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Original Research

Serum Biochemical Profile in Postpartum Anestrus Cows Treated with Herbal and Hormonal Protocols

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Abstract

The present study evaluated the serum profile changes in biochemical constituents in 18 postpartum anestrus (>60 days) cows, treated under field conditions with Estrona feeding at 125gm/day/animal for four days (group II; n=6) or CIDR-Synch protocol (group III; n=6) and untreated control (group I; n=6). The overall mean calcium and phosphorus concentration (mg/dL) varied significantly (P<0.05) within group II and mean glucose concentration varied significantly (P<0.05) in group III. However, no-significant difference was observed in cholesterol concentration observed in groups I, II, and III, before (0th day) and after (30th day) treatment. To conclude, the above results indicate that there was significant difference in serum calcium and phosphorus in Estrona feeding group before and after the treatment in postpartum anestrus cows.

Keywords: Calcium, Cholesterol, Estrona powder, Glucose, Phosphorus, Postpartum anestrus cows and Serum Biochemical

Introduction

The alteration in Ca: P ratio, may affect ovarian function through its blocking action on pituitary gland. This results in prolongation of first estrus and ovulation, delayed uterine involution, increased incidence of dystocia, retention of placenta and prolapse of uterus. Phosphorus deficiency is most commonly associated with decreased reproductive performance with inactive ovaries delayed sexual maturity and low conception rates. Whereas moderate deficiency may lead to repeat breeding condition and poor conception rate (Kumar, 2003). Normal levels of biochemical constituents are of utmost importance for maintaining the functional integrity of the reproductive system (Niazi *et al*., 2003).

Plasma glucose, cholesterol and minerals profile denote the nutritional status of animals and are related to their fertility. Cholesterol being a precursor of steroid hormones plays an important role in steroidogenesis. While calcium tones up the genitalia, and protein and inorganic phosphorus are involved at the cellular level in metabolic processes. These hormonal and nutritional profiles are being disturbed by many metabolic and environmental factors and hamper the normal physiology of the animal body (Patel *et al*., 2013).

Material and Method

Eighteen animals which did not exhibited estrus signs after 60 days of postpartum (3-4 months) were selected for the study. Age of animals were ranges between 4-6 years. All the animals were dewormed with (Wormivet powder ®, Rakesh Pharmaceuticals) @ 30 gm BID daily for two days. These animals were randomly devided into three groups: Group I serve as a control did not receive any treatment. Group II (Figure 1) was fed with Estrona® powder (125gm/day/animal) for four days animals were observed for estrus signs and artificial insemination was done on observed estrus and Group III (Figure 2) receive intramuscular injection of GnRH @ 20 mcg is given on 0th day and CIDR was implanted, on 7th day injection PGF2α @ 500 mcg is given along with removal of CIDR implant and on 9th day injection GnRH @ 10 mcg intramuscular was given. On 10th day animals were inseminated. Blood collection was done before (0th day) and after (30th day) the treatment and serum glucose, cholesterol, calcium and phosphorus were analyzed by using (ERBA ® Transasia Bio-Mediclas Ltd., Nalagarh Road, Village Malpur, Baddi, District Solan (HP) Kits.

Figure 1: Estrona feeding in postpartum anestrus cows

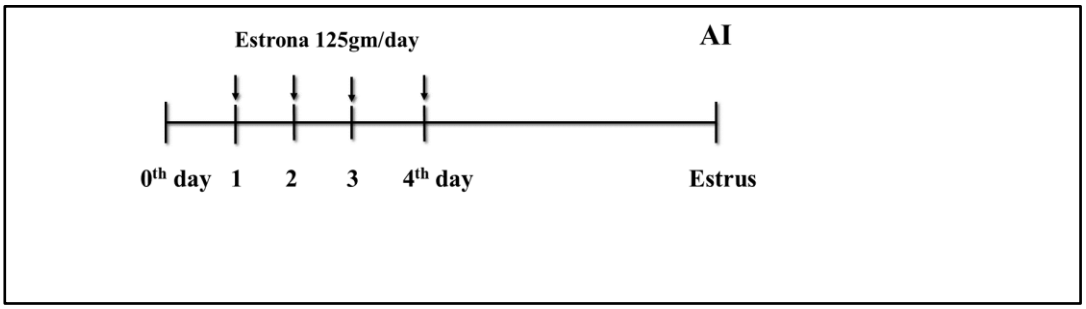
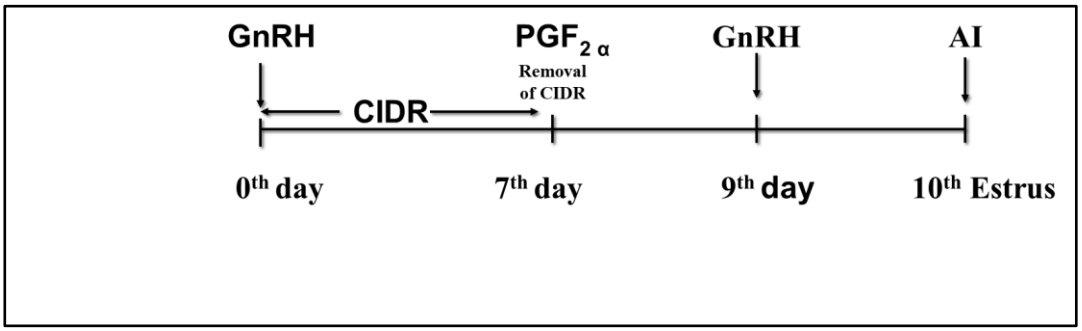


Figure 2: CIDR-Synch protocol in postpartum anestrus cows



Statistical Analysis

The statical analysis was done using SAS software through general linear model (GLM) procedure.

Results and Discussion

Serum Glucose

The mean serum glucose concentration in group I animals was 44.10 ± 2.83 and 47.00 ± 2.87mg/dL before (0^{th} day) and after (30^{th} day) treatment, respectively. The present findings were similar to observations of Ray *et al*. (2016) and Barathiraja and Thanislass (2017) who reported serum glucose concentrations of 41.01 ± 1.91 and 48.50 ± 0.90 mg/dL in postpartum anestrus cows. Similarly, lower glucose concentration was observed by Kumar *et al*. (2018) who reported glucose concentration of 42.58 ± 6.73 mg/dL.

Serum glucose concentration was significant in group I but lies within the normal range (45-75 mg/dL) (Radostits *et al*. 2007). The mean serum glucose concentration in group II animals was 49.14 ± 1.79 and 49.77 ± 1.32 mg/dL before (0^{th} day) and after (30^{th} day) treatment, respectively. These findings were similar with Mane *et al*. (2018) with glucose concentrations of 49.76 ± 1.23 and 49.91 ± 1.15 mg/dL before and after treatment of postpartum anestrus bovines with Estrona forte bolus. However, higher glucose concentrations in cyclical cows were observed by Das *et al*. (2016), Muneer *et al*. (2013) and Kumar *et al*. (2018) with reported glucose concentrations of 59.40 ± 2.32, 70.25 ± 2.31 and 73.70 ± 10.69 mg/dL, respectively.

The mean serum glucose concentration in group III animals were 45.93 ± 2.46 and 50.96 ± 1.69 mg/dL before (0^{th} day) and after (30^{th} day) treatment, respectively. The present findings were similar with observations of Sangram, (2016) with reported glucose concertation on day 0 (49.67 ± 0.80 mg/dL) and on day 10 after AI was 54.67 ± 0.42 mg/dL, respectively and Patil, (2020) who reported glucose concentration on day 0 (43.87 ± 1.57 mg/dL) and day 10 (47.38 ± 1.92 mg/dL) respectively.

Serum glucose concentration was significant in group III but lies within the normal range (45-75 mg/dL) (Radostits *et al*., 2007). The reproductive pathway between negative energy balance and the hypothalamicpituitary-ovarian axis is very complex and involves several metabolites and hormones. Among the metabolites required for normal ovarian dynamics in dairy cows, glucose has been reported to be most important (Barson *et al*., 2019). The glucose levels were almost similar in all the groups and well within the normal range suggestive of no influence of glucose in the present study.

Serum Cholesterol

The mean serum cholesterol concentration did not show any significant variation in group I animals with values of 94.33 ± 9.07 and 93.66 ± 8.93 mg/dL before (0^{th} day) and after (30^{th} day) treatment, respectively. The present findings were similar with observations of Ramakrishna, (1997), Tandle *et al*. (1997) and Muneer *et al*. (2013) who reported serum cholesterol concentrations of 80.94 ± 6.77, 94.38 ± 6.59 and 94.35 ± 6.44 mg/dL respectively. However, higher cholesterol concentration was observed by Tandle *et al*. (1998) who reported cholesterol concentration of 211.50 ± 18.43 mg/dL.

The mean serum cholesterol concentration in group II animals were 116.66 ± 11.07 and 117.66 ± 9.51 mg/dL before (0^{th} day) and after (30^{th} day) treatment, respectively. There was no-significant difference in this group. The present findings were similar to observations of Jayachandra *et al*. (2013) and Das *et al*. (2016) who reported cholesterol concentrations of 136.39 ± 4.19 and 118.30 ± 3.38 mg/dL respectively. However, lower cholesterol concentration was observed by Ray *et al*. (2016) who reported concentration of 88.91 ± 10.77 mg/dL.

The mean serum cholesterol concentration in group III animals were 118.66 ± 7.03 and 115.5 ± 8.06 mg/dL before (0^{th} day) and after (30^{th} day) treatment respectively. There was no-significant difference in this group. The present findings were similar to observations of Mahour *et al*. (2011) and Kalaswa *et al*. (2017) who reported cholesterol concentrations of 125.01 ± 9.65 and 100.7 ± 6.86 mg/dL respectively. However, higher cholesterol concentration was observed by Borakhatariya *et al*. (2017) and Dhami *et al*. (2019) who reported cholesterol concentrations of 164.54 ± 13.29 and 181.08 ± 21.04 mg/dL respectively.

Cholesterol is a precursor of ovarian steroidogenesis which gradually increases after calving reflecting fat mobilization that occurs during this time and in non-cyclic cows are reported to have lower total cholesterol than the cyclic cows (Jeong *et al.,* 2015).

Table 1: Serum biochemical profile of glucose, cholesterol, calcium and phosphorus (mg/dL, Mean ± SE) on day 0 and 30 in treated and untreated post-partum anestrus cattle.

Parameters	Day	Group I	Group II	Group III
		Mean ± SE	Mean ± SE	Mean ± SE
Serum Glucose	0	44.10^{aA}±2.83	49.14^{aA}±1.79	45.93^{aA}±2.46
	30	47.00^{bA}±2.87	49.77^{aA}±1.32	50.96^{bA}±1.69
Serum Cholesterol	0	94.33^{aA}±9.07	116.66^{aA}±11.07	118.66^{aA}±7.03
	30	93.66^{aA}±8.93	117.66^{aA}±9.51	115.5^{aA}±8.06
Serum Calcium	0	9.25^{aA}±0.21	9.10^{aA}±0.50	9.09^{aA}±0.28
	30	9.01^{aA}±0.24	9.49^{bA}±0.46	9.04^{aA}±0.39
Serum Phosphorus	0	4.62^{aA}±0.10	4.55^{aA}±0.25	4.54^{aA}±0.14
	30	4.50^{aA}±0.12	4.74^{bA}±0.23	4.52^{aA}±0.19

Note: 0^{th} day: Start of treatment, 30^{th} day: on the 30^{th} day of treatment; Group I (PT_0): Control, Group II (PT_1): Estrona Feeding, Group III (PT_2): CIDR Synch protocol; ^{AB} Different superscript between the rows vary significantly ($P<0.05$); ^{ab} Different superscript between the colums vary significantly ($P<0.05$)

Serum Calcium

The mean serum calcium concentration in group I animals were 9.25 ± 0.21 and 9.01 ± 0.24 mg/dL before (0^{th} day) and after (30^{th} day) treatment, respectively and between the days, no significant variation was observed. The present findings were similar to observations of Yadav *et al*. (2006) and Bhoraniya *et al*. (2012) who reported calcium concentrations of 8.74 ± 0.37 and 9.67 ± 0.23 mg/dL respectively.

The mean serum calcium concentration in group II animals were 9.10 ± 0.50 and 9.49 ± 0.46 mg/dL before (0^{th} day) and after (30^{th} day) treatment and between the days, significant variation was observed. The present findings were similar to observations of Mane *et al*. (2018) who reported calcium concentrations of 9.90 ± 0.27 and 10.44 ± 0.25 mg/dL before and after treatment with Estrona forte bolus. This may be due to tonic effect of *Aloe vera* (Kosif and Aktas, 2009) present in Estrona powder.

The mean serum calcium concentration in group III animals were 9.09 ± 0.28 and 9.04 ± 0.39 mg/dL before (0^{th} day) and after (30^{th} day) treatment, respectively and between the days, no significant variation was observed. The present findings were similar with observations of Dhami *et al*. (2015), Borakhatariya *et al*. (2017), Dhami *et al*. (2019) and Kumar *et al*. (2020) who reported calcium concentrations of 9.52 ± 0.14, 8.80 ± 0.21, 8.99 ± 0.47 and 9.06 ± 0.28 mg/dL respectively.

Calcium plays a functional role in maintaining the normal reproductive efficiency in dairy cows (Vinod, 2015). Many authors reported that blood calcium is reduced in postpartum anestrus cows (Jayachandran *et al*., 2013) but in the present study calcium values were well within the normal range. Calcium alone might not affect the ovarian activity, however, alteration in Ca:P ratio might affect the ovarian activity by impairing hypothalamic-pituitary ovarian axis (Uddin *et al*., 2019).

Serum Phosphorus

The mean serum phosphorus concentration in group I animals was non-significant between the days with values of 4.62 ± 0.10 and 4.50 ± 0.12 mg/dL before (0^{th} day) and after (30^{th} day) treatment, respectively. The present findings were similar with observations of Ramakrishna (1997), Yadav *et al*. (2006) and Barathiraja and Thanislass (2017) who reported phosphorus concentrations of 5.30 ± 0.11, 3.90 ± 0.30 and 4.81 ± 0.33 mg/dL respectively. Similarly, lower phosphorus concentration was observed by Tandle *et al*. (1997) who reported phosphorus concentration of 3.29 ± 0.09 mg/dL.

The mean serum phosphorus concentration in group II animals was significant (P<0.05) between the days with values of 4.55 ± 0.25 and 4.74 ± 0.23 mg/dL before (0^{th} day) and after (30^{th} day) treatment, respectively. The present findings were similar with Mane *et al*. (2018) who reported phosphorus concentrations of 5.08 ± 0.14 and 5.21 ± 0.14 mg/dL before and after treatment

The mean serum phosphorus concentration in group III animals was non-significant between the days with values of 4.54 ± 0.14 and 4.52 ± 0.19 mg/dL before (0^{th} day) and after (30^{th} day) treatment, respectively. The present findings were similar with observations of Mahour *et al*. (2011) who reported phosphorus concentration of 5.23 ± 0.30 mg/dL. However, higher phosphorus concentration was observed by Bhorakhatariya *et al*. (2017) and Kumar *et al*. (2020) who reported phosphorus concentration of 6.19 ± 0.09 and 8.28 ± 0.15 mg/dL respectively.

The phosphorous is part of phospholipids and cAMP synthesis which is a key factor in its effect on reproduction. Higher P values in normal cyclic animals have been recorded by several earlier workers (Newar *et al*., 1999). Nevertheless, even a marginal deficiency of phosphorus can cause disturbance in the pituitary-ovarian-axis including ovulation (Bhaskaran and Abdullakhan 1981) and hence can lead to non-cyclicity.

Conflict of Interests

There is no conflict of interest.

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