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THE EFFECT OF CLIMATIC CONDITIONS AND BIRTH WEIGHT ON AGE AT FIRST FERTILE ESTRUS IN ANATOLIAN WATER BUFFALOES

Mustafa GÜNDOĞAN[1] **Mehmet UÇAR**[1] **Mustafa TEKERLI**[1]

Anadolu mandalarında ilk fertil östrus yaşı üzerine doğum ağırlığı ve iklimin etkisi

ÖZET

Bu çalışmada, Anadolu mandalarının östrus ve buzağılama kayıtları, ilk fertil östrus yaşları üzerine doğum ağırlığı ve iklim koşullarının etkisini araştırmak için değerlendirildi. En yüksek seksüel aktivite (%59.8) 800-1100 gün arasında belirlendi ve ortalama ilk fertil östrus yaşı 917.7 ± 103.3 gün (yaklaşık 33 ay) olarak bulundu. Bütün hayvanların yarıdan fazlasında (%52.4), yılın en sıcak dönemi olan Haziran ile Ağustos ayları arasında yoğunlaşan iklimsel model gözlendi. Yıl, mevsim, doğum ağırlığı (31.3 ± 0.8 kg), gün uzunluğu ve nisbi nem oranının ilk fertil östrus yaşı üzerine etkisi bulunmamasına rağmen yağış miktarı ve çevre sıcaklığının etkisi düşük düzeyde önemli (P<0.10) olmuştur.

ANAHTAR KELİMELER: Yaş, doğum ağırlığı, manda, iklim, östrus.

SUMMARY

In this study, estrus and calving records of Anatolian water buffaloes were analysed to investigate the influence of climatic conditions and birth weight on the age at first fertile estrus of Anatolian water buffaloes. The highest sexual activity (59.8 %) was found between 800 and 1100 days, and the average age at first fertile estrus was 917.7 ± 103.3 days (33 months approximate). More than half (52.4 %) of the total animals showed a climatic conditional pattern concentrated between June and August which is the warmest period of the year. Although year, season, birth weight (31.3 ± 0.8 kg), day length and relative humidity had no significant effects on age at first fertile estrus, the effects of rainfall and ambient temperature were found significant (P< 0.10) at a lower rate.

KEY WORDS: Age, birth weight, buffalo, climate, estrus.

INTRODUCTION

Compared to cattle, the first insemination time is at the later age in the buffaloes. Age at first fertile estrus is affected by many factors directly or indirectly (Ahmad et al., 1981; Kumar et al., 1993; Madhu and Kodagali, 1983; Sing et al., 2000; Taylor et al., 1990a; Vale 1994). The climate affects the reproductive activity directly in buffaloes whereas the effect of feeding is indirect. Among the factors identified for the seasonality of reproduction are rainfall, relative humidity, day length, feed supply and environmental temperatures. Limited reports have been released in this subject. The economic importance of buffaloes related with the milk and meat production and drought power of these animals. These traits could not be ignored in developing countries.

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1: A.K.U. Veterinarian Faculty, AFYON.

Therefore, the aim of the present study was to evaluate the influence of certain factor on the age at first fertile estrus of the Anatolian water buffaloes maintained at the Afyon continental climate conditions in Turkey.

MATERIALS AND METHODS

The breeding records of Anatolian buffaloes maintained at the Afyon Kocatepe Agricultural Research Institute between 1984 and 1993 were used in the study. A total of 82 age at first fertile estrus and birth weight records were analysed. The first getting pregnancy was regarded as the first fertile estrus. The information on monthly variations of the years (1984 to 1993) in ambient temperature, relative humidity, rainfall and day length were obtained from the local meteorological station. The records of year 1990 were excluded, because of the limited data. The day length was categorised as ≤10 h and >10 h. According to

prevailing climatic conditions in Turkey, the season were divided into four group [December, January, February (Winter); March, April, May (Spring); June, July, August (Summer); September, October, November (Autumn)]. The effect of different factors on age at first fertile estrus were analysed by Harvey computer program (Harvey 1987).

RESULTS

The results of ANOVA for age at first fertile estrus are shown in Table 1. The overall mean of age at first fertile estrus was 917.7 (SEM 103.3) days. The effects of year, season, day length, birth weight and relative humidity were found not to be significant on this trait. Meanwhile environmental temperature and rainfall had significant effect at a lower rate (P<0.10).

Table 1. Analysis of Variance for Age at First Oestrus.

Factors	Adjusted means	SEM
Overall means	917.7	103.3
Year		
1984	942.1	135.7
1985	816.1	133.1
1986	793.8	156.4
1987	981.2	145.9
1988	1005.5	167.5
1989	943.6	130.1
1991	1044.4	170.1
1992	785.7	201.9
1993	947.4	151.3
Season		
Winter	602.9	207.4
Spring	889.6	193.4
Summer	1197.8	159.8
Autumn	980.7	125.4
Day length (h)		
≤ 10	937.7	279.3
> 10	897.8	112.3
Regression on birth weight (kg)	-1.9	8.9
Temperature (°C)	-29.4 †	16.9
Humidity (%)	-11.4	13.3
Rainfall (mm)	5.1 †	2.7

†: P < 0.10

The annual variation of age at first fertile estrus and number of insemination and calving animals and average ambient temperature, day length, relative humidity and rainfall in Afyon province of Turkey were shown in Figures 1 and 2.

Despite year, season, birth weight, day length and relative humidity had no significant effects on age at first fertile estrus. The age at first fertile estrus was determined between 800 and 1100 days and insemination records showed a monthly pattern concentrated between June and August. Likewise, annual distribution of calvings concentrated between May and July. Birth weight range are 21 to 40 kg and average weight is 31.3 (SEM 0.8) kg.

DISCUSSION

A few studies reported that the age at first fertile estrus are 30-36 months for Nili-Ravi buffalo heifers, 21-24 months for swamp buffaloes and 15-18 months for river buffaloes (Ahmad et al., 1981; Gordon 1996; Jainudeen 1983), 16 months for Surti and 20 months for Murrah buffaloes in Bulgaria (Alexiev 1998), 13-15 months for Murrah x Mediterranean crosbred in Amazon areas of Brazil (Vale 1994) and 9.9-24.9 months for Egyptian buffaloes (Nigm 1996). In the present study, the average age at first fertile estrus was 917.7 ± 103.3 days (about 33 months) for Anatolian water buffaloes. The ages at first fertile estrus in all buffaloes were in the range of literatures (Ahmad et al., 1981; Gordon 1996; Jainudeen 1983). The differences might be due to breed, feeding and managment and climatic conditions.

Seasonal pattern of estrous and conception in buffaloes maintained under farm and village conditions has been documented by many studies (Kaur and Arora 1982, Sing and Madan 1999, Srivastava and Sahni 1999, Tailor et al. 1990b, Vale 1994). Dahama (1991) reported that although oestrus occured during all the months of the year, most of the animals showed oestrus between September and March and a negative correlation of oestrus expressivity with temperature was observed in buffaloes in rural areas of Northern India. In Jaffarabadi buffaloes also, expression of oestrus was found to be negatively correlated with temperature and relative humidity (Bhatacharya and Dhanda, 1988). Similarly, the regression coefficients on temperature and humidity were also negative, but non-significant or lower rate. The significance could be too small to find in these data.

Studies on estrus behaviour in Murrah and Surti buffaloes in Southern India (Kumar et al., 1993) revealed that decreased light exposure during the winter months had a positive effect on estrous activity in Murrah buffaloes, most of which expressed oestrus during this period. However, this was not the case with Surti buffaloes, as oestrus expression was found throughout the year at similar frequencies, even during June-August. Similar observations were recorded in Murrah buffaloes by Sing and Lal (1994), greater numbers of inseminations being done in autumn and winter than during the summer season. Sing (1988) described a favourite breeding season between September and January for Indian buffaloes. Constantly, Taylor et al. (1990b) reported that more than 60 % of buffaloes were mated between October and December, while only 17.8 % of buffalo cows displayed oestrus between February and August in India. Although estrus occurred during all the months of the year and there was no significant effect of day length and season on age at first fertile estrus in this study, in more than half of the animals (52.4 %) first estrus evaluated in this study were concentrated between June and August which is the warmest period of the year in Afyon province located at latitude 380 45´ N and longitude 300 320 E in Anatolia.

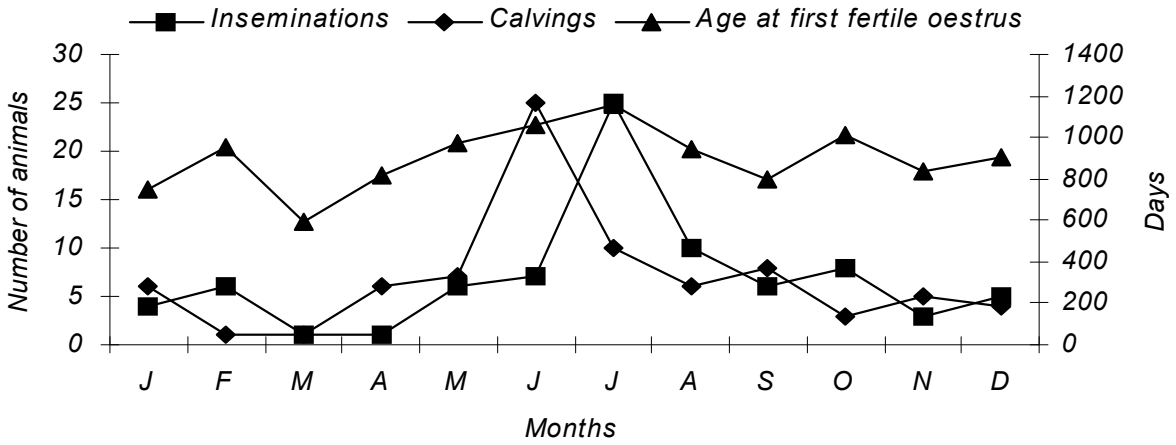

Figure 1. Annual Variation of Age at First Fertile Estrus (days) and The Number of Insemination and Calving Animals in Anatolian Water Buffaloes (n= 82)

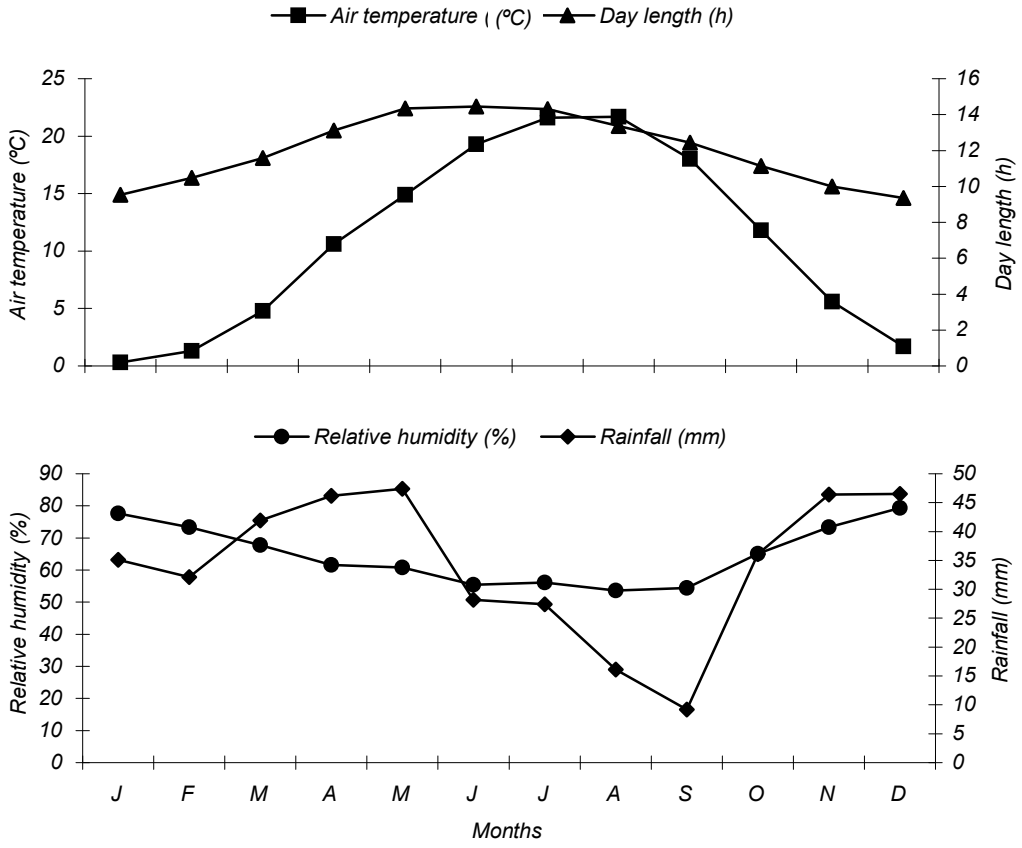

Figure 2. Annual Variation of Average Ambient Temperature (ºC), Day Length (h), Relative Humidity (%) and Rainfall (mm) in Afyon Province in Turkey During The Study.

Esposito et al. (1992) reported that the favourite calving season is between June and November for the buffalo cows in Italy. In the present study, we have observed that most of the animals had calved between May and July. This result was in agreement with the Dahama (1991), Kumar et al. (1993) and Taylor et al. (1990a). The differences might be due to geographical conditions.

The results of this study showed that the distribution of age at first fertile estrus might be

seasonal but because of the limited data of the findings of the study could not be enough to reveal the seasonality. Therefore the further studies in this subject will be useful.

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