EFFECT OF HORMONAL AND HERBAL THERAPIES ON PUERPERAL EVENTS AND POSTPARTUM PLASMA PROFILE OF GLUCOSE AND TOTAL PROTEIN IN HOLSTEIN FRIESIAN COWS

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ABSTRACT

Twenty-eight recently calved HF cows of University farm were monitored through clinical diagnosis and fortnightly plasma profile of glucose and total protein from the day of calving till 75 day postpartum to study effect of hormonal and herbal therapies on postpartum events. The animals were equally divided into four groups, each of seven animals. Group I served as Control; Group II received herbal ecbolic (Vantab), 3 intra-uterine infusions at weekly interval postpartum. Group III Oxytocin 50 units and $PGF_2\alpha$ 25 mg (Iliren) i/m immediately after parturition and Group IV only $PGF_2\alpha$ 25 mg (Iliren) i/m immediately after parturition. The overall mean time for regression of pregnancy CL, Uterine involution, first estrous postpartum and service period was 8.50±0.81, 29.71±0.71, 31.65±1.45 and 122.39±6.90 days, respectively. The influence of therapy was significant on uterine involution and first estrous postpartum, being lowest in PG treated groups. The overall mean plasma glucose concentrations in cows was 57.79 ± 0.50 (range 50 to 67) mg %. The differences between treatment groups and between periods were highly significant (P<0.01). The fortnightly mean values of glucose from parturition (0 day) to 75 day postpartum were observed to be 63.25 ± 1.32, 52.25 ± 1.19, 52.46 ± 1.24, 55.57 ± 1.19, 59.03 ± 1.10 and 60.67± 1.19 mg/dl, respectively. The values for glucose increased 60 days postpartum. The overall plasma total protein concentration was 7.25 ± 0.05 (range 6.65 to 7.87) g/dl. There was no significant difference between groups, but the period effect was significant (P<0.05). The fortnightly values were 7.23 ± 0.07, 6.92 ± 0.16, 6.90 ± 0.14, 7.70 ± 0.15, 7.43 ± 0.17 and 7.52± 0.13 g/dl, from parturition (0 day) to 75 day postpartum, respectively.

KEY WORDS : Holstein Friesian cows, Hormone/Herbal therapy, Puerperal events, Plasma glucose, Plasma protein.

INTRODUCTION

For economic dairy farming, exotic dairy cows should calve regularly at every 12-13 months interval. To achieve this goal, animals with longer postpartum interval and acyclic need to be identified and managed in time. Blood plasma profile of certain metabolites is a potential aid in characterizing nutritional status and reproductive problems in bovines (Larson *et al*., 1980). Cows loosing body weight and undergoing negative energy balance postpartum usually suffer from prolonged anoestrus or sub-fertility condition leading to extended calving interval (Roche and Diskin, 2000). Prostaglandin $F_2\alpha$ ($PGF_2\alpha$) during early postpartum period improves the reproductive efficiency in dairy animals (Narsimha Rao, 1991; Patel, 2004), and hence is a valuable aid in reproductive health of the dairy animals . Several reports are available on prepartum monitoring of blood glucose and total protein in zebu cows (Patil and Deshpande, 1979; Setia *et al*., 1992) and even in exotic cows from abroad (Tegegne *et al*., 1993; Butler *et al*., 2000). The present study was designed to evaluate the effect of hormonal and herbal therapies on postpartum protein and glucose profile in HF cows.

MATERIALS AND METHODS

This study was carried out over 0 to 75 day postpartum on 28 healthy HF cows managed under routine feeding and housing protocol of University farm at Anand, from May 2007 to April 2008. The animals were divided at random into four groups each having seven animals. The four groups were: Group I was kept as Control; Group II was treated with Herbal ecbolic (Vantab), 3 intra-uterine infusions at weekly interval postpartum; Group III was given Oxytocin 50 units plus $PGF_2\alpha$ 25 mg (Iliren) i/m immediately(0 hr) after parturition, and Group IV was treated with only $PGF_2\alpha$ 25 mg (Iliren) i/m immediately after parturition. The puerperal events like regression of pregnancy CL, uterine involution, first oestrus postpartum and service

period were recorded by rectal examination for all the animals.

Jugular blood samples were collected in heparinized vaccutaniers at 0, 6 and 24 hr, and on day 15, 30, 45, 60 and 75 postpartum. Blood plasma was separated out immediately after collection. The concentrations of plasma glucose and total protein was estimated using standard assay kits and an autoanalyzer. The data were analyzed statistically using simple and 2 factors' factorial completely randomized design for reproductive traits and blood profile, respectively (Snedecor and Cochran, 1994).

RESULTS AND DISCUSSION

Effect of Different Therapies on Puerperal Events

All the HF cows under the study showed complete regression of pregnancy CL by day 8.50 ± 0.81 (range 3-21). No significant difference was found between the groups, although the time required for the lysis of pregnancy CL was shorter in PG treated groups. The mean time taken to complete uterine involution was found to be 29.71 ± 0.71 (range 22- 37) days. There was highly significant difference (P<0.01) between various groups. The shorter uterine involution time of 25.85 ± 1.10 days was found for the animals in group III (PG + oxytocin) when compared with all other groups (Table 1).

In this study, the mean intervals from calving to first postpartum oestrus and service period were found to be 31.65±1.45 (range 23 to 45) and 122.39±6.90 (range 62-196) days, respectively in HF cows. Statistically, highly significant difference (P<0.01) was observed between treatments for first oestrus postpartum, but not on service period. The values for control group were higher for both the traits as compared to all the treatment groups, which did not vary significantly (Table 1).

Table 1. Puerperal events in HF cows treated with various drugs at calving

Trait	Gr-I (Control)	Gr-II (Ventab i/ut)	Gr-III (PG + Oxytocin i/m)	Gr-IV (PG alone i/m)	Overall
Regression of Pregnancy CL (days)	10.57±1.25	9.71±2.26	6.86±1.37	6.86±1.22	8.50±0.81
Uterine Involution (days)**	32.57±1.25	31.71±0.92	25.86±1.10	28.71±0.92	29.71±0.71
First oestrus postpartum (days)**	43.50±1.06	29.00±1.80	26.71±1.17	28.14±1.68	31.65±1.45
Service period (days)	142.29±21.53	123.43±9.29	109.0±9.05	114.85±11.02	122.39±6.90

**** P<0.05, between groups.**

Delay in the resumption of ovarian activity postpartum is one of the important factors contributing to prolonged calving to conception interval in dairy animals. The pregnancy CL was found to be partially regressed right at calving and was not palpable by day 7 postpartum in more than 70 per cent of cows with normal puerperium. Morrow *et al.* (1968), Patel (2004) and Mishra (2006) reported very similar findings in pure HF cows. Peiris *et al.* (1982), however, reported shorter uterine involution time of 27.2 ± 1.4 and 26.6 ± 1.6 days in normally calved Jersey and Holstein cows, respectively. The time taken for uterine involution (29.71 ± 0.71 days) and resumption of ovarian activity and first oestrus postpartum in the present experiment was in agreement with the values recorded in cows by Mc Dougall *et al*. (1995), Sheshappa *et al*. (2002), Patel (2004) and Mishra (2006). In contrary to the present findings Bekana *et al*. (1996) recorded (21.8 ± 3.0) days for uterine involution in cows with resumption of ovarian activity by 44 to 55 days postpartum. Service period is the true indicator of evaluating fertility of dairy animals and it means, if service period is less,

the economic gains of the animals are high.

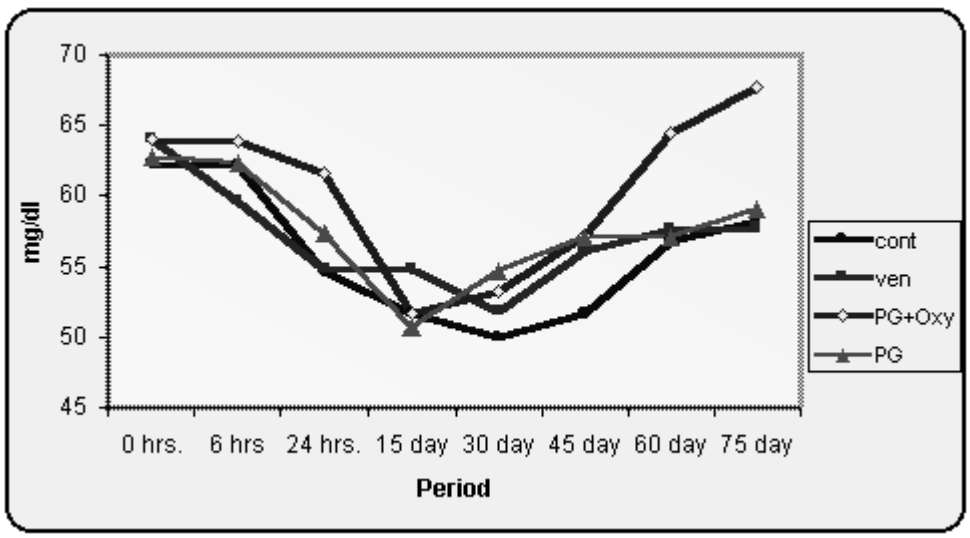
Plasma Profile of Glucose and Protein:

Mean ± SE of plasma glucose and total protein are presented in Table 2 and 3.

Plasma Glucose

The fortnightly overall mean plasma glucose levels from day of parturition (0 day) to day 75 postpartum varied significantly from 52.25 ± 1.19 to 63.25 ± 1.32 mg/dl with a pooled mean of 57.79 ± 0.50 mg/dl in HF cows. The difference between groups was also highly significant (P<0.01). Low levels of plasma glucose concentrations were observed in control group than in various treatment groups. The plasma glucose concentration on the day of parturition (0 day) was higher in all the groups, which declined significantly within 24 hrs and further declined to lowest level by day 15-30 postpartum and then showed a rising trend till day 75 postpartum in most groups. The overall pooled mean plasma glucose level was significantly(P<0.05) higher in group-III (60.48 ± 1.09 mg/dl) as compared to the group-I, II and IV (Table 2; Fig. 1).

Figure 1: Postpartum plasma glucose concentration (mg/dl) in HF cows under various treatment groups



In the present study the plasma glucose concentration recorded in different groups were within normal physiological range. The higher mean plasma glucose levels at parturition than at any stage thereafter (Ghosh *et al*., 1991) and an increasing trend from calving to different weeks postpartum (Patil and Deshpande, 1979) have been reported earlier. The mean plasma glucose concentrations were slightly higher in treatment groups than control group. It can be inferred that higher plasma glucose concentrations postpartum helps in initiating ovarian activity and early exhibition of postpartum oestrus. Higher blood glucose concentrations at the time of parturition might be due to storage of glucose during advanced stage of pregnancy. With the onset of lactation the concentration of glucose declines up to one month (Dhoble and Gupta, 1981). Ghosh *et al*. (1991) reported sudden fall in blood glucose levels one week after parturition in Jersey x Holstein cows as compared to levels at calving or at one month of gestation.

According to Butler *et al*. (2000) negative energy balance leading to low blood glucose concentration delays the time of first ovulation postpartum through inhibition of LH pulse frequency. .

Plasma Total Protein

The fortnightly overall average plasma total protein levels from day of parturition (0 day) to day 75 postpartum varied significantly from 6.90 ± 0.14 to 7.70 ± 0.15 g/dl with a pooled mean of 7.25 ± 0.05 g/dl in HF cows under study. There was statistically no significant difference (P<0.05) in plasma protein concentrations between groups. But the difference was significant (P<0.05) between the periods. The values on the day

Table 2: Levels of mean plasma glucose (mg/dl) in HF cows at different intervals postpartum following hormonal and herbal therapy

Group/ Interval	0 hrs	6 hrs	24 hrs	15 day	30 day	45 day	60 day	75 day	Pooled Mean
Group-I (Control)	62.29±1.68	62.14±1.28	54.71±2.85	51.71±1.86	50.00±2.22	51.71±1.93	56.85±1.31	58.14±1.80	55.95±0.87^{y}
Group-II	64.00±0.74	59.57±1.02	54.85±2.93	54.85±3.32	51.85±2.66	56.14±2.83	57.71±2.13	57.85±1.05	57.10±0.90^{y}
Group-III	64.00±2.43	63.85±3.08	61.57±2.70	51.71±1.28	53.28±1.71	57.28±2.13	64.42±2.83	67.71±2.80	60.48±1.08^{x}
Group-IV	62.71±4.40	62.28±1.98	57.42±3.85	50.71±2.80	54.71±3.24	57.14±2.38	57.14±1.05	59.00±1.44	57.64±1.06^{y}
Overall	63.25±1.32^{a}	61.96±0.99^{ab}	57.14±1.56^{cd}	52.25±1.19^{e}	52.46±1.23^{e}	55.57±1.18^{dc}	59.03±1.10^{bc}	60.67±1.18^{ab}	57.79±0.50

Means bearing different superscripts within the raw or column differ significantly (P<0.05).

Table 3: Levels of mean plasma total protein (g /dl) in HF cows at different intervals postpartum following hormonal and herbal therapy

Group/ Interval	0 hrs	6 hrs	24 hrs	15 day	30 day	45 day	60 day	75 day	Pooled Mean
Group-I	7.28±0.21	7.04±0.19	6.81±0.19	7.04±0.31	7.21±0.27	7.87±0.29	7.22±0.23	7.45±0.22	7.24±0.09
Group-II	6.81±0.25	7.17±0.27	6.97±0.18	6.84±0.26	6.68±0.29	7.34±0.28	7.34±0.40	7.64±0.26	7.10±0.10
Group-III	7.57±0.20	7.15±0.20	7.72±0.27	6.65±0.34	6.71±0.33	7.81±0.22	7.68±0.35	7.51±0.28	7.36±0.11
Group-IV	7.25±0.28	7.12±0.22	7.28±0.36	7.14±0.40	6.98±0.27	7.80±0.37	7.47±0.35	7.48±0.34	7.32±0.11
Overall	7.23±0.13^{bc}	7.12±0.11^{bc}	7.20±0.14^{bc}	6.92±0.16^{c}	6.90±0.14^{c}	7.70±0.15^{a}	7.43±0.17^{ab}	7.52±0.13^{ab}	7.25±0.05

Means bearing different superscripts within the raw differ significantly (P<0.05).

of parturition (0 day) were found higher in all the treatment groups and then declined subsequently with the lowest values around day 15 to 30 postpartum and then rose till day 75 postpartum (Table 3).

The level of total protein was slightly higher in group-III (7.35 ±0.11g/dl) as compared to group-I, II and IV. The total protein levels recorded in treatment groups were slightly higher than the control group but were within the normal range. These findings were in accordance with the observation made by Jain and Pandita (1995) and Lakum (2004). The findings on trend and levels of protein observed in the present study were comparable with the report of Jordon and Swanson (1979), who documented a linear decrease in serum total protein levels in non-suckled dairy cows from day four to forth week postpartum. Protein being the building block of the body, lack or insufficient protein intake has been regarded as one of the causes of failure of or delay in resumption of oestrous cycle, mainly due to retarded synthesis of sex hormones (Roberts, 1971). Morrow (1977), however, opined that protein deficiency is not much important in relation to reproduction.

ACKNOWLEDGEMENTS

We thank Dr. V.P. Belsare, Unit Officer of HF Project, AAU, Anand, for permitting us to take up this work on their animals. The laboratory facility provided by Department of Teaching Veterinary Clinical Services Complex, Veterinary College Anand is also gratefully acknowledged.

REFERENCES

Bekana, M., Jonsson, P. and Kindahl, H. (1996). *Acta Veterinaria Scandinavivica*, **37**(3): 251-263.

Butler, W.R., Forsenberg, M., Greve, T., Gustafsson, H., Kalita, T., Kindahl, H. and Ropstad, E. (2000). *Anim. Reprod. Sci.,* **60**: 449-457.

Ghosh, P.P., Roy Choudhury, R., Bandopadhyay, S.K., Sanyal, S., Haidar, S. and Ghosh, B.B. (1991). *Indian J. Anim. Reprod.,* **12**(2): 165-166.

Dhoble, R.L. and Gupta, S.K. (1981). *Indian Vet. J.,* **58**: 544-547.

Jain Aklank and Pandita, N.N. (1995). *Indian J. Anim. Reprod.,* **16**(2): 88-90.

Jordon, E.R. and Swanson, L.V. (1979). *J. Dairy Sci.,* **62**: 58-63.

Lakum, P.D. (2004). *Management of reproductive problems in Holstein Friesian cows.* M.V.Sc. Thesis, Anand Agril. Univ., Anand, India.

Larson, L.L., Mabruck, H.S. and Lowry, S.R. (1980). *J. Dairy Sci.,* **63**: 283-289.

Mc Dougall, S.; Burke, C. R.; Macmillan, K. L. and Williamson, N. B. (1995). *Res. Vet. Sci.*, **58**(3): 212-216.

Mishra, G.K. (2006). *Studies on effects of antibiotic treatment and hormonal and herbal supplementation on postpartum uterine involution, ovarian rebound and service period in Holstein Friesian cows*. M.V.Sc. Thesis, Anand Agril. Univ., Anand, India.

Morrow, D.A. (1977). *Proc. First All India Symposium on Animal Reproduction,* January 17-19, Punjab Agril. Univ., Ludhiana, India.

Morrow, D.A.; Roberts, S.J. and McEntee, K. (1968). *J. Anim. Sci*., **27**: 1404-1407.

Narasimha Rao, A.V. (1991). *Indian J. Anim. Reprod.,* **12**: 155-158.

Patel, P.M. (2004). *Monitoring postpartum period in HF cows through clinical diagnosis, metabolic profile and hormonal therapy.* M.V.Sc. Thesis, Anand Agril. Univ., Anand, India.

Patil, J.S. and Deshpande, B.R. (1979). *J. Reprod. Fertil.,* **57**: 525-527.

Peiris, G.S., Abeywardena, S.A. and Mohamed, A.R. (1982). *Sri-Lanka Vet. J*., **30(1)**: 1-4.

Roberts, S.J. (1971). *Veterinary Obstetrics and Genital Diseases*. 2nd Edn. Scientific Book Agency, Calcutta, India.

Roche, J.F. and Diskin, M.G. (2000). *Anim. Breed. Abstr.,* **69**: 880 abstr.

Setia, M.S., Duggal, R.S. and Singh, R. (1992). *Buffalo J.,* **8**(2): 123-129.

Sheshappa, H., Honnappagol, S.H., Dhabale, R.B. and Tandle, M.K. (2002). *Indian. J. Anim. Reprod*., **23**(1): 75-76.

Snedecor, G.W. and Cochran, W.G. (1994). *Statistical Methods*. 8th edn. Iowa State University Press, Ames, Iowa, USA

Tegegne, A., Entwistle, K.W. and Mukasa-Mugerwa, E. (1993). *Tropical Anim. Hlth. Prod.,* **25**(2): 101-110.

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