

Effect of mineral supplement on oestrus induction and conception in anoestrus crossbred heifers

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Minerals like calcium and copper are involved in steroidogenesis in ovaries (Velduis *et al.* 1982). Phosphorus deficiency induces irregular oestrus, anoestrus, decreased ovarian activity and lower conception rate (Pugh *et al.* 1985). Study on minerals and trace elements supplementation on oestrus induction and fertility in crossbred heifers is scanty, hence this experiment was designed.

Crossbred anoestrus heifers (30) maintained at livestock production management farm of the Institute were included in the experiment. These heifers attained the age of 20 to 28 months, but did not express oestrus symptoms. The body weight of these heifers ranged between 250–280 kg. Genital organs were examined per rectal twice at 10 day interval. There was no genital abnormality except ovaries were smooth. All the heifers were kept in a separate shed under loose housing system with one-fourth covered roof. A commercial mineral mixture was mixed in the concentrate @ 30–40 g/animal/day for 20 days. Oestrus was detected using teaser bull twice daily in the morning and evening. Animals were also examined per rectally to confirm the oestrus symptoms. Heifers detected in oestrus were inseminated using 0.25 ml frozen semen twice at 10–12 h interval. Pregnancy was confirmed per rectum 45–60 days post insemination.

In the experiment conducted, oestrus was induced in 93.33% (28/30) heifers. Similarly Akhtar *et al.* (2004) was able to induce the oestrus in 66, 75 and 80% in 3 groups of crossbred heifers after feeding vitamin-mineral feed supplements. The average oestrus induction interval from initiation of treatment was 28.36 days. After insemination of 28 oestrus heifers, 25 (89.28%) conceived with 1 to 5 inseminations. Out of these 25, 9 and 10 heifers conceived with first and second insemination and conception rates were 32.14 and 52.63% respectively. 3, 2, and 1 heifer conceived after third, fourth and fifth insemination, and conception rates were 33.33, 33.33 and 25.00% respectively (Table 1).

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Table 1. Conception rate in anoestrus heifers after mineral supplementation

Number of AI	Nos. of animals inseminated	Nos. of animals pregnant	CR(%)
First AI	28	9	32.14
Second AI	19	10	52.63
Third AI	9	3	33.33
Fourth AI	6	2	33.33
Fifth AI	4	1	25.00
Overall	66	25	38.18

Various workers have also studied the effect of mineral supplement on oestrus induction and conception in various species. Huang *et al.* (2002) reported that feeding of a mixture of selenium compound improved the reproductive performance and decreased services per conception significantly in 30 Holstein Friesian cows. Soto and Garmendia (1998) also reported that there was significant reduction in service per conception and increase in pregnancy in heifers fed with ration supplemented with mineral containing 19% calcium and 6% phosphorus than control heifers.

Anoestrus condition in heifers under study may be due to deficiency of either phosphorus (Pugh *et al.* 1985) or improper calcium and phosphorus ratio as calcium is related with GnRH and LH release from pituitary cells (Naor and Catt 1981). The reason for anoestrus condition may be also due to copper deficiency (Hidiroglou 1979) as this is a component of enzymes involved in steroidogenesis. Similar to present study, 80% Frieswal and 66.6% Sahiwal heifers expressed oestrus activity with 100% fertility after administering vitamin A and tonophosphan (Mathur *et al.* 2005). Oestrus induction rate and conception rate was also observed 81.3 and 91.6% by Lu-WenFa *et al.* (2003) after feeding PEP, a vitamin and mineral supplement in anoestrus cows which were even significantly higher than the cows treated with hormones alone. High oestrus induction and

satisfactory conception rate observed in the present study may be due to combined effect of various trace elements like zinc, copper, cobalt, calcium, phosphorus, iron and vitamins like A,D,E and nicotinamide present in commercial mineral mixture, as these have positive effect on steroid synthesis, release, follicular growth and symptoms of ovulatory oestrus.

Thus on the basis of present study, it can be reasonably stated that in heifers, feeding of imbalanced rations specially deficient in green fodder and certain minerals may be the main reason for true anoestrus condition. This deficiency possibly adversely affects the synthesis and release of gonadotrophin hormones from pituitary or its action at ovarian level, which can be corrected by supplementing mineral mixtures in the feed.

SUMMARY

Supplementation of 30–40 g commercial mineral mixture in concentrate for 20 days induced ovulatory oestrus in 93.33% (28/30) anoestrus crossbred heifers. Out of 28 heifers inseminated, 25 (89.28%) conceived with 1 to 5 inseminations. First AI conception rate was 32.14%. Maximum conception rate (52.16%) was observed in second AI. This indicates that in growing heifers true anoestrus occurs mostly due to imbalanced ration, deficient in various minerals, which may be corrected by supplementing mineral mixtures in the feed.

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REFERENCES

- Akhtar M H, Samantaray S, Ankesh Kumar, Roy G P and Singh AP. 2004. Effect of deworming and vitamin-mineral feed supplementation in combating anoestrus in crossbred heifers. *Intas-Polivet* 5: 43–45.
- Hidioglou M. 1979. Trace element deficiencies and fertility in ruminants. *Journal of Dairy Sciences* 62: 1195–98.
- Huang Z, Lin F, Qiu C, Luo J, Wu, Y and Hang, Z J. 2002. Effect of selenium on reproductive performance and immune functions in dairy cows. *Journal of Fujian Agriculture and Forestry* 31: 76–79.
- Naor Z and Catt K G. 1981. Mechanism of action of gonadotropin releasing hormone. Involvements of phospholipids turn over in luteinizing hormone release. *Journal of Biological Chemistry* 256: 2226–33.
- Lu-WenFa, Feng-PeiJin, Che-DongSheng, Wang-Heng AND Jiang-TieMin. 2003. Study on induced oestrus of anoestrus cows. *Journal of Jilin Agricultural University* 25: 83–85.
- Mathur A K, Srivastava S, Tyagi S and Mandal D K. 2005. Effect of vitamin A and mineral administration on the induction of oestrus in anoestrus Frieswal and Sahiwal heifers. *Indian Journal of Animal Reproduction* 26: 60–61.
- Pugh D G, Elmore R G and Hembu T R. 1985. A review of the relationship between mineral nutrition and reproduction in cattle. *Bovine Practice* 20: 10–18.
- Soto H E. and Garmendia J C. 1988. The effects of mineral supplements on the reproduction of heifers. *Brahman-Revista Cientfica Facultad-de-Ciencias-Veterinarias Universidad-del-Zuli* 8: 68–76.
- Veldius J D and Klase P A. 1982. Mechanism by which calcium ions regulate the steroidogenic actions of luteinizing hormone in isolated ovarian cells *in vitro*. *Endocrinology* 111: 1–9.