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RESEARCH ARTICLE

Environmental Factors Affecting Economically Important Traits of Anatolian Buffalo in Yozgat

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ABSTRACT

The aim of the study was to investigate the effects of some environmental factors on the growth, reproduction and production traits of Anatolian Buffaloes. The reproduction and production data of 1139 Anatolian buffaloes and the growth records of the calves between 2015 and 2019 in Yozgat province were used. The least-square means of the birth (BW), weaning (WW), sixth month (SMW) and yearling weights (YW) and daily gain between those traits were determined as 30.43, 97.79, 112.98, 169.40, 0.441, 0.459, 0.382 and 0.306 kgs respectively. Calving interval (CI) and service period (SP) were 470.08 and 150.08 days. Lactation milk yield (LMY), milk yield per day of lactation period (MY/LP), milk yield per day of CI (MY/CI), peak yield (PY), day at piek yield (DPY), and persistence (P) were found to be 860.40, 4.447, 1.916, 5.589 kgs, 83.34 days, and 77.35%. The effects of village and sex on BW, WW, SMW and YW were statistically significant ($P<0.05$) but the season affected all of these traits except for BW. Analysis of variance revealed all the environmental factors were significant on CI and SP. MY/LP and MY/CI weren't affected only by the season of calving and calving year respectively. The rest of the production traits were affected by all environmental factors. It was concluded that significant environmental factors such as the village, year, season, and age of the dam must be considered in farm management activities to improve the performances of Anatolian buffaloes.

Keywords: Anatolian buffalo, Economic traits, Environmental factors, Yozgat

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Yozgat İlinde Yetiştirilen Anadolu Mandalarında Ekonomik Özellikleri Etkileyen Çevresel Faktörler

ÖZ

Bu çalışma, Anadolu Mandalarının büyüme, üreme ve üretim özellikleri üzerine çevresel faktörlerin araştırılması amacıyla yapılmıştır. Bu amaçla Yozgat'ta 2015-2019 yılları arasında 1139 baş Anadolu mandasının üreme ve üretim verileri ile bunlardan doğan malakların büyüme verileri kullanılmıştır. Bu özellikler arasında doğum, sütten kesim, altıncı ay ve bir yaş ağırlığı ile bu özellikler arasındaki ortalama günlük canlı ağırlık kazancına ait en küçük kare ortalamaları sırasıyla 30,43; 97,79; 112,98; 169,40; 0,441; 0,459; 0,382 ve 0,306 kg'dır. Malaklama aralığı için en küçük kareler ortalaması 470,08 ve servis periyodu 150,08 gündür. Laktasyon süt verimi, laktasyonda ortalama günlük süt verimi, malaklama aralığında ortalama günlük süt verimi, pik verimi, pike ulaşım süresi ve süt veriminde inişe karşı direnme gücü en küçük kare ortalamaları 860,40; 4,447; 1,916 kg, 83,34 gün, 5,589±0,116 kg ve %77,35 olarak bulunmuştur. Doğum, sütten kesim, altıncı ay ve bir yaş ağırlığı üzerinde köy ve cinsiyetin etkisi istatistiksel olarak anlamlı bulunmuş ancak doğum ağırlığı hariç tüm bu özellikler mevsimden etkilenmiştir. Varyans analizi ayrıca tüm çevresel faktörlerin malaklama aralığı ve servis periyoduna anlamlı etkisi olduğunu ortaya çıkardı. Laktasyonda ortalama günlük süt verimini sadece buzağılama mevsimini etkilemezken, malaklama aralığında ortalama günlük süt verimini malaklama yılından etkilenmemiştir. Diğer süt verim özellikleri ise tüm çevresel faktörlerden etkilemiştir. Anadolu mandalarında verimlerin arttırılması için bakım ve idarede köy, yıl, mevsim ve ana yaşı gibi önemli çevresel faktörlerin dikkate alınması gerektiği sonucuna varılmıştır.

Anahtar Kelimeler: Anadolu mandası, Çevresel faktörler, Ekonomik özellikler, Yozgat

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INTRODUCTION

When the number of buffaloes is taken into account, buffalo breeding has kept its importance until recently in Türkiye. While the number of buffaloes was stated with millions in the 1970s, dropped to its lowest level in 2007. As a threatened animal, this breed was registered as an animal genetic resource and taken under protection in 2004. Protection was insufficient when the situation reassessment of the breed was due to its increasing commercial value. The Ministry of Agriculture and Forestry initiated a Community Based Anatolian Buffalo breeding project in 2011 (Kaplan et al. 2015). The importance of the Anatolian buffalo increases due to adaptation to environmental conditions, resistance to diseases, and the value of the products obtained from its meat and milk as well as the use of low quality roughage (Tekerli 2016; Soysal et al. 2018). In Türkiye, there are approximately 162000 buffaloes, which is one of the most important domestic animals in terms of genetic resources of the country (TUİK). Yields can be increased by improving the care, feeding and environmental factors of buffaloes. However, buffalo breeders to make plans for the future they need to know information about the yield levels of the animals in the aspect of effecting environmental factors. In addition, it is necessary to know both the traits on which selection is directed and significant factors to eliminate for calculating best breeding values. The aim of the study was to reveal the growth, reproductive, and productive traits of buffaloes and the environmental factors affecting them.

MATERIALS and METHODS

The data were obtained from the sub-project carried out in Yozgat province under the Community Based Anatolian Buffalo Breeding Project. The reproductive and productive data belonging to 1139 Anatolian buffaloes and growth records of their calves were used. BW, WW, SMW, YW, and daily gain among these traits are the growth parameters in the study. The reproductive parameters are CI and SP.

The production parameters are LMY, MY/LP, MY/CI, DPY, PY and P. The data provided by Manda Yılıdızı (Tekerli 2019), were used and controlled. Lactation lengths of less than 100 days and more than 365 days were not taken into account. The formula reported by Aziz et al. has utilized to calculate SP. In calculating the persistency, the modified coefficient of variation was used (Tekerli et al. 2001). Yozgat province is in the Central Anatolia Region and located between 34°05'-36°10' east meridians and 38°40'-40°18' north parallels. It is at an average altitude of 1300 meters above sea level and 15th among 81 provinces in terms of soil size. The basic economy of Yozgat is based on agriculture and animal husbandry. Villages and farms raising Anatolian buffaloes are distributed in 5 different counties, namely Akdağmadeni, Çekerek, Kadışehri, Merkez and Sorgun. Most of the buffalo breeders are engaged in both animal and plant production. The buffaloes are grown based on pasture by giving concentrated feed at different levels. Buffalo cows are inseminated naturally by bulls. Approximately 42% of the farms produce all or part of the feed they need. The average daily feed consumption of buffaloes consists of 9 kg forage and 4 kg concentrate. Buffalo cows spend half of the year as tied up in farms and the remaining half of the year is passed by grazing on the pasture all day. Milking is generally carried out by hand in the period between April and October (Kaplan et al. 2018). The least squares analysis was performed using the general linear model option of the Minitab (Minitab 2017). The significance levels of the differences between the groups were determined according to the TUKEY and FISHER. Statistical models used for the growth, reproduction and production traits are given below in their respective order.

$$Y_{ijklmno} = \mu + V_i + BY_j + BS_k + S_l + DA_m + AW_n + e_{ijklmno}$$ **Model [1]**

$$Y_{ijklm} = \mu + V_i + CY_j + CS_k + DA_l + e_{ijklm}$$ **Model [2]**

$$Y_{ijklmn} = \mu + V_i + CY_j + CS_k + DA_l + LP_m + e_{ijklmn}$$ **Model [3]**

Where; Y_{ijklmn}=observation, μ=overall mean, V=village, BY=birth year, BS=birth season, S=sex, DA=dam age, AW=age of weaning, CY=calving year, CS=calving season, LP=lactation period, $e_{ijklmno}$=error N (0, σ^2).

RESULTS

The least square means of the growth traits of calves different ages, reproduction and production traits of the cows and factors are presented in Table 1, 2 and 3. The village was significant (P<0.001) for all traits, showing that the changes in the care and feeding practices in the growing site could affect the growth and yield at a high level. The effect of the year was observed in birth and sixth month weights only (P<0.001). On the other hand, the season was found to be significant in the sixth month and one-year weights. It was determined that calves born in winter were heavier than those born in the other season. The sex had a significant effect on all traits and male calves were better than females in terms of weight. The least squares mean showed that only birth weight and DGSTM were affected by the age of dam from growth traits and calves born from cows older than seven years of age had higher birth weights than the others. Analysis of variance showed that the effect of weaning age on weight was significant (P<0.001).

This situation revealed that the breeders should care for calves to be suckled by their mothers. The significant (P<0.05; P<0.01; P<0.001) effects of village, year, and season on DGBSM and DGBTM indicated that these factors should be taken into consideration when determining the values of buffaloes in terms of these traits.

The reproductive traits were significantly (P<0.01; P<0.001) affected by environmental factors in ANOVA. The CI of cows delivered in the summer and autumn seasons was found to be longer. LMY was significantly (P<0.05; P<0.001) affected by all environmental factors. The fluctuations have shown significant differences in the care and feeding conditions according to the economic situations of the breeders, precipitation regime, drought, and so on. The highest milk yield was observed in cows that gave birth in the autumn and winter months. The least squares mean revealed that the buffaloes in Yozgat reached adult age yield in 7 or 10 years. The highest daily milk yield per day of calving interval was in the winter calvers showing that the most economical production is also realized in this season. While the highest peak yield was reached in the cows that calved in winter, the persistency in spring and summer calvers was better than the others. It was observed that the peak yield was affected by age (P<0.001) and increased gradually until 13. Even if the significance wasn't determined, the tendency of least squares means showed there is an opposite trend in the persistency.

Table 1. The least square result of the growth traits and daily gain between those traits of calves different ages and factors.

Factors	BW(kg)		WW(kg)		SMW(kg)		YM(kg)		DGBWW(kg)		DGBSM(kg)	
	n	$\bar{x}\pm s_{\bar{x}}$	*n*	$\bar{x}\pm s_{\bar{x}}$	*n*	$\bar{x}\pm s_{\bar{x}}$	*n*	$\bar{x}\pm s_{\bar{x}}$	*n*	$\bar{x}\pm s_{\bar{x}}$	*n*	$\bar{x}\pm s_{\bar{x}}$
μ	***2330***	***30.43±0.21***	***552***	**97.79±1.48**	***1808***	**112.98±1.13**	***1018***	**169.40±2.21**	***552***	**0.441±0.011**	***1808***	**0.459±0.0**
Year	p	***		NS		***		NS	p	NS		***
2016	*525*	30.13±0.27[b]	-	-	*483*	116.55±1.37[a]	*316*	169.84±2.57	-	-	*483*	0.480±0.0
2017	*551*	29.31±0.27[c]	-	-	*456*	115.51±1.39[a]	*303*	171.57±2.67	-	-	*456*	0.479±0.0
2018	*587*	30.62±0.27[b]	*104*	99.03±2.10	*496*	110.13±1.37[b]	*399*	166.79±2.55	*104*	0.451±0.015	*496*	0.442±0.0
2019	*667*	31.65±0.25[a]	*448*	96.55±1.30	*373*	109.74±1.54[b]	-	-	*448*	0.430±0.009	*373*	0.434±0.0
Season	p	NS		*		***		**	p	**		***
winter	*249*	30.47±0.33	*71*	100.81±2.23[a]	*220*	119.76±1.60[a]	*102*	177.41±3.12[a]	*71*	0.476±0.016[a]	*220*	0.496±0.0
spring	*1430*	30.72±0.17	*371*	98.29±1.40[ab]	*1222*	113.34±0.94[b]	*707*	168.93±1.62[ab]	*371*	0.432±0.010[b]	*1222*	0.459±0.0
summer	*556*	30.18±0.24	*110*	94.28±2.18[b]	*315*	107.55±1.39[c]	*189*	162.93±2.45[b]	*110*	0.414±0.016[b]	*315*	0.430±0.0
autumn	*95*	30.34±0.49	-	-	*51*	111.27±2.99[bc]	*20*	168.34±6.60[ab]	-	-	*51*	0.450±0.0
Sex	p	***		**		***		***	p	NS		***
female	*1145*	29.62±0.23[b]	*283*	96.00±1.63[b]	*908*	110.09±1.23[b]	*492*	162.24±2.41[b]	*283*	0.434±0.012	*908*	0.448±0.0
male	*1185*	31.24±0.23[a]	*269*	99.58±2.18[a]	*900*	115.87±1.23[a]	*526*	176.57±2.38[a]	*269*	0.446±0.012	*900*	0.470±0.0
Age of dam	p	***		NS		NS		NS	p	NS		NS
...< 4	*460*	29.19±0.27[c]	*104*	96.53±2.00	*364*	110.69±1.41	*193*	169.79±2.79	*104*	0.437±0.014	*364*	0.453±0.0
4≤…<7	*849*	30.16±0.23[b]	*177*	98.09±1.63	*673*	112.63±1.21	*385*	167.53±2.34	*177*	0.445±0.012	*673*	0.458±0.0
7≤…<10	*597*	30.84±0.25[a]	*150*	97.86±1.79	*451*	112.43±1.36	*256*	170.58±2.62	*150*	0.436±0.013	*451*	0.453±0.0
10≤…<13	*314*	30.64±0.31[ab]	*84*	100.66±2.11	*237*	114.37±1.64	*141*	172.12±3.11	*84*	0.454±0.015	*237*	0.465±0.0
13≤…<22	*110*	31.31±0.47[a]	*37*	95.81±3.00	*83*	114.79±2.45	*43*	167.00±4.79	*37*	0.431±0.021	*83*	0.464±0.0
Age of weaning weight			p	***					p	NS		
90≤...<135	-	-	*295*	82.66±1.33[c]	-	-	-	-	*295*	0.448±0.010	-	-
135≤…<180	-	-	*207*	95.89±1.76[b]	-	-	-	-	*207*	0.432±0.013	-	-
180≤…<217	-	-	*50*	114.82±2.72[a]	-	-	-	-	*50*	0.441±0.020	-	-

DGBWW; Daily gain between birth weaning. DGBSM; Daily gain between birth and six month. DGSTM; Daily gain between six and twelve month. Village: This factor is highly sig
importance level is not shown in the table; NS: non-significant (P>0.05); *P<0.05; **P<0.001; a, b, c, Differences between groups with different letters in the same column are signif

Table 2. The least square result of the reproduction traits of cows and factors.

Factors	CI(day)		SP(day)	
	n	$x \pm S_{x}$	*n*	$x \pm S_{x}$
µ	***653***	**470.08±9.32**	***653***	**150.08±9.32**
Calving year				
2016	*210*	489.70 ±11.30[a]	*210*	169.10 ±11.30[a]
2017	*234*	482.40±10.40[a]	*234*	162.40±10.40[a]
2018	*209*	438.80±11.00[b]	*209*	158.80±11.00[b]
	p	***		****
Calving season				
winter	*97*	441.30±12.00[b]	*97*	121.30±12.00[b]
spring	*435*	450.32±7.22[b]	*435*	130.32±7.22[b]
summer	*105*	486.70±11.10[a]	*105*	166.70±11.10[a]
autumn	*16*	502.00±25.40[a]	*16*	182.00±25.40[a]
	p	**		**
Age of calving (year)				
...<4	*145*	501.20±10.90[a]	*145*	181.20±10.90[a]
4≤…<7	*233*	467.75±9.78[b]	*233*	147.75±9.78[b]
7≤…<10	*170*	467.30±10.20[b]	*170*	147.30±10.20[b]
10≤…<13	*86*	470.80±13.10[b]	*86*	150.80±13.10[b]
13≤…<20	*19*	443.30±24.00[b]	*19*	123.30±24.00[b]
	p	**		**

Village: This factor is highly significant for all traits and has so many subclasses, because of the importance level is not shown in the table; NS: non-significant (P>0.05); *P<0.05; **P<0.001; [a, b, c,] Differences between groups with different letters in the same column are significant.

Table 3. The least square result of the production traits of cows and factors.

Factors		LMY(kg)		MY/LP(kg)		MY/CI(kg)		DPY(day)	
		N	$\bar{x}\pm S_{\bar{x}}$	*n*	$\bar{x}\pm S_{\bar{x}}$	*n*	$\bar{x}\pm S_{\bar{x}}$	*n*	$\bar{x}\pm S_{\bar{x}}$
	µ	***923***	**860.40±17.60**	***923***	**4.447±0.095**	***334***	**1.916 ±0.082**	**921**	**83.34±3.34**
Calving year	2016	*228*	797.10±21.30^{b}	*228*	4.282±0.113^{b}	*110*	1.654±0.100^{b}	*228*	80.88±4.00^{b}
	2017	*206*	908.40±22.10^{a}	*206*	4.909±0.119^{a}	*114*	1.831±0.091^{b}	*226*	84.08±4.06^{ab}
	2018	*280*	918.20±21.30^{a}	*280*	4.615±0.115^{a}	*110*	2.298±0.103^{a}	*283*	93.57±3.97^{a}
	2019	*209*	817.90±24.30^{b}	*209*	4.103±0.130^{b}	-	-	*184*	74.82±4.66^{b}
		P	***		***		***		***
Calving season	winter	*129*	926.80±23.60^{a}	*129*	4.640±0.124	*58*	2.342±0.106^{a}	*126*	95.02±4.33^{a}
	spring	*631*	836.70 ±14.40^{b}	*631*	4.549±0.077	*225*	1.942±0.065^{b}	*634*	70.30±2.66^{b}
	summer	*142*	796.90 ±21.20^{b}	*142*	4.424±0.111	*40*	1.611±0.117^{c}	*141*	67.35±3.90^{b}
	autumn	*21*	881.20±49.90^{ab}	*21*	4.297±0.270	*11*	1.816±0.218^{bc}	*20*	100.69±9.55^{a}
		P	***		NS		***		***
Age of calving (year)	...<4	*179*	821.50±22.70^{b}	*179*	4.258±0.123^{b}	*67*	1.743±0.106	*177*	95.41±4.31^{a}
	4≤…<7	*336*	862.30±19.70^{ab}	*336*	4.453±0.107^{ab}	*121*	1.923±0.090	*334*	84.44±3.72^{b}
	7≤…<10	*234*	900.90±20.50^{a}	*234*	4.661±0.111^{a}	*88*	1.996±0.094	*233*	81.12±3.90^{b}
	10≤…<13	*126*	857.30±25.00^{ab}	*126*	4.537±0.135^{ab}	*46*	1.868±0.120	*130*	77.18±4.73^{b}
	13≤…<20	*48*	860.00±35.30^{ab}	*48*	4.477±0.191^{ab}	*12*	2.108±0.210	*47*	78.54±6.67^{b}
		P	*		*		NS		**
Lactation period (day)	100≤...<160	*229*	671.60±21.90^{c}	-	-	-	-	-	-
	160≤…<220	*450*	873.40±20.10^{b}	-	-	-	-	-	-
	220≤…<366	*244*	1036.30±21.90^{a}	-	-	-	-	-	-
		P	***						

Village: This factor is highly significant for all traits and has so many subclasses, because of the importance level is not shown in the table; NS: non-significant (P>0.05); *P<0.05; **P< in the same column are significant.

DISCUSSION

While the birth, weaning, and sixth-month weights are similar to the values determined (Shahin et al., 2010; Çelikeloğlu et al., 2015; Iam 2019) in different buffalo breeds, they are slightly ahead of the others (Thiruvenkadan et al. 2009; Akhtar et al. 2012; Uğurlu et al. 2016). Weight at one year was between the ranges (134.20-188.83 kg) reported by some researchers (Thiruvenkadan et al. 2009; Shahin et al. 2010; Akhtar et al. 2012; Çelikeloğlu et al. 2015). Village and sex significantly ($P<0.05$) affected all of these traits. While some researchers (Thiruvenkadan et al. 2009; Akhtar et al. 2012; Uğurlu et al. 2016; Iam 2019) found the effects of year, season, sex, and age of dam on birth weight to be similarly significant, Çelikeloğlu et al (2015) stated that the effect of age of dam was not significant. Akhtar et al (2012) showed that the effect of the year of birth, season, and age of dam was significant on WW in Nili Ravi. This was compatible with the present study. The significant effect of sex and dam age on sixth-month weight in Anatolian buffaloes notified Çelikeloğlu et al (2015) was consistent with the present study, but the result of Thiruvenkadan et al. in Murrah buffaloes was different. In one-year weight, our findings were similar to the consequence of significant seasonal effects in Nili Ravi by Akhtar et al. But the effects of birth season in Murrah, and sex in Anatolian buffaloes were not found to be similar (Thiruvenkadan et al. 2009; Çelikeloğlu et al. 2015). Differences may be due to breed, husbandry, climate, care and feeding. It was determined that the effect of village and birth season on DGBWW was significant ($P<0.01$) in Egypt and Nili Ravi buffaloes (Shahin et al. 2010; Akhtar et al. 2012). While the findings of our study were consistent with the report of Akhtar et al (2012) on the birth season, contradicted in year and dam age. The effects of village, season, year, and sex on DGBSM and DGBTM traits are significant ($P<0.05$; $P<0.001$). This situation is different from the nonsignificant determination for the effect of year and season by Shahjahan et al (2017). The CI is between 385 and 560 days reported in Anatolian and Murrah buffaloes (Tekerli et al. 2001; Küçükkebapçı and Aslan 2002; Şekerden 2013; Dev et al. 2016; Soysal et al. 2018; Patil et al. 2018; Koçak et al. 2019; Alkoyak and Öz 2020). These researchers stated that the long CI may be due to lactation stress especially in high-yielding buffaloes, and the seasonality of reproduction. While the SP is slightly below the values reported by different researchers (Cady et al. 1983; Mostafa et al. 2017; Patil et al. 2018) in Murrah, Nili Ravi, and Egyptian buffaloes, it is among the values reported in Anatolian buffaloes (Küçükkebapçı and Aslan 2002). It was determined that these two reproductive traits were significantly ($P<0.01$) affected by all of the factors. This finding is compatible with the significant determination of the region, year, season and age effect detected in Anatolian, Murrah and Nili Ravi (Cady et al. 1983; Tekerli et al. 2001; Dev et al. 2016; Patil et al. 2018; Soysal et al. 2018; Koçak et al. 2019; Alkoyak and Öz 2020). LMY is between 894-1223 kg reported in Anatolian buffaloes (Tekerli et al. 2001; Borghese 2005; Tekerli 2016; Soysal et al. 2018; Koçak et al. 2019; Alkoyak and Öz 2020). However, it is slightly below the values reported in Nili Ravi, Murrah and Egyptian buffaloes (Bashir et al. 2015; Pandey et al. 2015; Sigdel et al. 2015; Dev et al. 2016; Mostafa et al. 2017; Patil et al. 2018; Iam 2019). This may be due to differences in breed, geographical and breeding conditions. The lack of controlled selection before the breeding project may have been effective in this fact. Lactation milk yield was significantly ($P<0.05$) affected by village, calving year, season, age and lactation period. This finding is consistent with the results of Cady et al (1983) and Bashir et al (2015). Different researchers (Soysal et al. 2018; Koçak et al. 2019; Akolyak and Öz 2020) found the effect of calving year, season and age to be significant, similar to this study. MY/LP is just below 5.08 kg per buffalo reported by Borghese in Anatolian buffaloes. In addition, this finding is behind reports (Sigdel et al. 2015; Dev et al. 2016; Patil et al. 2018) in Murrah buffaloes. MY/LP was significantly ($P<0.05$) affected by the village, calving year and age. This finding is consistent with the significant determination of the effect of year, season and age in Murrahs (Sigdel et al. 2015; Dev et al. 2016; Patil et al. 2018). MY/CI is below the values found in Murrahs (Jakhar et al. 2017; Patil et al. 2018). This trait was significantly ($P<0.05$) affected by the village, calving year and season. This finding is harmonious with the reports of Jakhar et al. and Patil et al in Murrah buffaloes. DPY is longer than determined (Tekerli et al. 2001; Thiruvenkadan 2011; Galsar et al. 2016) in Anatolian, Murrah and Mehsana buffaloes. DPY is affected by all factors with a moderate significance ($P<0.01$). This finding is consistent with the report of the significant period and season effect in Anatolian and Murrahs (Tekerli et al. 2001; Thiruvenkadan 2011). PY is lower than stated in different buffalo breeds (Tekerli et al. 2001; Thiruvenkadan 2011; Dev et al. 2016; Galsar et al. 2016; Patil et al. 2018). PY is significantly ($P<0.05$) affected by all of the factors. This finding is consistent with Tekerli et al (2001), Thiruvenkadan (2011), and Dev et al (2016) in terms of period effect. Persistence was behind the reports (Chaudhry et al. 2000; Mostafa et al. 2017) in Nili Ravi and Bulgarian Murrah, and ahead of Anatolian and Egyptian buffaloes (Tekerli et al. 2001; Elmaghraby 2010). The method of calculating the persistence and the number of data may have caused the difference. This trait was significantly ($P<0.05$) affected by the village, calving year, and season. This finding is consistent with the

reports of different researchers (Chaudhry et al. 2000; Penchev and Peeva 2013) in terms of year, period and seasonal effects.

CONCLUSION

As a conclusion, since the examined traits are affected by environmental factors, care and management should be arranged accordingly and this should be taken into account in the selection of breeder animals. The environmental factors should be considered for stable production. The seasonal breeding tendency should be considered and investigated with the aspects of the reasons. The increase in demand of customers in winter months should not be ignored from an economic point of view. It has been concluded that the milk yield increases until the age of 7 to 10 years in the buffaloes in Yozgat, and the performance decreases after the age of 13, so it is not beneficial to keep the older buffalo cows.

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