FACTORS ASSOCIATED WITH BIRTH WEIGHT OF CALVES IN NILI RAVI BUFFALOES AT BRI PATTOKI, PUNJAB

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ABSTRACT: This study was made to determine the effects of herd, year, season, lactation number and sex on calf's birth weight in Nili Ravi Buffalo. The data from 1975-2017 was taken in 15525 edited observations of 6932 buffaloes from six institutional herds. The year was divided into four seasons viz (December to February, March to May, June to August and September to November) to evaluate the real effects of herd x year and season. To analyze the data SPSS version 19, statistical package was used. The mean ± S.E of birth weight was calculated as 35.18±.018Kg. The mean of birth weight of male and female calf were as 35.82 ± 0.19Kg and 34.53 ± 0.18Kg, affected by herd-year-season, sex and lactation number (P<0.01) while the effect of gestation period and age of dam was non-significant. The sex ratio between male and female was 51.25 and 48.74 respectively. It was observed that calf's birth weight had significant effect on milk production.

Keywords: Birth Weight, Nili Ravi, Season, Milk Production.

(Received 01.02.22 Accepted 01.03.2022)

INTRODUCTION

Water buffalo is a major dairy animal of Pakistan and contributing more than 60% in total milk production (Anonymous, 2016-17). A large proportion of 37.7 million head of buffalo population is present in Punjab. As human population is increasing so it is essential to increase the production level of animals accordingly. In order to increase the production, this requisite to know points that have effects on production. The weight of the calf is closely related with survival rate, growth performance and replacement of future herd. No doubt, it is well understood that the dam and sire of a calf play a role in the genetically predicted birth weight of a calf; other factors do come into play. It is important to keep the other factors in mind that impact the birth weights of calves to help ensure a successful and prosperous calving season. Other factors which affect birth weight are environmental such as sex of calf, lactation number, herd year season etc (Akcapiner and Ozbeyaz, 1999;Akdog *et al*.2011). Low birth weight causes more morbidity and mortality as compared to higher birth weight by contributing higher survival rate (Nardone *et al*:1997).

Being an international institution "Buffalo Research Institute (BRI) Pattoki" is much contributing for the improvement of buffaloes; this study was conducted to estimate the calf birth weight in the buffalo herd of attached Livestock Experiment Stations (LESs) by using SPSS procedure. It is hoped that results so produced will be helpful in making future breeding plans and national policy for buffaloes.

MATERIALS AND METHODS

The data of birth weight for this study were collected from six different Livestock Experiment Stations (LESs) of Punjab. The period of data was 1975-2017.The 15525 edited observations of 6932 buffaloes were analyzed to estimate the means for birth weight. To evaluate environmental factors affecting birth weight, four calving seasons were established by keeping in view geo climatic conditions prevailing in Pakistan. viz

Winter(December to February)
Spring(March to May)
Summer (June to August) and
Autumn(September to November)

The environmental factors were evaluated as sex of calf, lactation number, birth season and location. The statistical model assumed for the evaluation of environmental factors on BW was as fallows;

$\gamma ijk\ell m = \mu + ai + bj + ck + d\ell + e\ ijk\ell m$

$\gamma ijk\ell m$ =The mth observation in the ith sex of calf, jth maternal age, kth birth season and ℓth location.

μ =overall mean,

ai =effect of ith sex of calf (i: Male and Female)

bj =effect of jth maternal age (j: 3 to 10)

ck =effect of kth birth season (k: Autumn, Winter, Spring and Summer)

$d\ell$ =effect of ℓth location

$eijk\ell m$ =Random error.

All statistical analyses were examined by using general linear model in SPSS for Windows statistical

package program (SPSS, 19.00). Significance of the differences among means were compared with Duncan's multiple range test (P<0.05).

RESULTS

The means of calf's birth weights for gender, lactation number and herd-year-season are present in Table 1. The overall birth weight mean of calf is 35.18±0.18 kg in the present study (Table 1). Gender, lactation number, season and herd have a significant effect on birth weight. The weight at birth in male is more than female. This study shows, weight at birth is continuously increasing up to 5th lactation (Table 1). It is noted that calf's birth weight increases in subsequent lactations. The milk production in present study was 2031.931±5.835 Kg, significantly affected by birth weight of calf, lactation number and herd year season.

Table 1-Means of calf birth weight in Nili Ravi Buffalo.

Parameters	Factors	Means ± SE	No.of observations	P< value
Sex	Male	35.82±0.18	7957	.000
	Female	34.53±0.18	7568	.000
Lactation no	1	33.29±0.18	3296	.000
	2	34.60±0.16	2970	.000
	3	34.93±0.15	2650	.000
	4	35.19±0.16	2140	.000
	5	35.43±0.17	1614	.000
Seasons	Winter	35.24±1.2	2374	.000
	Spring	35.39±1.5	1151	.000
	Summer	35.10±.77	5969	.000
	Autumn	35.00±.80	6031	.000
Herd	-	-	-	.000
	Overall Birth weight Mean± SE	35.18±0.18	15525	

Table 2-Means of Total Milk Yield in Nili Ravi Buffalo.

Parameters	Factors	Means	No.	P< value
Sex	Male	2027.70 ± 6.71	7957	0.207
	Female	2036.15 ± 6.74	7568	0.207
Lactation no	1	-	-	0.000
	2			
	3			
	4			
	5			
Seasons				0.000
Herd	-			0.000
Birth weight	-	-	-	0.000
	Overall mean Total Milk Yield 305 days	2031.931±5.835 Kg	15525	

DISCUSSION

Average BW was determined as 29.3 ± 0.43 kg. and average BW of the male calves (32.2 ± 0.57 kg) was found to be higher than those of the female calves (26.0 ± 0.50 kg) by Ertuğrul Kul1 *et al*,2018, all these values are lower than present estimation. The effects of calf sex, maternal age and birth season on BW were detected to be statistically significant, similar to present study. Also agreed with the conclusion, birth weight increased with subsequent lactation number.

UĞURLU *et al*.(2016) estimated overall means for birth weight in Anatolian Water Buffalo as 26.95 kg. that is lower than this study and also reported that weight at birth was affected by sex of calf and age of dam, so in this way supported our efforts. Hamad M. N. F., and M. M. Moghazy, 2015. Sex of birth had a significant (p<0.05) effect on milk yield while current study did not agree with this.

Rafiqul H Usmani *et al*, 1987. conducted trial to determine the effects of various factors on calf birth weight of Nili-Ravi buffaloes in Pakistan. After analysis

showed, calf birth weight averaged 38.2 ± 0.2 kg and ranged from 17 to 48 kg. Bull calves were heavier at birth than were heifer calves (39.0 vs. 37.5 kg) and differing with higher values.

The year, season and month of birth have been reported to be a significant source of variation in the birth weight of buffaloes (Duc *et al*. 1993; Goonewardene and Thevamanoharan, 1994). Dahama *et al*. (1990) reported in India, the birth weight averaged 29.85±0.08 Kg and lowered than the present study. However, a number of other workers also showed that birth weight in buffalo calves was not affected significantly by seasons (Rohilla and Chaudhry,1992). So differ from this study. Chaudhry *et al*.(1993) estimated the birth weight of female calves as 35.71Kg and differing with low value of present study.

Thavamanoharan (2003) reported that all the growth traits of swamp buffalo calves kept at a breeding station in Thailand were significantly influenced by the year and season of birth, also agreed that sex was the only source of variation in birth weight. Hence parallel to the present study.

On the other hand, calf's weight at birth increased with increasing lactation number in this study (Table 1). Calves born in subsequent lactations are heavier than previously ones (Akçapınar and Özbeyaz 1999). It may be happened with better physiological support provided by dam to fetus. In present work, male's birth weight is more than that of female. Present result resemble with Reynolds *et al*. (1980) and Ugurlu *et al*. 2016's study.

Total milk yield is an important factor in breeding selection for milking animals. The means for Anatolian Water Buffalo lactation milk yield in Turkey were reported as 894.3 kg (Tekerli et. al. 2001), 943.2 kg (Özenç *et al*. 2008) , in the range of 654.7-761.4 kg (Şahin and Ulutaş, 2014), 925.4Kg as by Ugurlu *et al*. 2016 and 1200 Kg in Romania (Bordhese and Mazzi,2005) which are lower than present findings. But, for total milk yield's means was 2031 kg in Pakistan (Chaudhry, 1992), similar with current values and in Italy for water buffaloes is 2175 kg (Bordhese and Mazzi, 2005) which is higher than the present estimation. These differences in the presented values could be due to traits of the breeds of buffaloes, different feeding pattern/practices, size of data and evaluation methods. Genetics and environmental factors such as lactation number, lactation length, calf's birth weight and season of calving could be contributed their effects. (Akçapınar and Özbeyaz, 1999).

The calf birth weight as indicate in table-1, increased in the subsequent lactations and affected significantly. These facts brief as with some research workers (Thevarnanoharan *et al*. 2001; Thiruvenkadan *et al*. 2009; Sahin and Ulutas, 2013), agreed with the point that effect of lactation is significant on calf birth weight. Rao and Rao (1996) also favour the present findings in Murrah males. Zaman *et al*. (2007) disagreed with this fact and (Kocak *et al*., 2007) explained due to existence of competition in nutrient utilization between dam and fetus results in lowering of birth weight in early lactations so agreed with present findings.

Conclusion: As the present and previous studies of many researchers concluded that genetics and environmental factors have importance in the improvement of birth calf weight and total milk yield in dairy animals. Consequently, the effects of non-genetic factors must be taken into account to provide the best estimates of genetic parameters and breeding values. Such investigations must be carried out; further more calf birth weight should be considered as dairy trait. To get better birth weight buffalo cow must bred with the semen of genetically superior sire and provide bestmanage mental practices, improved nutrition, , preventive measures, elevating the nutrition level through making silage, upgrading sanitation and ventilation system, provision of ponds during summer season and providing full comfort to animal.

REFERENCES

Akçapınar H, and Özbeyaz C. (1999). Fundamental animal breeding.1st ed. Kariyer Press, Ankara, Turkey Anonymous(2016-2017). Economic Survey.Economic Advisor's Wing. Ministry of Finance, Government of Pakistan Islamabad

Bordhese A, and Mazzi M. (2005). Buffalo production and research in Buffalo population and strategies in the world. Reu. Technical Series, 67, Rome, Italy.

Chaudhry M. A., (1992). Factors affecting the lactation length and milk yield in Nili-Ravi buffaloes. Asian Austr. Journal of Animal Science, 5: 375-382.

Chaudhry M. A, A.A., Asghar A, I. H. Shah, and A. Ali.(1993). Body weights of female buffalo calves at different stages of life under field conditions. 1th ann. Report(1992-93) Livestock Production Research Institute, Bahadurnagar, okara(Pakistan)

Dahama R. Malik P. S, and Sing B. 1991. Genetic analysis of birth weight in buffaloes. Indian Vet. J. 67 (10): 934-938.

Duc N. V, Varma R. P, Thari C. X and Tien N. Q. (1993). Factors influencing the birth weight of Murrah calves in Vietnam. Indian J. Dairy. Sci. 46 (11): 540-542.

Ertuğrul K, Gökhan F, Aziz Ş, Hayrettin Ç, Emre U, Hüseyin E, (2018). Effects of Some Environmental Factors on Birth Weight of Anatolian Buffalo Calves. Turkish Journal of

Agriculture - Food Science and Technology, 6(4): 444-446

Goonewardene L. A, and Thavamanoharan K. (1994). Water buffalo production and practices in the dry zone of Sri Lanka. Tropical Agric., 71 (2): 123-127.

Hama M. N. F. and Moghazy M. M.(2015). Influence of Sex and Calf Weight on Milk Yield and Some Chemical Composition in the Egyptian Buffalo' Journal of Animal and Veterinary Sciences, 2 (3): 22-27

Koçak S, Tekerli M, Özbeyaz C, Yüceer B. (2007). Environmental and genetic effects on birth weight and survival rate in Holstein calves. Turk. J. Vet. Anim. Sci. 31(4): 241-246.

Nardone A, Lacetera N, Bernabucci U and Ronchi B.(1997). Composition of colostrums from dairy heifers exposed to high air temperatures during late pregnancy and early postpartum period. Journal of Dairy Science, 80: 838-844.

Özenç E, Vural M R, Şeker E. and M. Uçar M.(2008). An evaluation of subclinical mastitis during lactation in Anatolian buffaloes. Turkish Journal of Veterinary Animal Science, 32: 359- 368.

Rafiq H. U, Gregory S. L, Niaz A. N. (1987). Factors affecting length of gestation and birth weight of Nili-Ravi buffaloes. Animal Reproduction Sci.14 (3):195-203

Rao AVN, Rao HRM. (1996). Effect of some non-genetic factors on growth rate of Murrah male calves. Indian Veterinary Journal, 73(11): 1193-1194.

Reynolds W. L, De Rounen T. M, Moin M. S and Koonce K. L.(1980). Factors influencing gestation length, birth weight and calf survival of Angus, Zebu and Zebu cross beef cattle. Journal Animal Science, 51: 860-867.

Rohilla P. P, and Chaudhry S. R.(1992). Effect of climatic factors on the performance traits of Murrah buffaloes, Harvana Agric. Univ J. Res., 23(3): 135-138.

Şahin A. and Ulutaş Z. (2014). Some environmental factors effect on milk yield estimated with different methods in Anatolian Buffaloes. Journal of the Faculty of Veterinary Medicine, Kafkas University, 20: 79-85.

SPSS. Statistical Package in Social Science for Windows. Statistical Innovations Inc. Chicago, USA.

Tekerli M., Küçükkebapçı M, Akalın N. N and Koçak S.(2001). Effects of environmental factors on some milk production traits, persistency and calving interval of Anatolian buffaloes. Livestock Production Science, 68: 275-281.

Thevarnanoharan A.K, Vandepitte W, Mohiuddin G, Chantalakhana C. (2001). Environmental factors affecting various growth traits of Swam: P Buffalo calves. Pak. I. Agri. Sci., 38(3-4): 5-10.

Thiruvenkadan A .K, Panneerselvam S, Rajendran R. (2009). Non-genetic factors influencing growth performance in Murrah Buffalos. South African Journal of Animal Science, 39(1): 102-106.

UĞURLU M., KAYA I and SARAY M.(2016). Effects of some environmental factors on calf birth weight and milk yield of Anatolian Water Buffalo (Bubalus bubalis). Bulg. J. Agric. Sci., 22: 995–998

Zaman G, Goswami RN, Aziz A. (2007). Factors affecting gestation period and birth weight in Swamp Buffaloes of Assam. Indian J. Anim. Hlth., 46(1): 33-36.