Pakistan Vet. J., 2006, 26(4): 197-200.

EPIDEMIOLOGICAL SURVEY OF GENITAL PROLAPSE IN BUFFALOES KEPT UNDER DIFFERENT SYSTEMS AND SERUM MICRO MINERAL CONTENTS

M. S. BHATTI, I. AHMAD, N. AHMAD, L. A. LODHI AND M. AHMAD

Department of Animal Reproduction, University of Agriculture, Faisalabad, Pakistan

ABSTRACT

The present project was planned to conduct an epidemiological survey of genital prolapse in buffaloes kept under different feeding and production systems and to study serum micro mineral contents in these animals. Data on 343 buffaloes were recorded for epidemiological studies, including 297 normal pregnant and 46 prolapsed cases. For serum micro mineral contents, blood samples were collected from 40 buffaloes comprising of 20 normal pregnant and 20 suffering from genital prolapse and analyzed for serum Cu, Zn, Fe and Mn contents. Occurrence of genital prolapse differed non significantly in animals kept under two feeding systems (stall fed and semi stall fed), three floor conditions (uneven floor, kacha/brick floor, sloppy floor) and two production systems (rural subsistence small holding and market oriented small holding). Its occurrence was higher during humid summer than other seasons.

The mean values of serum copper and zinc were lower in prolapsed buffaloes compared to controls ($P<0.01$), while there was no difference in serum iron and manganese concentrations among animals of the two groups. Parity had no effect on serum concentration of any micro mineral. However, serum Zn level was higher in buffaloes suffering from vaginal prolapse compared to those with uterine prolapse ($P<0.05$).

Key words: Epidemiology, serum, micro minerals, genital prolapse.

INTRODUCTION

The livestock sector is an integral part of the agricultural economy of Pakistan. This sector accounts for about 49.1% of the agricultural value added and 11.4% of the GDP in the country. The significance of livestock sector can be realized from the fact that the overall share of agriculture to the household income is 28.6%, out of which the share from livestock is 13.3%. Considering rural economy, approximately 32 to 35 million rural population is engaged in livestock raising, having holdings of 2 to 3 cattle/buffaloes and 5 to 6 sheep/goats per family, which help them to derive about 30 to 40% of their income (Anonymous, 2003-2004).

The nutritional status and mineral utilization are known to affect the production ability of both male and female animals. Minerals are the essential nutrients which play a significant role in the animal nutrition and the excess or deficiency of minerals can produce various detrimental effects on the performance of livestock (Leathem, 1966). Deficiency of minerals has been shown to be associated with reduced fertility due to irregular estrous cycle, delayed ovulation and silent estrus. Ovarian activity of water buffalo in particular is prone to minerals deficiency (Haq *et al*., 1999).

According to Jaffery and Edward (1988), a reproductive disorder increases the risk for another disorder directly or indirectly. Genital prolapse is a common obstetrical problem, which adversely affects the productive and reproductive performance of buffaloes by affecting postpartum estrus, conception rate and calving interval.

Information on serum micro mineral contents in buffaloes suffering from genital prolapse is scanty. Therefore, serum concentrations of some micro minerals (copper, zinc, iron and manganese) in buffaloes suffering from genital prolapse (both vagino-cervical and uterine) and kept under different production and housing systems of Pakistan have been described in this study.

MATERIALS AND METHODS

Epidemiological survey

The epidemiological survey of genital prolapse (both vagino-cervical and uterine) in the buffaloes was conducted in Sir Shamir project area of district, Faisalabad, Pakistan. A total of 76 farmers were interviewed and information regarding the prevailing buffalo production, housing and feeding systems was obtained. The production systems were categorized into four groups on the basis of number of animals owned by the farmer. The farmers keeping 1-3 buffaloes were categorized as rural subsistence small holding. The farmers with 4-10 animals were placed in the category of rural market oriented small holding. Peri-urban

commercial farm and commercial farm owners had 11-20 and more than 20 animals, respectively.

Information about feeding and housing system was collected in terms of animals kept on stall feeding, semi stall feeding, uneven floor, kacha/brick floor and slopping floor. Retrospective information on genital prolapse was recorded from the farmers in terms of age, parity, season and stage of gestation. Data on 343 buffaloes, including 297 normal pregnant and 46 with genital prolapse, were available.

Collection of blood samples

Jugular blood samples were collected without any anticoagulant from 40 buffaloes comprising of 20 normal pregnant and 20 suffering from genital prolapse. Serum was separated and preserved at -20^{o}C for analysis of copper, zinc, iron and manganese by using atomic absorption spectrophotometer.

Determination of micro minerals

For the determination of micro minerals, serum samples were subjected to wet digestion, as described earlier (Richards, 1968). For this purpose, about 0.5 ml of serum was taken in 50 ml conical flask, mixed with 5 ml nitric acid and heated for 20 minutes till yellow fumes disappeared. After cooling, 2.5 ml of perchloric acid was added and samples were again heated until solution became colorless. Then the samples were diluted with 20 ml redistilled water and filtered in clean sterilized bottles.

Serum micro mineral concentrations were determined by using atomic absorption spectrophotometer. First, standard solutions were run one by one, their absorbance was noted and regression equations were computed between concentrations of minerals in standards and their respective absorbance values. Then all samples were run one by one and their absorbance was also recorded. The concentrations of micro minerals were calculated from their respective regression equations.

Statistical analysis

Mean values (± SE) for the concentrations of various micro minerals for control and prolapsed animals were computed. In order to ascertain the magnitude of variation in concentrations of various micro minerals between buffaloes of two groups, the data were subjected to statistical analysis using t-test (Steel and Torrie, 1980). The epidemiological data were subjected to statistical analysis using Chi square method.

RESULTS AND DISCUSSION

Occurrence of genital prolapse

The occurrence of genital prolapse was higher in buffaloes kept under semi stall feeding system (14.07%) compared to those maintained under stall feeding (12.98%), the difference was non significant (Table 1). Pandit *et al*. (1982) reported that pluriparous and stall fed animals were more prone to genital prolapse than heifers and freely grazing animals.

Higher incidence of genital prolapse was recorded in uneven floor (17.54%) compared with the katcha/ brick floor (10.98%) and slopping floor (12.50%) condition (Table 1). But the difference in the occurrence of genital prolapse under three floor conditions was non significant. With regard to production systems, the incidence of genital prolapse was lower in rural subsistence small holding (11.86%) compared to market oriented small holding (14.22%), the difference was non significant. Unfortunately, information for buffaloes kept under peri-urban commercial farm and commercial farm systems was not available in the project area under study.

In present study, the highest incidence of genital prolapse was recorded during humid summer compared to other seasons (Table 1). These findings are in agreement with those of Samad *et al*. (1987), who also reported high incidence of this problem in buffaloes during humid summer season. This pattern of occurrence of prolapse in buffaloes may be due to seasonal calving in females of this species. Since maximum calvings occur in July and August in this species, so incidence of prolapse was high during these months.

Serum micro-minerals

Dietary mineral elements are known to affect the physiological function in general and reproduction in particular (Hidiroglou, 1979). Copper has considerable effect on fertility (Dabas *et al*., 1987). Desai *et al*. (1982) have reported the increased out put of FSH with increase in concentration of circulatory copper in cyclic animals.

In the present study, mean serum copper concentrations in prolapsed and normal control animals were 59.95 ± 6.41 and 73.45 ± 7.52 µg/dl, respectively, being higher ($P<0.01$) in control group (Table 2). These results are in agreement with those of Kelkar *et al* (1989), who reported consistently lower serum copper level in prolapsed buffaloes. An interaction between copper and estrogen has been suggested, however lower copper levels may be attributed to stress caused to the animal due to this problem (Wiener *et al*., 1980).

Table 1: Effect of different factors on occurrence of genital prolapse in buffaloes

Factors	No. of animals examined	No. of cases of genital prolapse	Percent occurrence
Feeding systems			
Stall feeding	208	27	12.98
Semi stall feeding	135	19	14.07
Floor conditions			
Uneven floor	114	20	17.54
Kacha or brick floor	173	19	10.98
Slopping	56	7	12.50
Production systems			
Rural subsistence small holding	118	14	11.86
Market oriented small holding	225	32	14.22
Seasons			
Winter (January - March)	86	11	12.79
Hot summer (April – June)	215	29	13.49
Humid summer (July - September)	42	6	14.29

Serum zinc level in prolapsed animals was significantly lower (P<0.01) compared to the control group (Table 2). Kelkar *et al*. (1989) also reported decrease in serum zinc level around parturition in prolapsed buffaloes. Hidiroglou (1979) suggested that a correlation possibly exists between the plasma zinc status of cattle and events occurring during gestation and parturition.

Wegner *et al*. (1973) reported negative correlation between zinc and corticosteroid levels. The low zinc values in affected animals of this study may be a reflection of increased cortisol levels. Zinc levels were reported to drop in cows round parturition (Dufty *et al*., 1977).

Mean values of serum iron in prolapsed and normal control animals were 349.60 ± 40.73 and 366.05 ± 42.85 µg/dl, respectively (Table 2). However the difference in serum iron levels between two groups was non significant. Kelkar *et al*. (1989) also made similar observations in buffaloes.

Mean serum manganese concentrations in prolapsed and normal control animals did not differ significantly, although the value was higher in control group (Table 2). Kelkar *et al*. (1989) also reported that manganese concentrations in prolapsed animals did not differ from the values recorded in normal pregnant animals. This suggests that, probably, adequate levels of this micro element were available in the feed and also that serum levels of this mineral are not adversely affected by changes associated with genital prolapse in buffaloes.

The mean serum concentrations of various micro minerals in buffaloes of parity 1-3 and >3 are given in Table 3. The serum concentrations of these minerals among buffaloes of different parities did not differ significantly. Pandit *et al*. (1982) reported that pluriparous animals were more prone to genital prolapse than heifers. This may be due to excessive relaxation of the pelvic ligaments and low energy reserves in older animals compared with heifers.

Mean serum values of copper in buffaloes with vaginal prolapse were lower than those recorded in animals with uterine prolapse. However, serum copper levels did not differ significantly between animals of the two groups (Table 4).

Mean serum values of zinc in buffaloes with vaginal prolapse were significantly higher than in animals with uterine prolapse (P<0.05). Mean serum values of iron and manganese in buffaloes with vaginal prolapse were higher than in animals with uterine prolapse, the difference was non significant (Table 4).

According to Roberts (1971), excessive relaxation of pelvic ligaments occur due to old age, debility, congenital weakness of ligaments, repeated parturitions and high levels of oestrogen either secreted through placenta in advance pregnancy or through fodder rich in

Table 2: Mean (± SE) serum micro mineral values (µg/dl) in normal control and prolapsed buffaloes

Parameter	Normal control	Prolapsed animals	t-value
Copper	73.45 ± 7.52	59.95 ± 6.41	6.10**
Zinc	171.45 ± 20.71	122.45 ± 13.16	8.92**
Iron	366.05 ± 42.85	349.60 ± 40.73	1.24^{NS}
Manganese	5.33 ± 1.05	5.13 ± 0.91	0.64^{NS}

** Highly significant (P<0.01); ^{NS} Non significant.

Table 3: Mean (± SE) serum micro mineral values (µg/dl) in buffaloes of different parities

Parameter	Parity 1-3	Parity >3	t-value
Copper	60.90 ± 7.07	58.77 ± 5.69	0.72^{NS}
Zinc	117.72 ± 12.79	128.222 ± 11.77	1.88^{NS}
Iron	344.72 ± 37.66	355.556 ± 45.76	0.58^{NS}
Manganese	4.81 ± 0.99	5.527 ± 0.56	1.83^{NS}

^{NS} Non significant.

Table 4: Mean (± SE) serum micro mineral values (µg/dl) in buffaloes with uterine and vaginal prolapse

Parameter	Uterine prolapse	Vaginal prolapse	t-value
Copper	61.00 ± 6.54	59.25 ± 6.524	0.58^{NS}
Zinc	115.25 ± 11.98	127.25 ± 12.04	2.18*
Iron	342.00 ± 43.69	354.66 ± 39.75	1.62^{NS}
Manganese	4.74 ± 1.06	5.39 ± 0.73	1.62^{NS}

* Significant ($P<0.05$); ^{NS} Non significant.

oestrogens. All these factors were suspected to cause genital prolapse in buffaloes.

REFERENCES

Anonymous, 2003-2004. Pakistan Economic Survey. Ministry of Agriculture and Livestock, Govt. Pakistan, Islamabad.

Dabas, Y. P. S., S. P. Singh and O. P. Saxena, 1987. Serum concentrations of certain minerals in anoestrous cows and buffaloes. Indian J. Anim. Reprod., 7: 98-101.

Desai, M. C., T. P. Thakkar, A. Dharshana and K. Janakiraman, 1982. A note on serum copper levels in relation to reproductive performance in Surti buffaloes. Indian J. Anim. Sci., 48: 534-536.

Dufty, J. H., J. B. Bingley and L. Y. Cove, 1977. The plasma zinc concentrations of non-pregnant and periparturient Hereford cattle. Aust. Vet. J., 53: 519.

Haq, I. U., I. Ahmad, Zia-ur-Rahman and M. S. Butt, 1999. Role of minerals in animal reproduction. PASF/PVMA Agro-Livestock Conference, Awani-e-Iqbal, Lahore, Pakistan. pp: 51-54.

Hidiroglou, M., 1979. Trace element deficiencies and fertility in ruminants: A review. J. Dairy Sci., 62: 1195-1206.

Jaffery, S. and P. C. Edward, 1988. Reproductive disorders in preparturient dairy cows. J. Dairy Sci., 71: 2572-2583.

Kelkar, M. A., S. K. Khar and V. M. Mandakhot, 1989. Studies on antepartum prolapse of the vagina in buffaloes and plasma trace element concentrations. Archiv. Exp. Vet., 43(2): 315-318.

Leathem, J. H., 1966. Nutritional effects on hormone production. J. Anim. Sci., 25: 78-82.

Pandit, R. K., S. K. Gupta and S. S. R. Pattabiraman, 1982.

Bacteriology and histopathology of the vagina during prepartum prolapse in buffaloes. Indian Vet. J., 59: 589-591.

Richards, L. A., 1968. Diagnosis and Improvement of Saline and Alkaline Soil. 1st Ed. Agri. Handbook No. 60. IBH Publishing Co., New Delhi, India.

Roberts, S. J., 1971. Veterinary Obstetrics and Genital Diseases. 2nd Ed., Published by the author, Ithaca, New York, USA.

Samad, H. A., C. S. Ali, N. U. Rehman, A. Ahmad and N. Ahmad, 1987. Clinical incidence of reproductive disorders in buffaloes. Pakistan Vet. J., 7(1): 16-19.

Steel, R. G. D. and J. H. Torrie, 1980. Principles and Procedures of Statistics. 2nd Ed., McGraw Hill Book Co., New York, USA.

Wegner, T. N., D. E. Ray, C. D. Lox and G. H. Scott, 1973. Effect of stress on serum zinc and plasma corticoids in dairy cattle. J. Dairy. Sci., 58: 748-752.

Wiener, G., W. S. Russel and A. C. Field, 1980. Factors influencing the concentrations of minerals and metabolism in the plasma of cattle. J. Agri. Sci., 94: 369-376.