GAU Res. J., 34 (1) : 74-77 (2009)

Progesterone profile in pubertal Mehsana buffalo heifers treated with norgestomet

S.M. Soni, B. N. Suthar, H.C. Nakhashi and V.K. Sharma

Department of Gynecology and Obstetrics
College of Veterinary Science and Animal Husbandry,
S.D. Agricultural University, Sardarkrushinagar-385506 (Gujarat)

Abstract

A study was conducted to know the seasonal influence on the induction of estrus by short term progesterone therapy along with injection of PMSG and injection of GnRH in twenty one pubertal Mehsana buffaloes maintained at village level condition of Banaskantha District. The animal were grouped in three different groups as per season i.e Summer (S_1, n=7), Monsoon (S_2, n=7) and Winter (S_3, n=7). Blood plasma was collected at Day 0 (Before insertion of implant), Day 5 after implant insertion, Day 10 (On the day of implant removal), On the day of induced estrus and at 5th, 10th, 15th and 20th day post estrus to know the fluctuations in P4 concentrations. Progesterone concentrations varied significantly during the different periods (P<0.01) and seasons (P<0.05).

Keywords : Progesterone, norgestmet, buffaloes

Introduction

The reproductive efficiency is one of the most important criterion for consideration in judging the worth of an animal, a breed or a species. Late puberty and prolonged post-pubertal ovarian inactivity are probably one of the most important reproductive deficiencies of buffalo. Systematic attempts to reduce the age at first calving are vitally needed. Anestrous is the single largest cause of infertility which is caused by the inhibitory effect of nutritional status, season, suckling and lactation on the reproductive system mediated by endocrine system (1). In buffaloes, normal fertility is generally associated with sequential changes in circulatory levels of gonadotrophins and steroid hormones (2).Several minerals and body metabolites also play an important role in the promotion of action of these hormones at sub cellular level in an integrated fashion (3),Further the fertility of buffaloes was closely related with the normal profile of progesterone (4, 5 and 6) and hence the present study was conducted to know the effect of short term norgestment treatment on the level of Progesterone hormone in the pubertal Mehsana buffaloes. Study and comparison of blood plasma Progesterone levels in pubertal anestrous Mehsana buffalo heifers and after the induced estrus will help to understand the probable physiological response affecting the reproductive rhythm.

Materials and Methods

Twenty one healthy pubertal Mehsana buffaloes weighing nearly 300 kg or more and attaining the age between 36 to 48 months and failed to exhibit ovarian cyclicity were selected for study. The experiment was splitted in three different groups as per the season i.e summer (S_1), monsoon (S_2) and winter (S_3). Heifers of each group were implanted with sialistic Crestar ear implant containing Norgestomet 3 mg (Intervet International B.V. – Boxmeer, Holland) subcutaneously in the middle of the outer face of the ear pinnae with the help of special applicator. Simultaneously, the heifers were also injected with 2 ml Crestar injection (3 mg Norgestomet + 5 mg Oestradiol Valerate), intramuscularly. The implants were kept for ten days in situ and then removed. Injection Folligon (Pregnant Mare Serum Gonadotrophin. Intervet International, Holland) 500 I.U. was injected intramuscularly on day ten, immediately after implant removal. The heifers were observed for estrus. The animals showing estrus were bred

naturally and injection Receptal (Buserelin Acetate injection, GnRH Analogue, International, Holland) 2 ml, intramuscularly was given. The concentration of progesterone was determined by Progesterone ELISA kits of micro well format (Tanya Biotech, Mohali, Punjab). For progesterone estimation blood plasma samples were collected at various intervals Viz. P_1 day 0 (Before insertion of implant). P_2 5th day post implant. P3: Day 10 (on the day of implant Removal), P_4 on the day of induced estrus. P6 10th day post estrus P_7 20th day post estrus.

Results and discussion

The concentration found at various periods from the day of Crestar ear implant insertion till 20th day post estrus in three different seasons are presented in Table 1.Mean plasma progesterone levels were found to be varying significantly ($P< 0.01$) at various period and during three different seasons ($P< 0.05$). (Table 2).

Table 1. Progesterone concentration (ng/ml) in blood plasma at various periods in three seasons in Mehsani buffalo heifers.

Group Periods	S_1	S_2	S_3	Mean
P_1	0.18 ± 0.01^{c}	0.23 ± 0.01^{c}	0.21 ± 0.01^{c}	0.18 ± 0.01^{b}
P_2	0.29 ± 0.02^{c}	0.32 ± 0.02^{c}	0.33 ± 0.01^{c}	0.31 ± 0.01^{b}
P_3	0.33 ± 0.02^{c}	0.36 ± 0.01^{c}	0.36 ± 0.01^{c}	0.35 ± 0.01^{b}
P_4	0.17 ± 0.01^{c}	0.17 ± 0.01^{c}	0.18 ± 0.01^{c}	0.17 ± 0.01^{b}
P_6	1.09 ± 0.51^{abc}	0.82 ± 0.26^{bc}	1.83 ± 0.55^{ab}	1.25 ± 0.30^{a}
P_7	1.05 ± 0.82^{abc}	0.25 ± 0.02^{c}	2.11 ± 1.19^{a}	1.14 ± 0.54^{a}

Means bearing superscripts in common do not differ significantly ($P<0.05$)

P_1 day 0 (Before insertion of implant) P_2 5th day post implant, P3: Day 10 (on the day of implant Removal) P_4 on the day of induced estrus, P6 10th day post estrus P_7 20th day post estrus, S_1 Summer S_2 Monsoon S_3 Winter

Table 2. ANOVA of Progesterone concentration on blood plasma at various on three seasons in Mehsani buffalo heifers.

Source	d.f	MSS	Cal.'F'	Table "F"	
Period (P)	5	4.97	6.89**	5%	1%
Season (S)	2	2.46	3.19*	2.35	3.30
P X S	10	1.11	1.53NS	3.11	4.96
Error	72	0.73		1.97	2.82

** Significant at $P < 0.01$ level * Significant at $P < 0.05$ level NS = Non Significant

The mean plasma progesterone levels during different periods were found to be varying significantly ($P < 0.01$) from 0.18 ± 0.01 to 2.11 ± 1.19 ng/ml in group S3. Whereas, the value varied non significantly from 0.17 ± 0.01 to 1.09 ± 0.51 ng/ml, and 0.17 ± 0.01 to 0.82 ± 0.26 ng/ml in group S1 and S2,respectively .

The mean plasma progesterone concentration in the present study prior to insertion of implant was at basal level (0.18 ±0.01 to 0.23 ±0.01) confirming the true anestrous state in all the heifers. These levels fluctuating non significantly at basal level till day of induced estrus in all the three seasons. Similar findings have also been recorded (6, 7 & 8). They all have noticed basal level of progesterone from the day of implant insertion till the day of induced estrus. The maintenance of recorded basal level of progesterone in the present findings till the removal of implant could be explained as the endogenous progesterone secretion was inhibited by norgestomet ear implant (9).Luteolytic effect of estradiol valerate may be contributing to this phenomenon. Otherwise, failure of assay to detect the norgestomet in the plasma sample may be responsible (10).

The overall mean progesterone concentration was 0.17 ± 0.00 ng/ml on the day of induced estrus and it differed non-significantly between seasons on the day of induced estrus. Basal levels of progesterone at induced estrus have been reported (11). The progesterone concentration was affected by season being higher in breeding season (12). In the present study during the summer and rainy season progesterone level did not differ at 10th and 20th day post-estrus than the rest of periods. However, during the winter the value at 10th and 20th day post-estrus differed significantly ($P < 0.05$) than the rest of periods. It indicated that all induced heat may not be ovulatory hence; no luteal activity could be recorded. During the summer and rainy season only three animals in each group confirmed the presence of corpus luteum. Further, during the summer one animal was found pregnant whereas, none was found pregnant in rainy season. This may be the probable reason for lower progesterone concentration in rainy season. Elevated levels of hypophyseal and gonadal hormones were indicating the resumption of ovarian cyclicity in buffaloes(13 & 14). However, during the winter five animals showed presence of CL and two animals were diagnosed pregnant, which has elevated the level of progesterone significantly at 10th and 20th post-estrus.

Progesterone is the main hormone for cyclicity in the animals. Luteal cells of the CL synthesize Progesterone (15). Progesterone profile taken over a period of time can give a clear idea of fertility status of the animal (16). Ovarian dysfunction was diagnosed through progesterone profile in cows and buffaloes (17). The fertility of the buffaloes was found to be closely related with the normal profile of progesterone (4 & 5). In conclusion, the mean progesterone levels varied significantly ($P<0.01$) at various periods and three different seasons ($P<0.05$). However, the progesterone concentration remained below 1 ng/ml from the day of insertion of implant up to the day of induced estrus. The average plasma progesterone levels varied non significantly in summer and monsoon, it varied significantly ($P<0.05$) in winter during the different periods.

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