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Short Communication

IMPACT OF LAMENESS ON UDDER HEALTH AND REPRODUCTION IN CROSSBRED CATTLE

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SUMMARY

A total of 34 lame crossbred dairy cattle were selected from 11 dairy farms. Analysis of milk samples from lame animals for mastitis employing sodium lauryl sulphate test (SLST) revealed animal-wise and quarter-wise prevalence of 64.70 and 76.47 per cent, respectively. The average values of somatic cell count (SCC) among lame animals with and without subclinical mastitis (SCM) were 16.67± 1.63 l/ml and 12.10± 1.10 l/ml, respectively. with a significant difference ($p<0.05$). Effect of lameness on reproduction was evaluated through anamnesis and clinical observation. Repeat breeding was recorded in 29.41% (10/34) of the lame animals followed by anoestrus and endometritis among 8.82% (3/34) animals in each group. History of abortion and dystocia was recorded among 8.82% (3/34) and 2.94% (1/34), respectively. Study suggests that lame cows are more prone to mastitis and reduced fertility. Therefore, to minimize the losses, early detection and treatment of dairy animals suffering from hoof disorders are warranted to improve the udder heath and reproductive performance.

Keywords: Abortion, Anestrus, Endometritis, Lameness, Repeat Breeding

Most of production diseases of dairy cows are multifactorial and highly interlinked. Lameness impairs reproductive performance and enhances the incidence of mastitis among dairy cows (Kiliç *et al.*, 2007). Unhygienic conditions and improper management at the farm have been attributed to higher incidence of lameness and mastitis among high producing animals. Imbalances of minerals contribute to the development of lameness, mastitis and also fertility disorders. The prolonged lying down of dairy animals results in exposure of udder to pathogenic microorganisms from the environment leading to mastitis. Predisposing factors like increased herd size, lower number of calving boxes and increased time for stall rearing on concrete floors are jointly shared for the prevalence of mastitis and lameness.

Lame cows have delayed calving to conception interval and higher incidence of cystic ovaries. Accordingly, the study was designed to investigate the udder health and reproductive performance of Holstein Friesian crossbred cattle suffering from lameness.

Thirty-four HF crossbred dairy cattle from 11 farms suffering from lameness were selected, 10 healthy animals were sampled. A detailed history including animal number, age, lactation number, date of calving, milk yield, reproductive status was recorded.

Hoof Examination: Each lame animal was properly restrained and different foot lesions were identified after performing hoof trimming (Toussaint., 1989).

Mastitis examination: Lame animals were evaluated for subclinical mastitis (SCM). Milk samples from individual quarters of cows were collected after washing the udder with antiseptic solution for visible debris and teat ends were scrubbed with cotton soaked in spirit for microbial isolation. Collected milk samples were subjected to sodium lauryl sulphate test (SLST) for the diagnosis of SCM. Total somatic cell count (SCC) was carried by DE LAVAL SC Counter. The milk samples found positive by SLST were transferred to the laboratory and were subjected to bacterial isolation and characterization as per the standard bacteriological methods (Cruickshank *et al.*, 1980).

Fertility examination: Relevant data concerning reproductive performance like post partum resumption of oestrus, ovarian cyclicity, anoestrus, conception rate, abortion if any, number of inseminations done etc. was recorded.

Sampling: Jugular blood samples were collected from each cattle affected with lameness and centrifuged at 3000 rpm for 30 minutes to separate plasma immediately. Plasma samples were stored at -10 °C in deep freeze for progesterone estimation by P liquid phase radioimmunoassay (RIA) procedure (Kamboj and Prakash 1993). The data were analyzed using SPSS version 16 software.

The overall animal-wise and quarter-wise prevalence of SCM among lame animals based on SLST was 64.70 and 76.47 per cent, respectively. as shown in Table 1. The average values of SCC among lame animals with and without SCM was 16.67 ± 1.63 l/ml and 12.10 ± 1.10 l/ml, respectively which were significantly ($p<0.05$) higher from control group animals having healthy (2.84 ± 0.13 l/ml) quarters (Table 2). Study indicates that lame animals

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Table 1

Prevalence of subclinical mastitis among crossbred cattle suffering from lameness

Total animals		Total quarters		
Examined	Positive	Examined	Positive	Blind Teat
34	22 (64.70 %)	85	65 (76.47 %)	19 (22.62 %)

Table 2

Somatic cell count of milk samples from lame crossbred cattle

Parameters	Control (n=10)	Lame animals with SCM (n= 22)	Lame without SCM (n = 12)
Somatic Cell Count lakhs/ml	$2.83^{ab} \pm 1.25$	$16.67^{a} \pm 1.63$	$12.10^{b} \pm 1.10$

Means marked with similar superscript a, b, c differ significantly (P<0.05) in row.

Table 3

Reproductive performance of lame crossbred cattle

Reproductive parameters	Lame cows with repeat breeding (n=10)		Lame cows with normal cycle(n=14)		Control (n=10)	
	Pregnant (n=5)	Non pregnant (n=5)	Pregnant (n=6)	Non pregnant (n=8)	Pregnant (n=7)	Non pregnant (n=3)
Days to first service (days)	119.00±27.82	46.00±9.73	78.17±11.73	132.63±24.53	67.86±7.09	69.66±10.83
Calving to conception interval (days)	248.00±63.83	-	139.17±11.73	-	95.57 ±10.83	-
Insemination per conception	7.8±2.35	-	1.33±0.21	-	1.29±0.18	-
Conception rate (%)	50.00	42.86	70.00			

have higher prevalence of subclinical mastitis which might be due to increased lying time which exposes udders to various intra-mammary infections (IMI) due to closer proximity to underfoot slurry. Peeler *et al.* (1994) and Arvidson (2000) suggested that elevated levels of SCC in milk act as precipitating factor for mastitis occurrence in lame cows. Coulon *et al.* (1998) proposed that animals with foot disorders have significantly increased SCC as uninfected cows are subjected to stress while walking. Walking induces non-infective inflammation which could be responsible for the elevated SCC. Olechnowicz and Jaśkowski (2010) revealed that clinically lame cows have elevated SCC compared with animals, which were never lame. Study related increased SCC in clinically lame cows to probably subclinical mastitis or lameness and their synergistic stressful effects and concluded that this mechanism needs further investigation.

Contrary to present study, Hultgren *et al.* (2004) observed that lameness and udder health have no relationship and concluded that only severe lameness impairs animal movement and increase the threat of teat injuries and subsequent mastitis. Olechnowicz and Jaśkowski (2012) reported similar results. Few workers reported negative association between locomotion score and milk SCC. Archer *et al.* (2011) reported lower milk SCC among lame than non-lame cows due to augmented standing time which less exposes the udder to IMI.

Effect of lameness on reproduction was evaluated through anamnesis and clinical observation. Repeat breeding was recorded in 29.41% (10/34) of the lame animals followed by anoestrus and endometritis among 8.82% (3/34) animals in each group. History of abortion and dystocia was recorded among 8.82% (3/34) and 2.94% (1/34), respectively. It was observed that affected animals had longer calving to conception interval (~248 days among repeat breeders; 139 days among normal cyclic lame animals) and days to first service (~119 days and 46 days) among pregnant and non-pregnant repeat breeders; than control group healthy cows (67 days and 69 days), respectively (Table 3). The conception rate of lame cows with repeat breeding and normal oestrus cyclicity was lower than in control group (50% and 42.86% versus 70%, respectively). Overall, average numbers of inseminations done per conception among lame animals with normal cyclicity and repeat breeding were 1.33 ± 0.21 and 7.80 ± 2.35 compared with 1.29 ± 0.18 among control group animals,

In corroboration to our finding, several studies have reported longer calving to first service intervals in lame

cows than in control ones (Hernandez *et al.*, 2001 and Garbarino *et al.*, 2004). Although, the duration reported by these studies from calving to the first service was lower i.e., between 70 to 95 postpartum days. Calving to conception interval was also higher in our study compared to period of 133 d (controls 106 d) quoted by Garbarino *et al.* (2004) and 140 days by Hernandez *et al.* (2001). Garbarino *et al.* (2004) reported delayed ovarian activity among lame animals during the early postpartum period. Kiliç *et al.* (2007) reported prolonged period from calving to first service (91.7 d versus 82.4 d) and a calving to conception (133.8 d versus 104.3 d) among lame than among non-lame cows (controls) ($P<0.05$).

The decreased fertility in lame cows can be associated to loss of body condition, pain, hormonal insufficiency and long-term negative energy balance (Pryce *et al*., 2001). Behavior of lame animals gets altered, which directly affects fertility as lame animals are less likely to be in oestrus and if case, they show oestrus, it is less intense and for a shorter period than among non-lame cows.

Progesterone level is a key hormone for exploring reproductive activity, and it is commonly employed to monitor ovarian functions in farm animals, as it indicates the developmental stages of corpora lutea after ovulation. The average value of progesterone in non pregnant repeat breeders and anestrous among lame animals were 0.256± 0.026 ng/dl and 0.115± 0.005 ng/dl, respectively compared to 0.493± 0.631 ng/dl in healthy animals. Significant ($p<0.05$) variation of plasma progesterone level was observed between normal cyclic and repeat breeder cows. Walker *et al.* (2010) attributed reduced oestrus intensity in lame cows to preceding lower progesterone concentrations for several days prior to oestrus. The low progesterone concentrations in chronically stressed cows may be due to changes in the function of the hypothalamus-pituatory-adrenal (HPA) axis. Lameness is a painful and stressful process characterized by hyperalgesia (Whay *et al.*, 1997).

In conclusion, these results suggest that lame cows have higher risk of having mastitis and reduced fertility. Therefore, to reduce the losses, early detection and treatment of dairy animals suffering from hoof disorders will improve the udder heath and reproductive performance.

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