointed out that more NW is essentially preferred by the farms where milking process is mainly managed by hand and relatively larger sized.

dMY means according to AM are presented in Table 1. A substantial amount of dMY (0.729 kg per cow) was higher in the farms with  $\leq 47$  y and this difference was statistically significant ( $P < 0.05$ ). This finding might be explained as the advantage of bodily functions and higher intention to work of younger workers. In an earlier study conducted in the same region, Atasever et al. (2015) reported that milk production of cattle positively affected by relatively young dairy farmers. This information supports the findings of this study for this section.

Table 1. Effects of farm traits on dMY of Anatolian buffaloes

Trait	n	$\bar{X} \pm S_x$
Number of the milking cows		ns
$\leq 15$	23	2.590 $\pm$ 0.127
$> 15$	14	3.133 $\pm$ 0.311
Number of the workers		ns
1	19	2.964 $\pm$ 0.251
2	18	2.618 $\pm$ 0.136
Age of the milker (y)		*
$\leq 47$	17	3.189 $\pm$ 0.260 <sup>b</sup>
$> 47$	20	2.460 $\pm$ 0.115 <sup>a</sup>
Experience of the milker (y)		*
$\leq 26$	21	3.049 $\pm$ 0.224 <sup>b</sup>
$> 26$	16	2.463 $\pm$ 0.131 <sup>a</sup>
Education of the farm owner		*
Primary	21	2.553 $\pm$ 0.123 <sup>a</sup>
Secondary	8	2.701 $\pm$ 0.263 <sup>a</sup>
High	8	3.526 $\pm$ 0.474 <sup>b</sup>
Hygiene score of milking parlor		ns
$\leq 81$	23	2.726 $\pm$ 0.211
$> 81$	14	2.909 $\pm$ 0.172
Overall	37	2.795 $\pm$ 0.146

Different superscript letters (a,b) in the same column indicate statistically significant differences, (\*:  $P < 0.05$ ; ns: non-significant)

Table 2. Effects of milking applications on dMY of Anatolian buffaloes

Application	n	$\bar{X} \pm S_x$
Milking type		ns
Hand	24	2.801±0.211
Machine	13	2.785±0.154
Milking frequency		ns
1	26	2.803±0.195
2	11	2.778±0.183
Udder cleaning pre-milking		ns
Yes	26	2.775±0.197
No	11	2.842±0.167
Udder cleaning post-milking		ns
Yes	4	2.979±0.381
No	33	2.773±0.158
Giving feed after milking		ns
Yes	18	2.664±0.157
No	19	2.920±0.243
Milking duration (min)		*
≤7	19	3.125±0.237 <sup>b</sup>
>7	18	2.447±0.126 <sup>a</sup>
Overall	37	2.795±0.146

Different superscript letters (a,b) in the same column indicate statistically significant differences, (\*:  $P < 0.05$ ; ns: non-significant)

As given in Table 1, effect of EM on dMY was also significant ( $P < 0.05$ ). This finding was found as parallel to the initial results those evaluated for AM. Really, the experience of a farm staff is highly related to his age, and this finding may be assumed to be an unsurprised case. The difference of dMY between two EM groups was calculated as 0.586 kg per milking cow. The results obtained here was found in contrary to the some study results of Atasever et al. (2015) and Bayram and Atasever (2020), who conducted the field researches in the same region.

EO significantly ( $P < 0.05$ ) affected dMY (Table 1). According to group means, farm owners who graduated high school obtained higher dMY from their milking buffaloes. In other word, milk production of the buffalo cows was affected by the EO. Ozcatalbas et al. (2010), who investigated the structural properties of dairy farms in Antalya province, informed that a high portion of the dairy farmers had illiterate and secondary level in education. In this manner, two studies show a parallelism by the EO issue.

As well known, cleanness of the milking area plays an important role not only on the health of the milking animal, but also on milk quality degree (Atasever and Erdem, 2009). In Table 1, the effect of HM on dMY is also presented. According to a 1 to 100 scale, the HM mean of the farms was calculated to be 81 points. By this table, farms with relatively lower and higher HM ratios were constituted to be 62.1% and 37.9%, respectively. However, farms with higher HM had 0.183 kg more dMY per buffalo cow in comparison with the other farms, but this value was found to be statistically insignificant.

Factors affecting dMY of Anatolian buffaloes are given in Table 2. Of these, milking type did not affect dMY, statistically. However, hand milking has been applied in many farms (64.9%). Çiftçi and Yılmaz (2019) also reported that hand milking was the only milking type in dairy cattle farms of Bitlis region. It may be regarded that hand milking is needed to higher labor force and it may be termed as relatively tiring process. However, it ensures an advantage for collecting the retained milk from the udder

gland. On the other hand, machine milking is more practical and less time consuming technique. In this context, both methods have some benefits into each other. In this study, relatively low dMY of milking buffalo cows might be commented to be the main reason of hand milking preference of the milkers. In another saying, the dairy animals with higher milk production would require machine milking in routine milking process in the farms.

In this study, MF was not an effective factor on dMY of Anatolian buffaloes those evaluated here. No statistical difference was determined between MF=1 and MF=2 groups and milking was routinely been applied 70.2% of whole farms once a day. This case might be associated with earlier comments for the farms where mainly performing hand milking. Namely, relatively low milk production of the evaluated buffalo cows might be regarded as the major reason of milking animals substantially once a day. Bademkiran et al. (2005) pointed out that increased MF encourages milk production in dairy herds. This information supports the statements revealed here for 1 or 2 MF levels.

As seen in Table 2, dMY was not significantly affected by UC1 and UC2. While 70.2% of the investigated farms had UC1 application, only 10.8% of the farms had UC2 process. However, dMY of milking buffaloes was not affected by UC1 and UC2 subgroups, statistically. Napolitano et al. (2005) emphasized a close relationship between the hygienic status of animals and the milk production level. To achieve more quality and hygienic raw milk, ensuring both UCU1 and UCU2 practices may be advised to buffalo farmers as the beneficial processes.

Normally, GF is known as useful practice that prevents the lying behavior of milking animals after milking process. Thus, the animals stand up to close sphincter muscle of the teats and thus, prevent the milk leakage (Klaas et al., 2005). In other words, GF indirectly prohibits mammary infections, such as mastitis. The farm numbers where GF practice was applied or not were similar and no statistical difference was found between two groups (Table

2). However, applying GF might be considered for elevating quality degree of raw milk apart from milk yield.

The mean of MD was calculated to be  $7.17 \pm 0.52$  min. Accordingly, dMY was evaluated by two MD subgroups as farms with  $\leq 7$  min and  $> 7$  min per milking buffalo cow. As seen in Table 2, the farm numbers were similar and the effect of MD on dMY was significant ( $P < 0.05$ ). Interestingly, lower MD had a positive effect on the milk production. Pullakhandam et al. (2004) indicated that oxytocin hormone stimulates milk secretion up to 5 min during the milking process, and after this time, milk secretion activity considerably drops. Obtained 0.678 kg higher dMY per buffalo cow in this study might likely provided by this concept.

## Conclusions

In this study, the effects of some farm characteristics and milking practices on the milk production levels of Anatolian buffalo cows were investigated. Of the traits, age and experience of milker, education level of the farm owner and milking duration were found as important environmental factors affecting milk yield.

In the view of the founded results, it is concluded that each factor that affect the milk production should exactly be regarded by the farm staff and proper milking programs should be prepared by farm owners according to these factors to boost the milk yield levels of their animals.

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