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Short communication

Profile of serum calcium, inorganic phosphorus, total protein, albumin and globulin in superovulated cattle*

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ABSTRACT

Thirteen, gynaecologically normal, Sahiwal cows were treated with 50 mg FSH-E in eight divided doses. The donors were classified as good (>3 CL), poor (3 CL) or non (< 3 CL) responders. The blood serum levels of calcium, inorganic phosphorus, total protein, albumin and globulin were estimated in all cows on day of PGF₂ α treatment, day of superovulatory estrus and day of embryo collection. The serum concentrations of all the above parameters were lower in non responding than poor and good responding donor cows.

Key words : Superovulation, cattle, calcium, phosphorus, albumin, globulin, total protein

Poor and unpredictable superovulatory response is a major limiting factor in livestock embryo transfer venture. Blood levels of calcium, inorganic phosphorus, total protein, albumin and globulin in superovulated cattle have been reported in the present paper.

Thirteen, clinically healthy, normal cycling, Sahiwal cows selected as embryo donors at Livestock Research Centre (L.R.C.), G.B. Pant University of Agriculture and Technology, Pantnagar were superovulated with 50 mg FSH-E (FSH-Equine, Schering, USA) divided into eight doses in decreasing order i.e. 7.5, 7.5; 6.5, 6.5; 6.0, 6.0; and 5.0, 5.0 mg, administered by i/m route, for four days at 12 hour interval. The treatment was started on 11th day of the cycle. Dinoprost Tromethamine 25 mg (Lutalyse, Unichem Lab Ltd., Mumbai) was injected intramuscularly at 48 and 60 hours after the start of the superovulatory treatment. The cows were inseminated at 12, 24 and 36 hours after onset of estrus with good quality semen. Embryo collection was carried out by non surgical method on day 7 post insemination.

Ovaries of donor cows were palpated per rectum one day before the flushing. On the basis of *Part of M. V.Sc. thesis submitted by the first author to G.B.P.U.A.&T., Pantnagar. 'M. V.Sc. Scholar,

Corresponding author - ²OSD, Pt., Deen Dayal Upadayay Univ. of Vety. Sciences and Research Institute on cattle, Mathura (U.P.) superovulatory response animals were classified into Group I (CL->3), Group II (CL-3) and Group III (CL-<3). Blood samples were collected from jugular vein from all donors on day of PGF₂ α treatment, day of superovulatory estrus and day of embryo collection. Serum was separated and stored in clean glass vials at -20°C until analysis. The serum was analyzed for calcium, inorganic phosphorus, total protein, albumin and globulin using 'System Reagent Kits' on fully automatic biochemical analyzer system (Nexct®, Schiaparelli Biosystems, U.S.A.).

Results revealed that out of total animals, nine cows (69.23%) responded (\geq 3 CL) to the superovulatory treatment and were subjected to embryo collection. Percentage of donor in Gr I, II and III were 30.77 (4/13), 38.46 (5/13) and 30.77 (4/13), respectively. The mean ovulation rate in these cows was 4.22±0.596 while the average number of embryo per donor flushed was 0.89±0.564. The blood serum levels of calcium, inorganic phosphorus, total protein, albumin and globulin are presented in Table 1. The mean serum calcium and inorganic phosphorus concentrations on day of PGF, a treatment was significantly higher in Gr I than Gr III indicating adverse effect of the low serum calcium and inorganic phosphorus on superovulatory response. Calcium is known to be vital for maintenance of normal fertility

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GR-		PGF	r_2^{2} at the at the	ent				Superovula	tory estrus	*		Ξ	mbryo colle	ection	
5	Ca mg/100ml	P, mg/100ml	TP g/100ml	Alb g/100ml	Glo g/100ml	Ca mg/100ml	P. mg/100ml	TP g/100ml	Alb g/100ml	Glo g/100ml	Ca mg/100µl	P _i mg/100µ1	TP g/100ml	Alb g/100ml	Glo g/100ml
Gr1	7.325	3.225	5.015	3.158	1.838	7.925	3.200	5.295	3.215	1.858	7.850	3.200	5.240	3.180	2.060
	±0.193^	±0.103^	±0.102 ^A	±0.119	±0.049	±0.272	±0.070	±0.077	±0.104	±0.079	±0.272 ^A	0.070	0.104	0.111	0.032^
Gr II	6:967	2.925	4.215	2.850	1.410	7.200	3.025	4.573	2.980	1.488	7.000	3.100	4.430	2.818	1.613
	±0.488^B	±0.202^B	0.225 ^{AB}	±0.079	±0.154	±0.619	±0.249	±0.190	±0.081	±0.225	±0.595^B	±0.227	±0.227	±0.091	±0.157AB
Gr III	6.425	2.650	4.180	2.893	1.288	7.099	2.850	4.583	3.110	1.473	6.850	2.825	4.503	3.118	1.385
	±0.363 ^B	±0.175 ^B	±0.080 ^B	±0.081	±0.081	±0.581	±0.206	±0.059	±0.064	±0.087	±0.462 ^B	±0.131	±0.047	±0.037	±0.023 ^B

in animals as it is an integral part of steroid biosynthesis pathways in the ovaries and adrenal glands (Veldhuis and Klase, 1982). Phosphorus is important for attainment of sexual maturity and maintenance of regularity of estrous cycle. The involvement of phosphorus in phospholipid and cAMP synthesis may be a key to its effect on reproduction (Hurley and Doane, 1989).

Mean serum total protein, albumin and globulin concentrations on all days of observation were higher in good than in poor and non responders. It has been reported that in absence of sex hormone binding proteins, the reproductive failure ensues due to lack of desired levels of ovarian hormones at the target cells. Protein deficiency retards the development of sex organs and adversely effects reproductive performance (Srivastava and Kadu, 1985). There was a non significant increase in the mean serum calcium, inorganic phosphorus, total protein, albumin and globulin on the day of superovulatory estrus, as compared to the day of PGF, a treatment in all the three groups of donors. Similar observations were made by Bardos et al. (1990) and Boryczko et al. (1994) for calcium and phosphorus, McLennan and Willoughby (1973); Agrawal et al. (1982), Baruah et al. (1993) and Jain and Pandita, (1995) for total protein, albumin and globulin. From the present study it may be concluded that deficiency of calcium, inorganic phosphorus, total protein, albumin and globulin adversely affected the superovulatory response in Sahiwal cows. The nutritional management is thus of prime importance in an embryo transfer venture.

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