Title of thesis : Studies on the effect of supplementation of certain hormones on conception in cows showing metestrual bleeding  
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SUMMARY

The study was designed to evaluate incidence of metestrual bleeding in the state, its correlation with repeat breeding and to suggest suitable hormone therapy to improve conception rates in cows affected with this malady. Overall 21078 randomly selected cows belonging to different villages of all the districts of Himachal Pradesh were screened for occurrence of metestrual bleeding post estrus. The highest (15.89%) incidence was recorded in Jersey crossbred followed by 10.96% in HF crossbred cows. Only 3.54 per cent local cattle were affected with this malady. The overall incidence of Metestrual bleeding was 14.95 per cent in the cows of Himachal Pradesh.

Altogether 540 crossbred cows (477 with the history of metestrual bleeding and 63 normal cyclic cows without bleeding) presented for insemination in Veterinary clinical complex of Dr. G.C Negi College of Veterinary and Animal Sciences, Palampur and nearby Veterinary hospitals (Kunsal, Saliana and Garh) were included in the study. These animals were categorized on the basis of parity (heifer or calved) and number of inseminations to be done (Single or Double).

Animals selected for the study were distributed in three treatment viz. hydroxy progesterone caproate (progesterone), busereline acetate (GnRH) and human chorionic gonadotrophin (hCG), and two control viz. untreated control and normal control (no metestrual bleeding) groups. Each treatment group was further divided into three sub-groups with either of the treatments instituted on Day 0 or 3 or 5 post AI.

The animals of all the groups were randomly selected for single or double insemination. Heifers or cows were also randomly distributed within groups. Artificial insemination (AI) was performed with frozen thawed semen. In all the double insemination groups, second AI was performed about 24 hours later. Irrespective of single or double insemination, day of first insemination was considered as day 0 for treatments. Pregnancy was detected 60 days post AI by per rectal examination in animals not returning to estrus.

In progesterone treatment groups, the conception rate was 39.44, 59.65 and 43.48 per cent, respectively, in cows administered exogenous progesterone simultaneous to AI.
(group 1), 3rd (group 2) or 5th day (group 3) post inseminations. The conception rates were highest (59.65%) in cows when progesterone was administered on Day 3 post Al.

In fourth group (n=85), where GnRH was administered intramuscularly simultaneous to AI (day 0), 56.47 % cows conceived. In fifth (n=41) and 6th (n=22) groups the conception rates were 53.66 and 46.88 per cent in cows receiving GnRH on Days 3 or 5 post estrus respectively.

The hCG was administered simultaneous to AI (group 7, n = 47); day 3 (group 8, n = 33) or Day 5 (group 9, n = 24) post AI and 51.06, 54.55 or 45.83 per cent cows conceived.

The comparative conception rate in untreated control (group 10) cows (n=41) was 34.15 per cent. Whereas in normal control (group 11; n=63) cows it was 52.38 per cent.

Clinically, progesterone injected 3rd day post AI in cows showing metestrual bleeding was the most efficacious as the conception rate (CR) obtained was the highest among all treatment groups (59.65%). It was significantly better (P<0.05) than the CR (34.15%) recorded in untreated control cows. GnRH injected simultaneously to AI was also almost equally effective, where CR achieved (56.47%) was also significantly better (P<0.05) than that of untreated control. Other treatments viz., GnRH administration 3rd day post AI and hCG injected simultaneously to AI or 3rd day post AI also improved the conception in cows showing metestrual bleeding as compared to untreated control cows however, the increase was statistically not significant. Other treatments viz., progesterone administration simultaneous to AI, GnRH or hCG administration 5th day post AI were not effective in increasing conception in cows exhibiting metestrual bleeding.

The improvement in conception rate was recorded in all treatment groups with double AI protocol with highest (72.00%) conception rate in cows administered progesterone on Day 3 (group 2). Similarly, in the normal control cows also the conception rates were higher (56.10 vs. 45.45%) with double than single AI.

The conception rates obtained in heifers or pluriparous cows after different treatments were comparable. The insemination of heifers or cows resulted in conception rates of 40.00 vs. 39.13, 52.38 vs. 63.89 and 38.89 vs. 46.43 per cent, respectively, after treatment with progesterone on day 0, 3 or 5 post AI in cows showing metestrual bleeding.

Similarly when GnRH was administered on Day 0, 3 or 5 post AI, the conception rates in heifers and cows were 50.00 vs. 58.21, 60.00 vs. 51.61 and 60.00 vs. 40.91 per cent, respectively. The comparative values for conception rates recorded after administration of hCG to heifers and pluriparous cows on day of AI were 46.15 and 52.94
per cent, respectively. Whereas after hCG treatment on Day 3 or 5 post AI, the conception rates were 46.15 vs. 60.00 and 44.44 vs. 46.67 per cent in heifers and cows respectively.

Among untreated control animals, 5 (35.71%) out of 14 heifers and 9 (33.33%) of 27 inseminated pluriparous cows conceived. Amongst normal control cows, 8 of 17 heifers and 25 of 46 inseminated pluriparous cows became pregnant with a CR of 47.06 and 54.35 per cent, respectively.

Irrespective of the treatment, out of 88 heifers 37 (42.05%) conceived after single and among 80 heifers 41 (51.25%) conceived after double AI. However, the difference was non significant. Overall CR in heifers showing metestrual bleeding was 46.43 per cent.

Similarly, irrespective of the treatment, out of 204 pluriparous cows inseminated following single insemination protocol, 92 (45.10%) conceived, whereas, 97 (57.74%) pluriparous cows conceived out of 168 inseminated with double insemination schedule. However, the difference was non significant. Overall, of the 372 pluriparous cows showing metestrual bleeding, 189 (50.81%) conceived. The difference in overall CR between heifers and pluriparous cows was non significant (Figure 5a).

Irrespective of parity, out of total 292 cows showing metestrual bleeding and inseminated following single insemination schedule, 129 (44.18%) conceived and among 248 cows, 138 (55.65%) animals became pregnant following double insemination protocol. The CR with double AI were non-significantly higher than single AI protocol.

C. BLOOD PLASMA MINERAL ESTIMATION

Twenty four cows showing metestrual bleeding and 6 without bleeding were selected for collection of blood samples for mineral estimation. Out of twenty four cows showing metestrual bleeding, 18 were from treatment groups (6 each from progesterone, GnRH and hCG administration groups administered on Day 0 of estrous cycle) and 6 were form untreated metestrual bleeding cows. Three samples from each cow were collected on Day 0, 3, and 5, respectively. Day of insemination was designated as Day 0. In all, 90 samples were taken for the estimation of calcium, phosphorus, magnesium, zinc, copper, cobalt, iron, sodium, chloride and potassium.

The mineral profile of all (treated and untreated control) cows on the day of estrus (day 0) were compared with the values obtained on same day (day 0) in normal cyclic cows. There was no variation in blood plasma calcium, phosphorus, magnesium, zinc, copper, iron, sodium, chloride and potassium concentrations between the MEB and
normal control cows. However, the plasma cobalt levels were non-significantly lower in MEB (98.44±9.71 ng/ml) than normal control (244.00±15.96 ng/ml) cows.

The conclusions drawn from this study were;

• The incidence of Metestral bleeding (MEB) was the highest in Jersey crossbred and the lowest in local cows.
• Progesterone (250mg i/m) administered on Day 3 post AI was the most effective treatment for improving conception in cows showing MEB.
• The treatment of cows with GnRH analogues (Busereline acetate, 0.21mg i/m) simultaneous to AI also improved conception rate significantly in the cows showing metestral bleeding.
• Non-significantly higher conception rates were also obtained in cows when hCG was given on Day 0 to cows showing MEB.
• No improvement in conception rates were recorded when progesterone was administered simultaneous to AI in the MEB cows.
• Two inseminations at 24h interval improved the conception rate as compared to single AI at estrus. The variation was evident in pluriparous cows than heifers which probably indicated increasing tendency of prolonged estrus in pluriparous cows.
• The cobalt concentrations were significantly higher in cows without MEB when compared with untreated control animals.
• There was no significant variation in blood plasma calcium, phosphorus, magnesium, zinc, copper, iron, sodium, chloride and potassium concentrations in non-MEB and MEB group of cows.