



Short Communication

Factors Affecting the Birth Weight of Cholistani Cattle Calves

F. Shahzad*, M. Yaqoob¹, M. Younas¹, U. Farooq, F. Sher², M. Asim², S. Qamar², M. Akbar³ and I. Irshad⁴

University College of Veterinary and Animal Sciences, The Islamia University of Bahawalpur, ¹Department of Livestock Management, University of Agriculture, Faisalabad, ²Govt. Livestock Farm, Jugait Peer, Bahawalpur, ³Department of Statistics, The Islamia University of Bahawalpur, Pakistan, ⁴University of Veterinary and Animal Sciences, Lahore, Pakistan

*Corresponding Author: faisalshehzad76@yahoo.com

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ABSTRACT

Effect of year, season and lactation number on birth weight of Cholistani calves was determined by analyzing the data of 709 cows recorded at Government Livestock Farm, Jugait Peer, district Bahawalpur during the years 1999-2007. The Cholistani calves showed a mean birth weight of 19.13 ± 0.06 Kg and was significantly affected by year ($P < 0.05$), calf sex ($P < 0.01$) and lactation number ($P < 0.05$). Male calves were heavier than the female (19.53 vs 19.04 Kg).

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INTRODUCTION

Birth weight is a characteristic of great economic importance in the cattle industry. In dairy cattle, this trait has been comprehensively studied by different researchers in several places among different breeds. Differences between birth weights of calves are also used as an indication of differences between them in vigor, potential growth rate and mature size. It is not only an easy and reliable measurement of prenatal period, but also an important factor that affects the postnatal growth and development (Akubulut *et al.*, 2001). It has been demonstrated that calves having too small live weight at birth may lack vigor and tolerance to external conditions (Johanson and Berger, 2003). Various degrees of dystocia may occur in calves that are too large at birth (Bakir *et al.*, 2004). The effect of various environmental factors such as farm, period of fodder availability, parity, and calving season on birth weight of cattle calves has been reported (Swali and Wathes, 2006). Considerable research work on Red Sindhi and Sahiwal breeds of cattle has been done, however, research data regarding Cholistani breed is still very scanty. An attempt, therefore, has been made in this study to assess the factors influencing birth weight of Cholistani cattle calves kept at Government Livestock Farm, Jugait Peer, district Bahawalpur.

MATERIALS AND METHODS

Data on 709 Cholistani cattle calves maintained at the Government Livestock Farm, Jugait Peer, district Bahawalpur during 1999-2007 were utilized to study the effect of various environmental factors on the birth weight. The parameters included the year of calving, birth weight, sex of calf, lactation number and period of fodders availability. In order to determine the effect of period of fodder availability on the birth weight the following feeding periods were designed: P1 {April –July: feeding practices - Sadabahar, Sorghum (Jumbo), Bajra, Maize and concentrate}, P2 {August – November: feeding practices - Sadabahar, Bajra, Maize, grazing and concentrate and P3 {December-March: feeding practices - Berseem, Lucern, Javi, Sarsoon and concentrate}. The calving months were grouped into 4 seasons: Spring (16 February–15 May), Summer (16 May -15 August), Autumn (16 August -15 November) and Winter (15 November- 15 February), and Lactation numbers were listed numerically.

The mathematical model for the analysis included fixed effects of year, sex, season of birth, lactation number and three different feeding regimes mentioned above. Data were analyzed using Harvey's Mixed Model Least Squares and Maximum Likelihood Computer Programme (Harvey, 1990). The general mathematical model for parameters of interest is given below:

$$Y_{ij} = \mu + F_i + \varepsilon_{ij}$$

μ = is the population mean

F_i = is set of all fixed effects considered to have some effect on a particular trait

ε_{ij} = is random error associated with each observation

Y_{ij} = is j th observation in i th factor

Significant differences among the means were determined by Duncan's multiple-range test.

RESULTS AND DISCUSSION

The analysis of variance showed that all the studied factors had significant effects ($P < 0.01$) on birth weight except period of fodder availability and season of birth. Estimates of least-squares means and standard errors by year, season, calf sex, and lactation number are shown in Table 1.

Table 1: Least squares means and standard errors for birth weight (Kg) of Cholistani cattle calves.

Factors	N	Mean \pm SE
Year of birth		
1999	32	18.70 \pm 0.24 ^b
2000	39	19.08 \pm 0.15 ^b
2001	72	18.71 \pm 0.16 ^b
2002	89	17.62 \pm 0.15 ^b
2003	80	18.81 \pm 0.19 ^c
2004	98	20.55 \pm 0.15 ^a
2005	119	19.25 \pm 0.14 ^b
2006	68	19.70 \pm 0.17 ^a
2007	58	21.12 \pm 0.19 ^a
Sex		
Male	380	19.53 \pm 0.09 ^a
Female	329	19.04 \pm 0.10 ^b
Periods of fodder availability		
P1 (April – July)	310	19.18 \pm 0.15
P2 (August – November)	205	19.18 \pm 0.13
P3 (December-March)	194	19.48 \pm 0.16
Season of birth		
Spring	215	19.39 \pm 0.19
Summer	163	19.00 \pm 0.19
Autumn	132	19.23 \pm 0.19
Winter	199	19.51 \pm 0.18
Lactation number		
1-2	258	18.64 \pm 0.094 ^b
3-4	137	19.32 \pm 0.136 ^b
5-6	127	19.46 \pm 0.140 ^a
7-9	91	19.34 \pm 0.197 ^b
9-11	74	19.62 \pm 0.210 ^a
12-15	22	19.09 \pm 0.377 ^b
Overall mean	709	19.13 \pm 0.06

Values followed by different superscripts within each column differ significantly ($P < 0.05$).

In general, calves born during 2004-2007 were heavier than those born during 1999-2003. Similar results for the effect of years on birth weight have been reported by earlier workers (Bilgic and Alic, 2004). In the present study, the variation in birth weight due to year could be attributed to improved feeding and other management conditions over the years.

Male calves had significantly higher ($P < 0.01$) birth weights than females by 0.49Kg. This was in agreement with the findings of Nix *et al.* (1998) and Bakir *et al.* (2004). This was attributed to the longer gestation period of male calves or higher androgen concentration in male fetuses (Spencer, 1982). The findings of present study also confirmed to those many workers (Akubulut *et al.*, 2002). They found that effect of sex on birth weight was significant.

The period of fodder availability and season of birth had non-significant effect on birth weight. However, the calves born during the period P1 were heavier than those born during P2 and P3. These results were in agreement with previous studies (Akubulut *et al.*, 2001; Bakir *et al.*, 2004). Calves born during early lactations were lighter in weight than those born during late lactations. This finding agrees with the findings of various workers (Johanson and Berger, 2003; Swali and Wathes, 2006). The cows during early lactations were not fully grown and thus continued to grow till attaining in adult size. This appeared to influence the birth weight of calves born later.

It can be concluded that year, sex and lactation number affects the birth weights of calves and further studies are required to understand the complex nature of factors affecting the birth weight of Cholistani calves in their home tract.

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