EFFECT OF OVSYNCH TREATMENT ON BLOOD BIOCHEMICAL CONSTITUENTS AND CONCEPTION RATE IN RETAINED FETAL MEMBRANES AFFECTED AND NORMALLY CALVED COWS *

C.VELLADURAI**, R.EZAKIALNAPOLEAN, M.SELVARAJU AND K.A.DORAISAMY

*Department of Animal Reproduction Gynaecology and Obstetrics,
Veterinary College and Research Institute, Namakkal – 637 002*

Eight cows treated (Group I) for retained fetal membranes (RFM) and 8 normally calved (NC) cows (Group II) were selected around day 35-50 post-partum and were supplemented orally daily with 30-50 g mineral mixture continuously for 15 days. At the end of mineral mixture supplementation, all the cows of both the groups were treated with ovsynch protocol. The mean blood glucose, serum total protein, cholesterol, triglycerides, calcium and phosphorus levels were found to be lower in RFM affected cows than NC cows at i) the time of animal selection (ii) the initiation of ovsynch treatment (iii) $PGF_2\alpha$ injection (iv) Timed artificial insemination (TAI) and (v) 10 days following TAI. Further, in both the groups, there was an increasing trend in all these blood constituents from selection to 10 days post AI. The conception rate obtained was 87.50 and 75.00 per cent, respectively. It is concluded that ovsynch programme influenced the levels of blood constituents and improved conception rate in RFM affected and NC cows.

Key words: Ovsynch, Blood biochemical constituents, RFM, Cows

INTRODUCTION

Nutrients play an important role in fertility management in dairy cattle and have specific requirements in reproductive tissues. Variations in certain blood constituents during different reproductive phases alter the functions of the reproductive organs. Nutrient deficiency may impair the enzymatic function and cellular metabolism of reproductive organs and induce reproductive disorders (Thavani et al., 2012). Konyves et al. (2009) reported that RFM resulted in a delayed renewal of the ovarian activity and an increased interval between the parturition and the first ovulation. Synchronization of ovulation with GnRH and $PGF_2\alpha$ brought a major impact on managing lactating cows by allowing timed AI and ascertained ovulation time with eliminating oestrus detection (Pursley et al., 1997). However, Comparative studies on the blood biochemical and mineral profiles before and after treatment with ovsynch protocol in cows affected with and treated for retained fetal membranes and correlation of these factors on fertility in cows are lacking. Hence, the present investigation was formulated to study the effect of ovsynch treatment on blood biochemical constituents and conception rate in RFM affected cows.

MATERIALS AND METHODS

At 35-50 days post-partum 8 cows treated (Group I) for retained fetal membranes (RFM) and 8 normally calved (NC) cows (Group II) were selected and were supplemented orally daily with 30-50 grams of TANUVAS mineral mixture continuously for 15 days. At the end of mineral mixture supplementation Group I and II cows were treated with ovsynch protocol. The protocol included administration of 10 µg of GnRH injected intramuscularly (2.5 ml, Buserelin acetate, Ovulanta®, Vet Mankind, New Delhi) on the day of start

of synchronization (day 0), 500 µg of $PGF_{2\alpha}$ injected intramuscularly (2 ml, Cloprostenol, Pragma®, INTAS, Ahmedabad) seven days later (day 7), another 10 µg of GnRH was injected intramuscularly 48 h after $PGF_{2\alpha}$ (day 9) and timed artificial insemination (TAI) was done at 16 to 18 hours after the second GnRH injection (day 10).

Blood collection was done in groups I and II at (i) the time of selection of cows (ii) the initiation of ovsynch treatment (iii) $PGF_{2\alpha}$ injection (iv) TAI and (v) 10 days following TAI. The serum samples were separated immediately for the analysis of blood glucose and the remaining serum samples were stored at -20°C until analysis of serum biochemical parameters. The serum biochemical profiles were analyzed in UV-VIS double beam spectrophotometer (SYSTRONICS, Model 2202, India). Blood glucose (mg/dl) level was determined by the GOD/POD method (Glucose Oxidase/Peroxidase). Total protein (g/dl) level was determined from the serum samples by the BIURET method. The triglycerides (mg/dl) level was determined from the serum samples by GPO (glycerol-3-Phosphate oxidase). Serum total cholesterol (mg/dl) level was determined by the method of Allain *et al.* (1974). Serum calcium (mg/dl) level was determined by the ARSENAZO III method. Serum phosphorus (mg/dl) level was estimated by the UV Molybdate-End Point Assay method. Conception rate was calculated as percentage of animals that conceived to AI at induced estrus in both the groups. Pregnancy was confirmed by rectal palpation at 60 days post insemination.

RESULTS AND DISCUSSION

The mean blood glucose (mg/dl) level at the time of animal selection, first GnRH injection, $PGF_{2\alpha}$ injection, first AI and 10 days post AI was 40.83±0.96, 45.40±0.97, 49.31±1.05, 52.03±1.09 and 54.32±0.97 in group I and 55.84±0.88, 56.26±0.74, 56.42±0.69, 56.70±0.77 and 56.92±0.89 in group II, respectively. In the present investigation, the blood glucose level was lower in RFM affected cows than NC cows. Similar finding was reported by Pandey *et al.* (2007)

and Thavani *et al.* (2012) in buffaloes. Further, in this investigation, the mean blood glucose levels were found to be low in RFM affected cows when compared to NC cows. This fact was reflected in conception rates between RFM affected and NC cows in this study. Foster and Nagatani (1999) stated that blood glucose is a metabolic signal providing information for the central control of GnRH release and Westwood *et al.* (2000) reported that expression of oestrus at first post-partum ovulation was more likely in cows which maintained a higher blood glucose level. The increasing concentration of blood glucose from animal selection to 10 days post AI in this current experiment might be due to the increased energy metabolism to make the availability of glucose in the genital organs especially in the uterus as explained by Pandey *et al.* (2007).

The mean serum total protein (g/dl) levels at the above said five points were 8.17±0.21, 8.27±0.29, 8.33±0.19, 8.42±0.22 and 8.54±0.18 in group I and 8.32±0.13, 8.33±0.11, 8.34±0.08, 8.39±0.05 and 8.43±0.05 in group II, respectively. In this study, the total protein levels did not show any significant difference between RFM affected and normally calved cows. Similar finding was made by Thavani *et al.* (2012) in buffaloes. In this study, the increasing concentration of serum total protein from selection of animals to 10 days post AI might be due to the increased metabolism for the preparation of histotrophic nutrition in the uterus for the embryonic development as reported by Thavani *et al.* (2012).

The mean serum triglycerides (mg/dl) levels at the above said five points were 83.81±1.50, 127.81±0.86, 128.92±0.69, 129.12±0.89 and 129.79±0.72 in group I and 126.20±0.56, 126.95±0.61, 127.18±0.58, 127.25±0.40 and 127.45±0.57 in group II, respectively. At the time of first GnRH injection and $PGF_{2\alpha}$ injection, there was a significant (P≤0.05) difference in mean serum triglycerides (mg/dl) level between group I and II. The mean serum triglycerides in this study ranged from 83.81±1.50 to 130.16±0.76 mg/dl. Similar values in cows were reported by Hashem and Amer (2008). In this investigation, significantly low levels of mean

serum triglycerides were observed in RFM affected group than in NC group. The reduction in mean serum triglycerides levels might be due to disturbed lipid metabolism and increased tissue lipolytic enzymes in RFM affected cows as demonstrated by Hashem and Amer, (2008). Induction of oestrus in all the cows increased the mean serum triglycerides from selection of cows to 10 days post AI. This might be due to the altered lipid metabolism towards the conception in cows as stated by Michal et al. (2006).

The mean serum cholesterol (mg/dl) levels the above said five points were 100.00±0.52, 139.64±0.62, 146.36±0.56, 147.50±0.44 and 148.09±0.34 in group I and 142.80±0.57, 143.28±1.04, 144.65±0.84, 146.48±1.04 and 146.52±0.38 in group II, respectively. Similar value was reported by Kabir et al. (2001) in buffaloes. The lower mean serum cholesterol level observed in RFM affected cows than NC cows at the time of selection was similar to the report of Semacan and Sevinc (2005). The lowered cholesterol in RFM affected cows might be due to the increase in breakdown of cholesterol as explained Kandeil et al. (2002). In this study, there was an increase in serum total cholesterol level in cows from the time of selection to 10 days post AI and it might be due to persistent utilization of serum cholesterol for progesterone synthesis (Michal et al., 2006).

The mean serum calcium (mg/dl) levels the above said five points were 6.36±0.26, 8.78±0.21, 9.57±0.20, 10.14±0.20 and 10.20±0.18 in group I and 9.13±0.22, 10.03±0.24, 10.79±0.29, 10.96±0.18 and 11.03±0.13 in group II, respectively. The mean serum calcium level recorded in present study ranged from 6.36±0.26 to 11.07±0.17 mg/dl in NC and RFM affected cows. The similar values were reported in NC and RFM affected buffaloes by Pandey et al. (2007). In this study, the mean serum calcium levels at all points were low in RFM affected cows than in NC cows. This observation corroborated with the findings of Pandey et al. (2007) in buffaloes. The finding of the present study suggested that the lower calcium concentration might be responsible for the occurrence of RFM in cows and further reduction in

fertility. The disturbances in the calcium metabolism and its utilization by the tissue result in atony of genital organs especially the uterus (Pandey et al., 2007). In this current experiment, the mean serum level of calcium increased from the time of animal selection to 10 days post AI in both the groups. It indicated that oestrus induction programme influenced the mineral metabolism of the cows and increased the calcium availability to reproductive organs.

The mean serum phosphorus (mg/dl) levels in the above said five points were 3.99±0.14, 4.79±0.11, 5.30±0.14, 5.37±0.15 and 5.52±0.13 in group I and 5.06±0.06, 5.10±0.03, 5.12±0.06, 5.13±0.08 and 5.15±0.05 in group II, respectively. The mean serum phosphorus levels observed were in normal range as reported by Roberts (1971). In this study, lower levels of phosphorus in RFM affected cows than in NC cows were observed. Arosh et al. (1998) stated that even marginal deficiency of phosphorus was sufficient to cause disturbances in pituitary-ovarian axis without manifesting the syndrome. The involvement of phosphorus in phospholipids and cAMP synthesis might be a key factor to its effect of reproduction. It clearly indicated the disturbances in calcium and phosphorus metabolism in RFM affected cows as described by Pandey et al. (2007). The increased level of phosphorus from the time of selection to 10 days post AI in both the groups showed that oestrus induction programme influenced the mineral metabolism in NC and RFM affected cows. It could be the reason for the achievement of 100 per cent oestrus response and higher fertility rate following oestrus induction in this study.

Oestrus induction with ovsynch protocol in cows resulted 87.50 and 75.00 per cent conception rates in NC and RFM affected cows, respectively. It was in concurrence with the findings of Pursley et al. (1997). Greater chance of conception achieved in the present study was due to the commencement of ovsynch at appropriate stage of the oestrous cycle which would have induced preovulatory LH surge and ovulation as described Moreira et al. (2000). From this study it was clear that ovsynch protocol in RFM affected and NC

cows influenced the blood biochemical and mineral metabolism and thereby improved the conception rate.

REFERENCES

Allain, C.C., Poon, L., Chan, S.G., Richmond, W. and Fu, P. (1974). Enzymatic determination of total serum cholesterol. *Clin. Chem.*, **20**: 470.

Arosh, S.K.J., Singh, S.K and Rajkumar, R. (1998). Reproductive disorders and their management in cattle and buffalo: A review. *Indian J. Anim. Sci.*, **75**: 858-873.

Foster, D.L. and Nagatani, S. (1999). Physiological perspectives on leptin as a regulator of reproduction: Role in timing puberty. *Biol. Reprod.*, **60**: 205-215.

Hashem, M.A. and Amer, H.A. (2008). Hormonal and biochemical anomalies in dairy cows affected by retained fetal membranes. *Bull. Vet. Inst. Pulawy*, **50**: 92-106.

Kabir, K.K., Varshney, J.P., Rawal, C.V.S and Ansari, M.R. (2001). Studies on serum progesterone and certain blood biochemical indices in cyclic and acyclic non-descript rural buffaloes. *Indian Vet. J.*, **78**: 1116-1118.

Kandeil, M.A., Amin, K.A. and Ali, K.M. (2002). Comparative biochemical studies between retained and non-retained placenta in cows and buffaloes. *Egypt. J. Vet. Med. Assn.*, **62**: 255-264.

Konyves, L., Szenci, O., Jurkovich, V., Tegzes, L., Tirian, A., Solymosi, N., Gyulay, G. and Brydl, E. (2009). Risk assessment and consequences of retained placenta for uterine health, reproduction and milk yield in dairy cows. *Acta Veterinaria Scandinavica*, **78**: 163-172.

Michal, K., Edward, M. and Hanna, M. (2006). Some hormonal and biochemical blood indices in cows with retained placenta and puerperal metritis. *Bull. Vet. Inst. Pulawy.*, **50**: 89-92.

Moreira, F., Sota, R.L., Diaz, T. and Thatcher, W.W. (2000). Effect of day of the estrous cycle at the initiation of a timed artificial insemination protocol on reproductive responses in dairy heifers. *J. Anim. Sci.*, **78**: 1568-1576.

Pandey, A.K., Shukla, S.P., Pandey, S.K. and Sharma, Y.K. (2007). Haemato-biochemical profile in relation to normal parturition buffaloes and buffaloes with retained fetal membranes. *Buffalo Bull.*, **26**: 46-49.

Pursley, J.R., Kosorok, M.R. and Wiltbank, M.C. (1997). Reproductive management of lactating dairy cows using synchronization of ovulation. *J. Dairy Sci.*, **80**: 301-306.

Roberts, S.J. (1971). Veterinary Obstetrics and Genital Diseases. 2nd edn. CBS Publishers and Distributors, New Delhi.

Semacan, A. and Sevinc, M. (2005). Liver function in cows with retained placenta. *Turkey J. Vet. Anim. Sci.*, **29**: 775-778.

Thavani, W.W., Macmillan, K.L., Hansen, P.J. and Drost, M. (2012). Concepts for regulation of corpus luteum function by the conceptus and ovarian follicles to improve fertility. *Theriogenology*, **61**: 149-154.

Westwood, C.T., Lean, I.J. and Garvin, J.K. (2000). Factors influencing fertility of Holstein dairy cows: A multivariate description. *J. Dairy Sci.*, **85**: 3225-3237.