



Reproductive patterns, treatment response and fertility in dystocia affected dairy buffaloes developing postpartum metritis

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ABSTRACT

Buffaloes (28) suffering from dystocia, presented at University Veterinary Clinics were studied postpartum for reproductive patterns, evaluation of treatment response and fertility. The animals were periodically followed up to day 42 after discharge from the hospital. All the animals had developed varying degrees of postpartum metritis. Based on the type of treatment, the buffaloes were randomly divided into group 1 (8 buffaloes subjected to antibiotics alone), group 2 (12 buffaloes given both antibiotics and prostaglandin) and group 3 (8 buffaloes administered prostaglandin). The broad spectrum antibiotics were given for 5 consecutive days immediately after parturition. In group 2, prostaglandin was additionally administered (lulalyse @ 25 mg) on day 5, while in group 3, injection prostaglandins were administered on day 5 and 12 postpartum. Vaginal discharges, localization and size of uterine horns and ovarian activity were studied through per-rectal examination and later confirmed ultrasonographically. The response to double prostaglandin administration was better in respect of all the parameters for clearing of uterine tract infections. The vaginal discharge disappeared by day 14 and became odorless. The uterine involution, days to first estrus and conception and services/conception were significantly lower in group 3. In conclusion, occurrence of uterine infections and metritis was a common finding in all handled cases of dystocia. Addition of prostaglandins in the treatment protocol proved highly beneficial to clear uterus of infections, enhance uterine involution and initiate ovarian activity in the dystocia affected buffaloes.

Key words: Buffalo, Dystocia, Reproductive patterns

Uterine infections subsequent to dystocia are very common in cows and buffaloes that induce stress and cause immuno-suppression. Postpartum metritis, one of the most common disorders affecting dairy buffalo (Usmani *et al.* 2001) often leads to a delay in the onset of postpartum ovarian activity and increase in the days open. This results in prolonged calving intervals that affect the dairy economics through decreased milk yield, reduced fertility, increase culling and treatment costs. Treatments that improve reproductive performance are needed to mitigate the economic loss associated with the condition. Prostaglandin ($\text{PGF}_2\alpha$) is commonly used during the early postpartum period to improve uterine involution and fertility in dairy cattle (Nakao *et al.* 1997), although, their role on postpartum

fertility is still obscure in buffaloes. Application of $\text{PGF}_2\alpha$ increased myoelectrical activity and contraction of the uterus (Hirsbrunner *et al.* 2002). The hypothesis tested in this study was that buffaloes with postpartum metritis treated with $\text{PGF}_2\alpha$ at 5 and 12 days postpartum would have faster uterine involution and onset of ovarian activity in dystocia affected dairy buffaloes that developed metritis.

MATERIALS AND METHODS

Selection of animals: The present study was carried on 28 dystocia affected dairy buffaloes, presented for treatment at GADVASU Veterinary Clinics. Complete history with regard to their age, stage of gestation, duration of labor and previous handling or medication of the buffaloes, if any, were recorded. All the buffaloes were in their second to fifth parity. Dystocia was relieved either through mutations or fetotomy following routine procedures and all animals were followed postpartum for any complications, evaluation of treatment response reproductive patterns and fertility. The animals after delivery of the fetus were given routine treatment including antibiotics, fluids, anti-inflammatory drugs and tonics. The buffaloes were periodically followed up to day 42 after

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discharge from the hospital and later data were collected from the owners. They were followed up after discharge from the hospital and complications, if any, were recorded and their reproductive patterns followed. All animals had developed varying degrees of postpartum metritis. Based on the type of treatment, the buffaloes were randomly divided into 3 groups; buffaloes subjected to antibiotics alone (group 1; $n = 8$), those given antibiotics followed by prostaglandin (lutalyse @ 25 mg) on day 5 (group 2; $n = 12$) and buffaloes administered additional dose of prostaglandin on day 12 (group 3; $n = 8$).

The broad spectrum antibiotics (enrofloxacin + gentamicin @ 5 mg/kg bw and 4 mg/kg bw, respectively) were given for 5 consecutive days immediately after parturition. Vaginal discharges, localization and size of uterine horns and ovarian activity were studied through per rectal examination and later confirmed ultrasonographically before instituting any treatment and at weekly intervals up to 6 weeks. Days to estrus, days to conception and number of services required were also recorded.

Data were subjected to difference of proportion test to find the significant differences at 5% level of significance (Gupta 1986).

RESULTS AND DISCUSSION

Reproductive patterns and response to antibiotics in dystocia affected buffaloes: The dystocia affected buffaloes treated with antibiotics along with supportive therapy (group 1) were slow to respond in terms of onset of reproductive activity till the uterine infections persisted (Table 1). Clinical examination on different days postpartum through per-rectal and ultrasonographic examinations revealed that uterine involution was slow and was achieved by day 46 in 63% dystocia affected animals treated with antibiotics while in rest of the cases it was delayed. Uterine involution and diameter of uterine horns can be monitored directly using transrectal ultrasonography (Sheldon *et al.* 2003) and through palpation per-rectum (Kindahl *et al.* 1999). It is completed around 45 d postpartum and consists of reduction in size, loss of tissue and tissue regeneration of the uterus (Gajewski *et al.* 1999). Reduction in size, in general, is a response of myometrial contractility that plays a major role in clearing lochial debris from the uterus after

calving (Hirsbrunner *et al.* 2002). Therefore, our results are consistent with studies that have investigated myometrial physiology in dairy animals. Probably, 37% of the buffaloes with metritis were not affected by treatment because of physiological differences between them. Ovarian activity though had started by then, but the growth of the follicles was slow and ovulation did not occur in any of these animals. The bacterial contamination of the uterine lumen with uterine pathogens perturbs ovarian folliculogenesis, resulting in slower growth of the dominant follicle and affecting ovulation of the dominant follicle, which is likely to contribute to infertility associated with uterine disease (Williams *et al.* 2007).

Response to antibiotics and $\text{PGF}_2\alpha$ treatment: The buffaloes that developed metritis after handling of dystocia and did not respond to antibiotic treatment were additionally treated with $\text{PGF}_2\alpha$ on day 5. Animals were observed for uterine/vaginal discharge, and examined per-rectally and ultrasonographically for the location of uterus, uterine size, presence or absence of inflammation and ovarian activity. As compared to group 1, the response to antibiotic plus $\text{PGF}_2\alpha$ treatment was better in respect of all the parameters studied (Table 2). The vaginal discharge disappeared by day 20 and became odorless. Prostaglandin (lutalyse) at doses of 25 mg per animal has been used therapeutically for postpartum metritis (Sheldon and Noakes 1998). It increases the uterine tonicity and decreases size which might be a reflection for contractility of uterus and reduction of uterine diameter. Between third and fourth week, the reproductive organs were located in the pelvic cavity and ovaries had few soft areas, though, follicular development became apparent only by day 42. The ovarian activity commences in consonance with uterine involution and elimination of bacterial contamination especially after therapeutic treatment (Shah *et al.* 2004).

Response to double injections of $\text{PGF}_2\alpha$ postpartum: In group 3 of dystocia affected buffaloes that carried uterine infections and additional injection of $\text{PGF}_2\alpha$ was administered early postpartum on day 5 and 12, it was observed that by day 14 vaginal discharges were either absent or very scanty and were odorless (Table 3). Involution of the uterus had started and reproductive organs were near pelvic

Table 1. Response of animals treated with antibiotics after delivery of fetus (group 1)

Observations	Days postpartum				
	1	7	14	28	42
Vaginal discharge	+	+	+	+	+
Odor	-	+	+	+	-
Uterine location	Abdominal	Abdominal	Abdominal	Pelvic brim	Pelvis (62.5%)
Uterine size	—	Not palpable	18.8 cm	10.8 cm	8.9 cm (62.5%)
Inflammation	—	+	+	±	-
Ovaries	Not palpable	Not palpable	Smooth	Smooth	Few soft areas

Table 2. Response following treatment with antibiotics and PGF₂α on day 5 after fetal removal in dystocia affected buffaloes (group 2)

Observations	Days postpartum				
	1	7	14	28	42
Vaginal discharge	+	+	+	-	-
Odor	-	+	+	-	-
Uterine location	Abdominal	Abdominal	Abdominal	Pelvic brim	Pelvis
Uterine size	—	Not palpable	14.2 cm	9.1 cm	6.7 cm
Inflammation	—	+	+	-	-
Ovaries	Not palpable	Not palpable	Smooth	Soft areas	Few small follicles

Table 3. Response to postpartum injections of antibiotics and PGF₂α on day 5 and 12 after fetal removal (group 3)

Observations	Days postpartum				
	1	7	14	28	42
Vaginal discharge	+	+	±	-	-
Odor	-	+	-	-	-
Uterine location	Abdominal	Abdominal	Near pelvic brim	Pelvis	Pelvis
Uterine size	—	Palpable	11.2 cm	6.2 cm	4.7 cm
Inflammation	—	+	-	-	-
Ovaries	Not palpable	Not palpable	Smooth	Soft areas	Follicles

brim without any inflammation by 2 weeks contrary to other treatment groups (groups 1 and 2), where by 2 weeks the uterus was intra-abdominal. Normal myoelectrical activity of the uterus is greater at calving and decreases drastically around day 7 to 9 postpartum (Gajewski *et al.* 1999). However, the myometrium responded strongly when exogenous uterotonics like oxytocin and/or prostaglandins are administered (Usmani *et al.* 2001); more so in case of PGF₂α, during the early postpartum period (14 d postpartum; Gajewski *et al.* 1999, Sheldon 1999) indicating decrease influence of endogenous PGF₂α that may predispose to emergence of uterine infections. The fact confirmed by the emergence of mixed type uterine infections in dystocia affected buffaloes by this period (Prabhakar *et al.* 2009). By the end of 4 weeks, uterus was almost involuted and ovaries had few soft areas palpable on them. By day 42, clear follicles were palpable on the ovary, indicating onset of reproductive activity in the animals of this group. Uterine infections may inhibit the pulsatile GnRH and LH secretions and thus reducing the pituitary responsiveness to endogenous or exogenous GnRH pulses (Battaglia *et al.* 2000, Mateus *et al.* 2003). PGF₂α reverses these effects of uterine infection and tends to re-initiate the postpartum ovarian activity (Sheldon *et al.* 2000).

Fertility parameters in dystocia affected buffaloes: The buffaloes were regularly examined at weekly intervals for the onset of ovarian activity and reproductive parameters recorded were days to estrus, days to conception and services needed per conception in dystociac buffaloes after the delivery of fetus (Table 4). There was significant ($P < 0.05$)

Table 4. Fertility parameters in dystocia affected buffaloes

Parameter	Group 1	Group 2	Group 3
Days to estrus	82–114	80–96	58–78*
Days to conception	124–180	110–158	80–96*
Services per conception	3–4	1–2	1–2

Values with different superscripts within the rows differ significantly ($P < 0.05$).

reduction in days to onset of estrus in group 3 as compared to group 2. Similarly, the days to conception were significantly ($P < 0.05$) lower in buffaloes treated with prostaglandins on days 5 and 12. Services needed per conception were also lower in these buffaloes as compared to buffaloes treated with antibiotics alone where 3–4 services were required. The involution was delayed and infections persisted for longer period of time in group 1. Previous studies revealed that antibiotics reduced leucocytic infiltrations into the uterus, which is mandatory for the clearance of infections from the uterus (Qureshi *et al.* 1997, Singh *et al.* 1999). Rapid uterine involution might have enhanced the uterine environment for onset of estrus and hence establishment of a successful conception at first service. Indeed, PGF₂α given daily during the early postpartum period decreased the time of uterine involution in about 1 week in healthy cows, resulted in early onset of estrus and improved first service conception rate in cows with suffering from dystocia (Nakao *et al.* 1997).

Occurrence of uterine infections and metritis was a common feature in all the handled cases of dystocia and

would have significantly delayed the reproductive activity and lowered production. Thus it appeared that addition of prostaglandins in the treatment protocol proved highly beneficial to clear the uterus of infections; enhance uterine involution and initiate ovarian activity in dystocia affected buffaloes.

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