

## SOME ANALYTICAL STUDIES IN RELATION TO CYCLICITY OF BUFFALO-HEIFERS

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### SUMMARY

Twenty non-cycling buffalo-heifers were used. The heifers were treated by exogenous sex steroids "Synchro-Mate-B" plus equine chorionic gonadotrophins (eCG) with or without carboxylic ionophore (Lasalocid) supplement for induction of estrus. Blood samples were collected from all heifers before treatment and from ten positively responded heifers after treatment. Blood samples from ten responded heifers (before and after treatment) in each group were subjected to study the effect of hormonal induction of cyclicity on metabolic profile testing. The results revealed that, the hormonal treatment without Lasalocid supplement did not alter Hb concentration, PCV%, ALT activity, total protein, albumin and urea nitrogen concentrations. While, the activities of plasma AST and ALP were significantly increased and CPK activity, glucose and cholesterol concentrations were increased.

Synchro-Mate-B implants plus eCG administration in Lasalocid supplemented cycling heifers did not lead to significant alterations in most of metabolic profile testing except PCV% and glucose concentration as compared to non-cycling buffaloes supplemented with Lasalocid.

Concentrations of plasma macro- and micro elements (Ca, Mg, Na, K and lithium) after induction of estrus by sex steroids plus eCG were not significantly differed in heifers either supplemented or not with Lasalocid

Thus, we can conclude that usage of Synchro-Mate-B implant plus eCG to induce estrus in prepubertal buffalo-heifers did not alter most of the metabolic profile parameters.

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### INTRODUCTION

Onset of puberty in heifers is primarily influenced by age, weight, dietary energy and endocrine functions of the animal. Age of puberty is influenced by level of nutrition (Wiltbank et al., 1960) and prepubertal gain (Laster et al., 1972).

Moreover, McCartor et al., (1979) found an integral relationship between synthesis and production of reproductive hormones; and synthesis and utilization of lower volatile fatty acids in ruminants.

Carboxylic ionophore (monensin) was used to

initiate sexual puberty in cattle (Bushmich et al., 1980; Kunc, et al., 1981 and Sportt, 1981) and in buffaloes (Badawy et al., 1993). Bushmich et al., (1980) concluded that, dietary monensin (a rumen fermentation-modifier) increased the ovarian activity with more follicles formation and developed corpora lutea.

Hormonal induction of estrus in non-cycling heifers includes usage of equine chorionic gonadotrophins (eCG) (Shah et al., 1992), estrogen plus progesterone only or followed by eCG (Tibary et al., 1992) and Synchro-Mate-B implants plus eCG (Younis et al., 1996). In addition, Younis et al., (1996) concluded that, treatment of non-cycling buffalo-heifers with Synchro-Mate-B implants plus eCG could be helpful in induction of ovulatory cycle and pregnancy, and that Lasalocid improves the occurrence of estrus in aged heifers.

The response of the animals to different hormonal manipulations is closely related to endogenous metabolism of the animal, therefore, it is imperative to do metabolic profile testing (Imakawa et al., 1987).

Therefore, the present study was designed to monitor and investigate the effect of sex steroids on metabolic profile testing of buffalo-heifers supplemented or not with carboxylic ionophore (Lasalocid).

## MATERIALS AND METHODS

The present investigation was carried out on forty

non-cycling buffalo-heifers. Heifers were of average 300 kg b. wt. and more than 12 months-age. Heifers were checked for acyclicity by repeated rectal palpation (small ovaries containing non specific structures) and repeated plasma progesterone measurements (twice weekly), where it was below 0.5 ng/ml. Heifers were allocated into two experimental groups:-

### First Experiment:-

It was performed on twenty prepubertal non-cycling buffalo-heifers. They were treated with Synchro-Mate-B implants (6 mg norgestrel and 5 mg estradiol valerate) for 10-12 days after that each heifer was injected with a single shot of 700 -1000 i. u. eCG (Folligon, Intervet Co, Holland) depending on body weight (Tibary et al., 1992). The occurrence of estrus was 57.89% (Younis et al., 1996). Ten positively responded cycling heifers were subjected to metabolic profile testing.

### Second Experiment:-

It was carried out on twenty prepubertal non-cycling buffalo-heifers. Heifers were kept on a ration supplemented with Lasalocid (carboxylic ionophore, Roche, Egypt) at a rate of 33 mg/kg concentrates daily after weaning. Concentrates were given at a rate of 2% of live body weight of each heifer. Heifers were treated with Synchro-Mate-B implants plus eCG as in the first experiment. The incidence of estrus was 75.0% (Younis et al., 1996). Ten positively responded cycling heifers were subjected to metabolic profile testing.

### **Blood sampling:**

Individual blood samples were collected from all heifers before treatment and from ten positively responded heifers after treatment from the jugular vein into heparinized vacutainers. Whole blood was used for determination of hemoglobin (Hb) and packed cell volume (PCV%) and plasma was separated after centrifugation. Individual plasma samples were divided into aliquots, to avoid repeated freezing and thawing, then kept at -20°C and all assays were carried out.

### **Data collection technique:-**

Plasma progesterone levels were determined using RIA kit (Abraham, 1981). Blood samples of ten responded heifers (Before and after treatment of the same animals) were subjected to metabolic profile tests.

Hemoglobin (Hb) content of blood was determined by using Drabkin's reagent and Hematrol according to Drabkin (1932) and the packed cell volume was determined using microhematocrit capillary tubes with special reader scale (Jain, 1986). Plasma transferases; aspartate amino-transferase (AST) and alanine amino-transferase (ALT) activities were determined according to Reitman and Frankel (1957) using kits of Diamond Diagnostics; plasma alkaline phosphatase activity (ALP) was determined calorimetrically according to Ratliff and Hall (1973) using Bio-Analytics kits, plasma creatine phosphokinase (CPK) was determined calorimetrically according to Morin (1977); total plasma protein was determined according to Doumas et al., (1981) using biuret reaction method (Bio Merieux kits); plasma albumin

according to Doumas and Biggs (1972) using calorimetric kits; plasma glucose according to Caraway (1976) using enzymatic calorimetric test; plasma cholesterol level according to Zoppi and Fellini (1976) using calorimetric kits (Quimica Clinica Aplicada, QCA) and plasma urea nitrogen according to Crocker (1967) using calorimetric kits of Stambio. Plasma calcium was determined calorimetrically according to Biggs and Moorehead (1974) using kits purchased from "QCA" kits; inorganic phosphorus according to Goodwin (1970) and plasma magnesium was determined using Bio-Analytics kits according to Henery et al., (1974). Plasma sodium, potassium and lithium were determined using flame photometer according to the method adopted by Willard et al., (1965).

### **Data Analysis:**

Data were subjected to statistical analysis according to the procedures reported by Snedecor and Cochran (1980) and "t" test was performed to evaluate the difference between means.

## **RESULTS AND DISCUSSION**

The improvement of reproductive performance in heifers under ideal dietary and metabolic processes could be achieved by using hormonal therapy (Synchro-Mate-B and eCG) in non-cycling heifers and may be helpful in getting more cyclic and pregnant heifers early in the breeding season (Tibary et al., 1992 and Younis et al., 1996).

Results of the present investigation revealed that induction of estrus in non-cycling heifers using Synchro-Mate-B implant plus eCG (without Lasalocid supplement) did not alter Hb conc., PCV%, ALT activity, total protein, albumin and urea nitrogen concentrations (Table, 1). While, the activities of plasma AST and ALP were reduced, and the activity of CPK, blood glucose and cholesterol were increased as a result of these treatments. Moreover, Synchro-Mate-B implants plus eCG in Lasalocid supplemented heifers did not lead to significant alterations in most of the tested parameters except a decrease in PCV% and an increase in glucose concentration.

Regarding to plasma AST, it was found that the activity was decreased after treatment with sex steroids plus eCG in buffaloes (without Lasalocid supplement). These results coincide with those reported by El-Naggar et al., (1983) who recorded that buffaloes with inactive ovaries have plasma AST activity higher than those with active ones.

Many investigators link infertility with abnormalities in energy status, particularly hypoglycemia in Holstein cows (Kappel et al., 1984) and in beef cows (Dowine and Gelman, 1976), where they found that blood glucose level in fertile cows was higher than that of cows with fertility problems. The present results showed a significant increase in blood glucose level in cycling buffalo-heifers either with or without Lasalocid supplement. These results agree with those of Abdel-Reheim (1982) who found an increase in blood glucose level in cycling buffaloes than those with inactive ovary.

Cholesterol and AST were the best prediction variables, higher nutritional status was associated with lower serum concentration of cholesterol and increase in AST activity (Kronfeld et al., 1982). Haraszti et al., (1982) found a clear marked correlation between cow infertility and a fall in serum cholesterol. Moreover, Patel, et al. (1990) concluded that serum cholesterol concentration of anoestrous-buffaloes exhibited lower values than that of estrus-ones.

Concerning plasma urea nitrogen, it was found that treatment of heifers with sex steroids plus eCG did not alter urea nitrogen concentration in heifers either supplemented or not with Lasalocid. Moreover, monensin did not affect plasma urea nitrogen content in buffalo-heifers (Badawy et al., 1993) and cattle (Davenport et al., 1989). It seems most likely that, urea nitrogen concentrations of heifers in the present study were relatively higher than those presented by Kumar et al., (1992) in buffalo-heifers which may be due to difference in ration formulations and management.

Results of the present investigation revealed that the concentrations of blood plasma elements (Ca, Mg, Na, K and lithium) after induction of estrus by sex steroids plus eCG administration were not significantly different either with or without Lasalocid supplement, except a decrease in plasma phosphorus concentration in cyclic buffalo-heifers without Lasalocid supplement (Table, 2). Concerning plasma calcium, these findings agree with those of Farrag (1978); Farrag and Hassan (1982) and Osman et al., (1985), who found that plasma calcium concentration did not change significantly between fertile and infertile

buffaloes. On the other hand, Ullan et al., (1983) reported that plasma concentration of calcium was higher in cycling buffaloes than in non cycling-ones.

Plasma magnesium concentration in buffalo-heifers did not differ before and after treatments. These results coincide with those of Osman et al., (1985) who found no difference in magnesium concentration between cycling buffaloes and those with inactive ovaries. On the other hand, Bordauf et al., (1970) found an inverse relationship between magnesium deficiency and cattle sterility.

Plasma potassium concentration did not differ between non-cycling and cycling prepubertal buffalo-heifer either supplemented or not with asalocid. These results agree with the finding of Reissbauer (1971) who recorded no significant differences in plasma magnesium and potassium between fertile and non-fertile cattle. Moreover, Starns et al., (1984) and Badawy et al., (1993) reported that serum concentration of calcium, magnesium, potassium and sodium were not affected by monensin. While, Hewett (1974) detected a close relationship between fertility and mineral imbalance especially; excess phosphorus and potassium that interfered with estrus regularity and conception rate of cattle.

Thus we can conclude that usage of Synchro-Mate-B plus eCG either with or without asalocid supplement to induce estrus in non-cycling buffalo-heifers significantly altered some metabolic profile parameters.

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