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Fertility response in relation to gross uterine involution and GnRH supplementation in Mehsani buffaloes

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ABSTRACT

Mehsani buffaloes of different groups were examined for reproductive rhythm at 10-days interval from the day of calving to evaluate the uterine involution and resumption of ovarian cyclicity. At day 35th postpartum 19 out of 29 buffaloes were injected i/m with 0.02 mg (5 ml) Buserelin acetate (GnRH analogue, Receptal, Intervet India Pvt. Ltd.). All the buffaloes were examined for their ovarian and uterine status and were monitored for signs of oestrus and subsequent fertility. Buffaloes of control group had gross uterine involution faster and among the buffaloes of treatment group those which had performance comparable with control group, responded better to the GnRH at 35th day postpartum. Non-significantly earlier uterine involution was associated with the early behavioural oestrus and conception within the treatment and control groups.

Key words : Gross uterine involution, mehsani buffaloes

Defective involution was associated with ovarian inactivity during first 3-4 weeks of parturition (Bostedt *et al.* 1976.). A varying average interval from calving to uterine involution has been reported for different buffalo breeds, viz. for Egyptian buffaloes 40 days (El Sheikh and Mohamed,1977) for suckled Murrah buffaloes 41.8 days (13), for suckled swamp buffaloes 28 ± 6 days (Jainudeen *et al.*, 1983.) and for suckled Nili-Ravi buffaloes 26 days (Usmani *et al.*,1985.), and for non-suckled Surti buffaloes 28.8 days (6). The time required for complete involution as 27.5 ± 8.3 days in Nili-Ravi buffaloes as reported (Chaudhry *et al.*,1987.), which was not significantly affected by lactation number. It was recorded 32.9 ± 8.2 days for uterine involution in Srilankan buffaloes based on rectal palpation (Pereraet *al.*, 1987) which was generally delayed with increase in parity, whereas in Kundhi / Murrah buffaloes, the value was 38.4 ± 2.46 days (Samoet *al.*,1987.), 35 days (Dhanani *et al.*,1988.), 39.50 ± 2.74 and 32.50 ± 3.01 days for winter and summer calved Murrah buffaloes (1) and average uterine involution period in fertile and infertile Surti buffaloes as 23.61 ± 0.78 and 24.75 ± 1.27 days (Shah, 1999). Through Ultrasonographic studies conducted on eight Murrah buffaloes It was reported that the mean size of horn and cervix decreased significantly to 4.09 ± 0.09 and 3.56 ± 0.08 cm by day 27 postpartum, respectively, as compared to values on day six (9.07 ± 0.74 and 8.58 ± 0.00 cm). (Lohanet *al.*,2004).

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MATERIALS AND METHODS

A total of 29 suckled postpartum Mehsani buffaloes of the farm in healthy state from the day of calving till 60 days post-breeding were utilized for the present study. All buffaloes had normal calving. All buffaloes of different experimental groups were examined for reproductive rhythm at 10-days interval from the day of calving to evaluate the uterine involution and resumption of ovarian cyclicity. A total of 19 buffaloes at day 35th postpartum were injected i/m with 0.02 mg (5 ml) Buserelin acetate (GnRH analogue, Receptal, Intervet India Pvt. Ltd.), a synthetic gonadotrophin releasing hormone and were examined for their ovarian and uterine status on 35th and on 42nd day. They were monitored for signs of induced oestrus and fertility. The animals, which failed to exhibit oestrus signs post-treatment, were considered to be non-responsive to the drug. The animals exhibiting normal oestrus were bred by natural

service. Among the non-respondents a second dose of GnRH was given at 45th day postpartum and were served naturally upon oestrus detection. Pregnancy was confirmed on 45th day post-breeding. Group-2: Control Group Ten animals, which were not given any treatment but were followed to know the reproductive status and bred at natural oestrus served at controls. Uterus and cervix were considered completely involuted when they returned to their normal size, tone and location in pelvic cavity. Measurements were taken by using palm and a centimeter scale following transrectal palpation of the reproductive tract and the findings were recorded /classified as follows:

1. Cervical diameter and length (cm)
2. Location of the uterus (entirely within the pelvis, or over the pelvic brim but completely palpable after retraction, or over the pelvic brim and not completely palpable)
3. Diameter and length of the (larger) uterine horn (in cm)
4. Symmetry of the uterine horns (yes or no)
5. Texture of uterine wall (thin or thick)
6. Palpable uterine lumen (yes or no)
7. Dominant palpable ovarian structure [corpus luteum (CL), follicle, cyst (>2.5 cm in diameter), or no palpable structures. When more than one structure was present, the order of dominance was cyst, CL, then follicle].

The days of gross uterine and cervical involution were estimated by subtracting two days from the day of palpation at which uterus and cervix were completely involuted.

RESULTS AND DISCUSSION

At day 7 postpartum the uterus was within the abdominal cavity and was felt like a flabby sac. It was over the brim and could be covered within the abdomen by hand and palm completely at an average of 9.53 ± 0.20 days. On 15th day, in 12 out of all 29 animals (41.38%), uterus was over the brim and completely palpable after retraction, whereas at an average of 18.40 ± 0.62 days it was possible to palpate the same in all animals under study as shown in the following Table.

Groups	OBNCP (days)	OBHPCP-Abdomen (days)	OBCP Retraction (days)	Entirely within Pelvis (days)
Treatment (n=19)	7.00	9.65 ± 0.26	19.35 ± 0.69*	23.50 ± 0.63
Control (n=10)	7.00	9.30 ± 0.30	16.50 ± 1.07	21.70 ± 0.73
Overall (n=29)	7.00	9.53 ± 0.20	18.40 ± 0.62	22.90 ± 0.50

* ($P < 0.05$). OBNCP: Uterus over the brim and not completely palpable OBHPCP-Abdomen: Uterus over the brim & covered by hand and palm completely within the abdomen OBCP-Retraction: Uterus over the brim and completely palpable after retraction in the pelvis

The uterus was entirely within the pelvis in 25 out of 29 (86.21%) buffaloes at day 25th postpartum and it took an average of 22.90 ± 0.50 days for all the 29 animals. Days at which uterus was entirely in the pelvis did not differ significantly in treatment and control groups of buffaloes, being 23.50 ± 0.63 and 21.70 ± 0.73 days, respectively. But the days when uterus was over the brim and completely palpable after retraction in the pelvis differed significantly ($P < 0.05$) being 19.35 ± 0.69 and 16.50 ± 1.07 days in treatment and control groups, respectively.

Overall gross uterine involution was found to occur by 23 to 31 days with an average of 27.80 ± 0.46 days (Table 1). In all the buffaloes, the size of uterus decreased slowly during the first week postpartum and there was a marked decrease in the uterine size between days 7 to 15 postpartum. These findings are in close agreement with those for Murrah buffaloes (Bhalla *et al.*,1966 ; Jainudeen*et al.*,1983) and for suckled swamp buffaloes (28 ± 6 days) (Pereraet *al.*, 1987). However, it was observed as 24.75 ± 1.27 and 31.12 ± 0.93 days in Surti buffaloes, respectively (Shah, 1999 ; Khasatiya, 2003).

An interval of 33 to 68 days was recorded for uterine involution in Murrah and Nili-Ravi buffaloes (Chauhan *et al.*,1977) and it was delayed with increasing lactation number. However, on the basis of rectal palpation the time required for complete involution was reported as 27.5 ± 8.3 days in Nili-Ravi buffaloes (Chaudhry *et al.*,1987), which was not significantly affected by lactation number. Further little longer interval of 35 to 39 days has been reported in Kundhi buffaloes (Dhanani *et al.*,1988 ; Samo *et al.*,1987) and in winter calved Murrah buffaloes (Bahga and

Table 1 Comparison of gross uterine involution measurements (cm) in different groups of buffaloes (Mean ± SE)

Days Postpartum	Organ Measurement (cm)	Treatment (n=19)	Control (n=10)	Overall (n=29)
7	Cervix length	17.40 ± 0.17	17.80 ± 0.36	17.50 ± 0.17
	Cervix diameter	7.30 ± 0.30 [a]	8.50 ± 0.40 [b]	7.69 ± 0.29
15	Cervix length	12.60 ± 0.32 [a]	10.70 ± 0.62 [b]	12.00 ± 0.34
	Cervix diameter	6.10 ± 0.20	6.20 ± 0.30	6.10 ± 0.14
	Uterus length	24.60 ± 1.28	21.40 ± 1.86	23.50 ± 1.08
	Uterus diameter	7.58 ± 0.48	5.90 ± 0.57	7.00 ± 0.39
25	Cervix length	7.20 ± 0.20	6.90 ± 0.20	7.07 ± 0.16
	Cervix diameter	3.45 ± 0.18	3.00 ± 0.33	3.29 ± 0.17
	Uterus length	13.40 ± 0.59 [a]	9.50 ± 0.87 [b]	12.00 ± 0.59
	Uterus diameter	4.00 ± 0.20	3.20 ± 0.40	3.72 ± 0.21
35	Cervix length	6.79 ± 0.22	6.80 ± 0.20	6.80 ± 0.20
	Cervix diameter	2.70 ± 0.20	2.40 ± 0.20	2.57 ± 0.12
	Uterus length	10.8 ± 0.43 [a]	8.30 ± 0.62 [b]	9.90 ± 0.40
	Uterus diameter	2.40 ± 0.20	2.40 ± 0.20	2.40 ± 0.11
Gross Involution (days)		28.60 ± 0.43 [a]	26.30 ± 0.90 [b]	27.80 ± 0.46
First Expressed Heat (days)		55.40 ± 6.32	43.10 ± 7.02	51.17 ± 4.85

n = number of animals; Means carrying different superscripts within a row differ significantly (P<0.05) between groups.

Gangwar, 1988) as 35.80 ± 0.63 days in cows (Sheshappa*et al.*, 2002.) and as 40 days in crossbred cows (Sinha *et al.*, 2002). This variation observed by different workers could be attributed to the breed of animals, effect of suckling or nonsuckling, season of calving, nutritional status and endocrine balance. In the present study, it seems that the season of calving and suckling enhanced the rate of uterine involution.

In the present study, control group of buffaloes were found to have gross uterine involution significantly ($P < 0.05$) earlier at 26.30 ± 0.90 days as compared to 28.60 ± 0.44 days for the treatment group (Table 1). The time taken for involution in the buffaloes that took more than 90 days for conception (MT 90) was also non-significantly higher than the buffaloes conceiving within 90 days (LT 90) postpartum in both treatment and control groups. However, it was observed significantly ($P < 0.05$) earlier (26.13 ± 1.13 days) in LT 90 buffaloes of control than the MT 90 buffaloes of treatment group (29.10 ± 0.74 days) (Table 2).

The uterine lengths were significantly higher ($P < 0.01$) on days 25th and 35th in buffaloes of treatment group (13.40 ± 0.59 and 10.80 ± 0.43 cm) as compared to buffaloes of control group (9.50 ± 0.87 and 8.30 ± 0.62 cm, respectively). While, on 35th day postpartum both the treatment and control group of buffaloes did not differ for the uterine diameter, cervix diameter and cervix length (Table 1). Twelve buffaloes of the treatment group conceiving within 90 days (LT 90) also had significantly higher values on 25th ($P < 0.05$) and 35th ($P < 0.01$) day for the uterine lengths as compared to LT 90 of control group (Table 2).

In the present study, the average rate of involution for the length of gravid uterus was more rapid during 7 to 15 days. On the basis of internal measurements of the involuting genitalia, it was measured to be 1.13 cm / day between 15 to 25 days which was almost 3.76 times speedier than the involution rate of 0.3 cm/day during days 25 to 35. Whereas, the average rate of involution for uterine diameter was almost twice during 15 to 25 days (0.32 cm / day) as compared to that during 25 to 32 days (0.16 cm / day). The average rate of involution in the length of cervix was 19.73 times and 12.89 times higher between days 7 to 15 (0.75 cm/day) and 15 to 25 (0.49 cm/day), respectively, as compared to the same during the 25 to 32 days (0.04 cm/day). It was 1.5 times higher during 7 to 15 days as compared to 15 to 25 days. Involution of cervix diameter occurred at the rate of 0.23, 0.28, 0.09 cm per day during 7 to 15, 15 to 25 and 25 to 32 days, respectively. Involution of cervix diameter was 2.5 and 3 times higher during 7 to 15

Table 2 Gross uterine involution measurements (Mean ± SE cm) in the buffaloes conceiving at more than 90 days (MT 90) and less than 90 days (LT 90) postpartum in different groups

Days Postpartum	Organ Measurement	Organ Measurement		Organ Measurement	
		LT 90 (n=12)	MT 90 (n=7)	LT 90 (n=8)	MT 90 (n=2)
7	Cervix length	17.50 ± 0.19	17.10 ± 0.34	17.8 ± 0.45	18.00 ± 0.00
	Cervix diameter	7.50 ± 0.45^{a}	6.86 ± 0.55^{ab}	8.13 ± 0.40^{ab}	10.00 ± 0.00^{b}
15	Cervix length	13.00 ± 0.40^{a}	13.00 ± 0.60^{ab}	11.00 ± 0.70^{b}	10.00 ± 1.00^{b}
	Cervix diameter	6.00 ± 0.21^{ab}	6.14 ± 0.26^{ab}	6.50 ± 0.19^{a}	5.00 ± 1.00^{b}
	Uterus length	24.00 ± 1.60	25.00 ± 2.20	23.00 ± 2.00	16.00 ± 2.00
	Uterus diameter	7.30 ± 0.60	8.00 ± 0.70	6.30 ± 0.60	4.50 ± 1.50
25	Cervix length	7.50 ± 0.29	6.57 ± 0.30	6.75 ± 0.16	7.50 ± 0.50
	Cervix diameter	3.42 ± 0.24	3.50 ± 0.31	2.88 ± 0.39	3.50 ± 0.50
	Uterus length	13.00 ± 0.82^{a}	14.00 ± 0.82^{a}	9.50 ± 1.00^{b}	9.50 ± 2.5^{ab}
	Uterus diameter	3.96 ± 0.36^{ab}	4.14 ± 0.26^{a}	3.00 ± 0.38^{b}	3.75 ± 1.25^{b}
35	Cervix length	6.958 ± 0.28	6.50 ± 0.36	6.63 ± 0.18	7.50 ± 0.50
	Cervix diameter	2.75 ± 0.18	2.57 ± 0.30	2.25 ± 0.13	2.75 ± 0.75
	Uterus length	10.83 ± 0.59^{a}	10.71 ± 0.64^{a}	8.13 ± 0.67^{b}	9.00 ± 2.00^{ab}
	Uterus diameter	2.50 ± 0.18	2.21 ± 0.26	2.38 ± 0.18	2.50 ± 0.50
Gross Involution (days)		28.25 ± 0.55^{ab}	29.10 ± 0.74^{a}	26.10 ± 1.12^{b}	27.00 ± 0.00^{ab}
First Expressed Heat (days)		48.42 ± 4.73^{a}	73.10 ± 13.00^{b}	42.25 ± 6.07^{a}	56.50 ± 28.00^{ab}

n = number of animals; Means carrying different superscripts within a row differ significantly ($P<0.05$) from one another.

and 15 to 25 days as compared to the same during 25 to 32 days, respectively.

On 7th day postpartum, the cervix diameter in the buffaloes of control group (8.50 ± 0.40 cm) was significantly ($P < 0.05$) larger as compared to treatment group (7.30 ± 0.30 cm), but the differences were not significant on day 15th, 25th and 35th postpartum between these groups (Table 1). While the 12.60 ± 0.32 cm length of the cervix in treatment group was significantly ($P < 0.01$) higher than that of 10.70 ± 0.62 cm in the control on day 15th whereas, it had non-significant differences at all other days of palpation. Moreover, there was no significant difference in the cervix length or diameter at different intervals postpartum in buffaloes conceiving and not conceiving within 90 days postpartum in either treatment or control group (Table 2). Using ultrasonography in Murrah buffaloes, the mean size of horn and cervix was recorded on day six (9.07 ± 0.74 and 8.58 ± 0.00 cm) and it decreased significantly to 4.09 ± 0.09 and 3.56 ± 0.08 cm by day 27 postpartum, respectively. (Lohan*et al.*, 2004). Early postpartum factors that influence cervix involution rate (CIR), but not uterine body involution rate (UBIR), may also influence the onset of ovarian activity. Afterwards, ovarian activity influences similarly both CIR and UBIR. (Marques and Horta 1987).

CONCLUSION

Overall findings in the study suggest that control group of buffaloes had gross uterine involution faster, and among the treated buffaloes those, which had comparatively similar involution rate responded better to the GnRH at 35th day postpartum. Non-significantly earlier uterine involution was associated with the early behavioural oestrus and conception within the treatment and control groups.

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