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EFFECTS OF CALVING AGE AND SEASON ON SOME MILK YIELD TRAITS IN ANATOLIAN BUFFALOES

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Abstract

The objective of the study was to investigate the non-genetic factors affecting the some milk yield traits of Anatolian buffalo raised at public hand in Amasya province, Turkey. A total of 239 buffalo calved in 2014 year were constituted the research material. Calving age and calving season were assessed as affecting non-genetic factors on daily milk yield (DMY), lactation milk yield (LMY) and lactation length (LL). The overall means of DMY, LMY and LL were 2.76±0.051 kg, 470.91±9.784 kg and 171.8±1.66 day, respectively. Calving age had a significant (P<0.05) effect on DMY and LMY, but its effect on LL was not significant. The effects of calving season on DMY, LMY and LL were not significant. DMY and LMY increase progressively until 8th calving age, and the highest milk yield found in the 8thage, then decline gradually in the 9th and 10th ages. The current results show that good selection programme and improvement management including for calving age could improve milk yield traits.

Key words*: Anatolian buffalo, calving season, daily milk yield, lactation milk yield, lactation length.*

INRODUCTION

Buffalo farming has been an important production source for Turkey. However, Turkey's buffalo population and its amount of production have declined dramatically during the last 40 years because of increasing demand for cattle production rather than buffalo production (Soysal, 2014).

Turkish water buffalo, which is called as Anatolian buffalo are practically classified as a river water buffalo of Mediterranean water buffaloes group (Cicek et al., 2009; Soysal, 2014). Buffaloes are having high capacity to face adverse environmental conditions and a remarkable longevity. Anatolian Buffalo breeding which is a traditional production model has great importance in the rural household economy with small holding of Turkey (Pawar et al., 2012). They are mostly bred in North, Middle, West, East, and Southeast Anatolia in Turkey (Atasever and Erdem, 2008). Anatolian buffaloes are a considerably preferred due to their resistance to diseases and lower feed consumption (Şahin et al., 2014). Most important reasons for rearing Anatolian water buffalos are their milk and meat (Soysal et al., 2015).

Lactation milk yield (LMY) and lactation length (LL)are important parameters of dairy buffaloes (Chaudhry, 1992). Milk yield in buffaloes are depended upon genetic and non-genetic factors. The non-genetic or environmental factors such as management, amount and quality of feed and season (Afzal et al., 2007; Pawar et al., 2012) are also closely interacted with animal's health and productivity (Kamble et al., 2014). The milk yield traits in buffaloes are influenced by numerous environmental factors (Zakariyya et al., 1995), for example calving age and calving season (Raza et al., 1999; Khosroshahi et al., 2011; Şahin and Ulutaş, 2015). In order to enhance productivity of a dairy buffalo cow, it is necessary to develop and understanding of the factors effecting its milk production (Afzal et al., 2007; Pawar et al., 2012). Only a few reports about these factors on milk yield and lactation length for Anatolian buffaloes. Thus, further studies are needed to determine on milk yield traits of Anatolian buffaloes. The objective of this investigation was to determine

the effects of non-genetic factors on some milk yield traits in Anatolian buffaloes.

MATERIALS AND METHODS

Data were obtained from the scope of the project of improvement of Anatolian buffalo in public hand supported by General Directorate of Agricultural Research and Policies in Amasya province.

Milk records collected a total of 239 Anatolian Buffalo cows calved 2014 year in Amasya province was used for the present study.

Milk records were obtained from individual farms. Abnormal records and lactations affected by disease were excluded from the study.

The milk production was calculated on monthly record. Buffaloes are milked one a day by hand and machine in the morning. They were fed *ad libitum* in shelter.

The lactating buffaloes grazed outside between the months of April to December, while being kept and fed indoors through the winter. The buffaloes were fed a total mixed ration all year round.

The data was classified according to eight calving ages (from 3 to 10) and four calving seasons' groups (autumn, winter, spring and summer).

The environmental factors were evaluated included calving age and birth season.

The statistical model assumed for the evaluation of environmental factors on daily milk yield (DMY), lactation milk yield (LMY) and lactation length (LL) were as fallows;

$\gamma_{ijk}=\mu + a_i + b_j + e_{ijk}$

γ_{ijk} = The k^{th}observation in the i^{th}calving age and j^{th}calving season

μ = overall mean,

a_i= effect of i^{th} calving age (*i: 3 to 10*)

b_j= effect of j^{th}calving season (*j: autumn, winter, spring and summer*)

e_{ijk} = random error.

Analyses were performed by the general linear model technique in SPSS for Windows statistical package programme (SPSS, 13.00). Duncan's multiple range test was used to find out difference between means within the same statistical package programme.

RESULTS AND DISCUSSIONS

Means of milk yield traits and standard error of means, and effective factors are given in Table 1. The overall means of DMY, LMY and LL were 2.76±0.051 kg, 470.91±9.784 kg and 171.8±1.66 day, respectively. Similar results were observed by Şekerden et al. (1999) for DMY, and Şahin and Ulutaş (2014) for LMY and LL in Anatolian buffaloes. The mean of DMY, LMY and LL were generally lower than the findings of Özenç et al. (2008), Soysal et al. (2015), Kücükkebapçı et al. (2015) and Ugurlu et al. (2015) for Anatolian buffalo. The difference may be due to various management and environmental conditions, herd and farm size (Afzal et al., 2007), variations in feed and fodder availability, sire used for breeding and their genetic potential (Jamuna et al., 2015).

Effect of calving age on DMY in present study was significantly important ($P<0.05$). DMY was the highest in buffaloes which calving in the 8th age, butthe lowest in the 3^{th} and 10^{th} age. Generally, DMY was increase progressive with age, especially between 4^{th} to 8^{th}ages, then reduce in the 9^{th} and 10^{th} age. The result of this study was closely in agreement with the results of Şahin and Ulutaş (2015) and Eskandari and Karimpour (2012), who found that effect of calving age on DMY was significantly important in Anatolian Buffalo and Iranian Khuzestan Buffalos, respectively. Similar to present study, Khosroshahi et al. (2011) reported that the first parity was significantly different from the others ($P<0.05$). In addition, Khosroshahi et al. (2011) also found that the lowest milk production was in the first calving ($P<0.05$).

In present study, DMY was not significantly affected by calving season. Similar results were obtained by other researches (Dutt and Yadav, 1986; Ghaffar et al., 1991; Jamuna et al., 2015), who season of calving had non-significant on DMY. It can be explained that climate stress factors may be minimize and overcome through better feeding and management (Afzal et al., 2007). The results of present study were not in line with the findings of Zaman et al. (2007), Khosroshahi et al. (2011); Şahin and Ulutaş (2015), who reported that the season of calving had a significant effect on DMY. Khosroshahi et al. (2011) stressed that Buffaloes calving in

the spring had the highest DMY, but lowest in the summer. Hassan Razaet al. (1999) showed that the highest milk production in Nili Ravi buffaloes was in autumn.

Table 1. Means of milk yield traits in Anatolian Buffaloes (Mean±SE)

Factors	Classes of the factors	Number	DMY (kg)	LMY (kg)	LL (day)
Calving age	3	54	2.60±0.107[b]	443.44±19.553[ab]	173.1±3.56
	4	37	2.79±0.111[ab]	470.53±21.607[ab]	168.5±3.46
	5	45	2.74±0.085[ab]	468.23±16.677[ab]	172.1±3.85
	6	33	2.86±0.133[ab]	490.85±28.692[ab]	170.6±4.27
	7	26	2.92±0.278[ab]	506.48±46.430[ab]	175.8±3.79
	8	12	3.14±0.169[a]	534.97±36.941[a]	170.6±7.82
	9	17	2.62±0.165[ab]	467.72±33.901[ab]	178.6±6.59
	10	15	2.61±0.106[b]	425.57±34.353[b]	162.9±10.52
Calving Season	Autumn	25	3.00±0.164	522.80±31.346	174.5±3.28
	Winter	30	2.69±0.090	474.05±20.730	176.5±4.47
	Spring	105	2.66±0.086	454.28±15.373	172.8±2.68
	Summer	79	2.84±0.084	475.39±17.104	167.8±2.89
	Overall	239	2.76±0.051	470.91±9.784	171.8±1.66

DMY: Daily Milk Yield, LMY: Lactation Milk Yield, LL: Lactation Length
[ab]: Means in the same column with no common superscripts differ (P<0.05)

Differences between this research results may be largely due to different management methods, environmental condition employed and different breed (Eskandari and Karimpour, 2012).

Calving age had a significant effect on LMY (P<0.05). The highest LMY determined in the 8th age, but lowest in the 10th age. LMY was increase progressively until 8th calving age, then decline gradually (Table 1). This is in agreement with the previous researches (Khosroshahi et al., 2011; Şahin and Ulutaş, 2015) reported that effect of calving season on LMY was significantly important. Afzal et al. (2007) determined that effect of parity on milk yield was statically important and milk yield did not differ between 2nd to 7th lactations. Swain and Bhatnagar (1983) found that mean lactation yield for 2nd to 9th parities were similar in Murrah buffaloes. Increased milk production in subsequent lactations is explained by maturation and continued to grow and mammary gland (Afzal et al., 2007; Pawar et al., 2012). Bashir et al. (2015) stressed that age may be more precise factor to be incorporated into models for lactation milk yield. Because, the culling of animals with lower production and reproduction contribute toward better lactation yield of herd in subsequent lactations (Khan, 1997). Conversely, Pawar et al. (2012) reported that effect of parity on LMY was not important.

In this study, LMY was not affected by calving season. Similarly, Ghaffaret al. (1991) reported a non-significant effect of season of calving was found on milk production in Nili-Ravi buffaloes. Conflicting reports on effect of season on milk production indicated that these stress factors might be overcome through better feeding and management (Afzal et al., 2007). However, the findings of Chaudhry (1992), Eskandari and Karimpour (2012), Pawar et al. (2012) and Bashir et al. (2015) did not confirm the findings of present study and they determined that season of calving had a significant effect on LMY. Patel and Tripathi (1998) also reported maximum milk yield in the winter calving and minimum in the autumn calving. In Italian buffaloes, milk yield was also maximum in winter calving and minimum in summer calving (Catillo et al., 2002). Afzal et al. (2007) founded that the buffaloes calving in spring showed the highest and those calving in summer showed the lowest milk yield.

LL is defined as number of days in which an animal has milk. In this study, effects of calving age and calving season on LL were not statistically significant. This finding is close to the finding of Chaudhry (1992) in Nili-Ravi buffaloes, which calving month on LL was not important. The controversy results were reported by Şahin and Ulutaş (2015) and they found that effects of calving age and calving season on LL were statistically important.

Bashir et al. (2015) found that LL influenced by season of calving. Khalil et al. (1992), who observed that spring calving had the longest LL in Egyptian buffaloes. Dhar and Deshpande (1995) noted that the means of LMY in summer calving were significantly higher than the other seasons. Differences in feed resources and environmental conditions were major determinants of variation among herds (Bashir et al., 2015).

CONCLUSIONS

The DMY and LMY of Anatolian buffaloes were significantly affected by calving age. However, the effect of calving age on LL was not important. The effect of the calving season on all milk yield traits was not important. Generally, DMY and LMY were increased with progressing of age, but decrease after 8th calving age. To conclude, calving age plays a major role on milk yield, good selection programme and improvement management including calving age could improve milk yield traits.

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