Ain Shams University
Faculty of Science
Dept. of Zoology

SOME PHYSIOLOGICAL Aspects OF POST-NATAL CALVES AFTER PREPARTUM SELENIUM INJECTION OF DAMS

THESIS PRESENTED BY

OMAIMA MAHMOUD MOHAMED

B. Sc. ,1980

For the Degree of M. Sc.

(Animal Physiology)

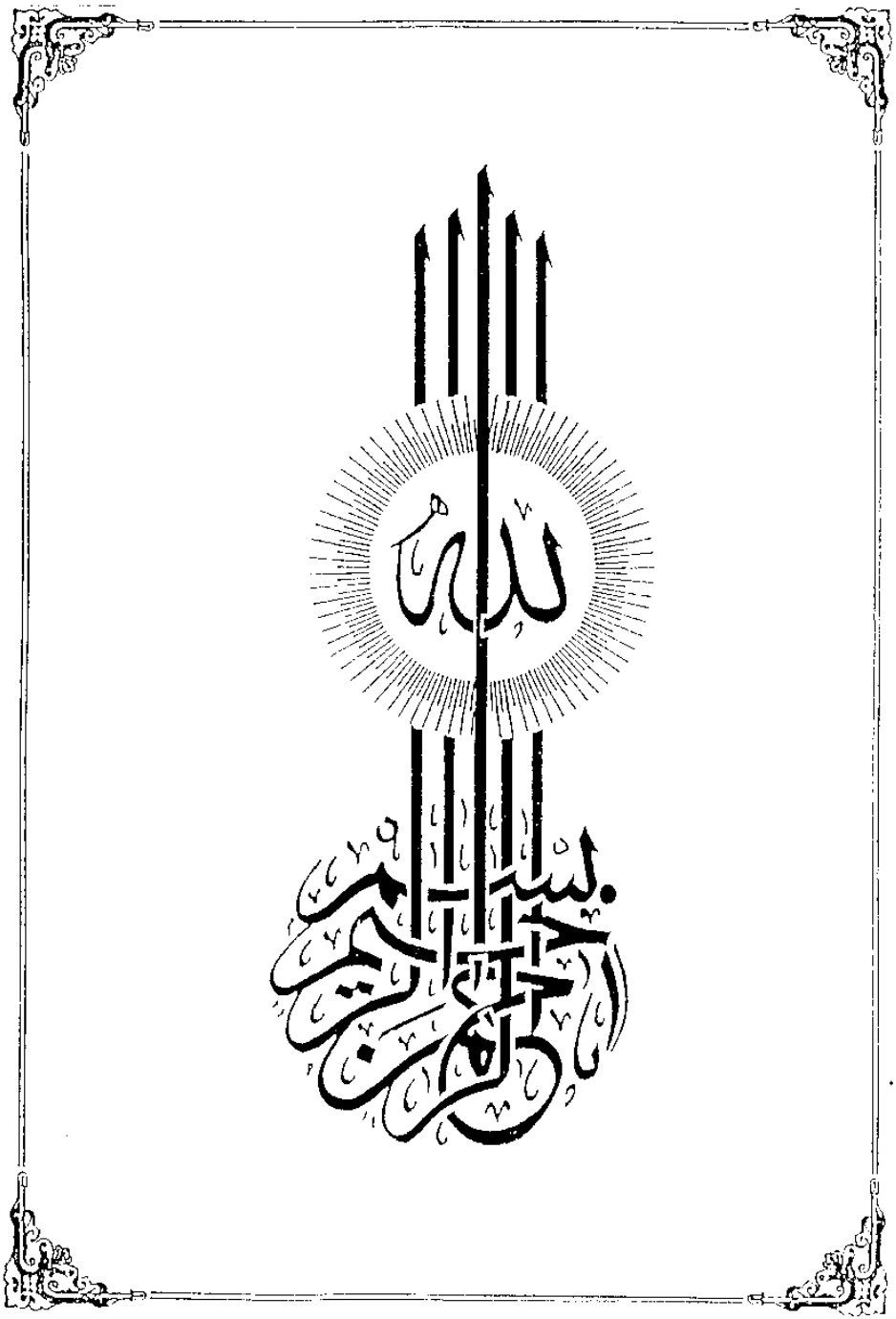
Under Supervision of

Prof. Dr. MONIR EL-SAYED AHMED GABR
Prof. of Physiology, and Radiobiology
Faculty of Science,
Ain Shams University

Prof. Dr. RAOUF HELMY YOUSSEF
Head of Biochemistry and Nutritional Deficiency Dept.,
Animal Health Research Institute

1 9 9 0

CONTENTS



ACKNOWLEDGEMENT

ACKNOWLEDGEMENT

I wish to express my thanks and gratitude to Prof. Dr. **MONIR EL-SAYED AHMED GABR**, Professor of Physiology and Radiobiology, Faculty of Science, Ain -Shams University, for his participation in planning of this study and for his valuable help, guidance and advices.

My thanks and gratitude are also due to Prof. Dr. **RAOUF HELMY YOUSSEF**, Professor of Physiology, Animal Health Research Institute , for his valuable help, supplying facilities and advices throughout the course of this study.

I am very grateful for the help and encouragement of Prof. Dr. **YOUSSEF LABIB AWAD**, Deputy Director of Animal Health Research Institute.

Thanks are also due to Dr. **HASSAN ALI HASSANIN**, Sakha Breeding Station, Animal Production Research Institute, for all facilities supplied by him during the collection of samples.

Thanks for the great effort offered by Dr. **Ahmed Aboul-Ela**, Assistant Professor of Physiology, Faculty of Veterinary Medicine, Beni-Suef, Cairo University, during the hormonal assay.

Deepest thanks are due to Prof. **Dr. Salvator Raiti**, Director of National Hormone and Pituitary Program, NIADDK, USA, for his generous supply of bovine growth hormone and prolactin.

TO MY FAMILY

INTRODUCTION

INTRODUCTION

The calf in Egypt is encountered with several problems of steer that may interfere with the physiological parameters and equilibrium. Morbidity and mortality rates are higher in new-born animals than in any other age group and the prevention of losses among them assumes special importance. There are many causes of loss in new-born animals,and most of such losses are caused by faults in management of dams in late stage of gestation and cannot be considered as due to disease. Their omission does not in any way detract from their importance.

There are numbers of congenital defects in animals which are known to be caused by deficiencies of specific nutrients in the diet of the dam. Trace elements has long been known to be of importance in animal nutrition. Selenium is considered as an essential trace element required specially in late stage of pregnancy, and its deficiency may lead to congenital muscular dystrophy in new-born calves. This syndrome is characterised by weekness, inability to nurse and decline in growth rate of calves, and, in acute form, sudden death may occur. Awad et al.(1985) recorded a high mortality rate in newborn buffalo's calves in selenium-deficient area, which was lowered by selenium supplementation of dams.

The object of the present study is to elucidate the effect of selenium supplementation of cows during the last

month of pregnancy, on some physiological parameters of their newborn calves. It will include some blood biochemical constituents and metabolic hormones related to growth rate of calves.

REVIEW OF LITERATURE

REVIEW OF LITERATURE

Physiological status of newborn calves and their growth rate are correlated with the healthy condition of of dams and their blood constituents, especially during the last period of gestation.

Wigglesworth (1966), stated that nutrition of the dams is important in relation to resistance of the offs-pring, but it is impossible to be specific in recommending the ration to be used.

Alexander (1974), concluded that birth weight of the calf is particularly sensitive to variations in nutrient supply of the dam, especially in the last six weeks of pregnancy when the foetus normally gains 3 kg.

Eley, Thatcher, Bazer, Woilcox , Becker, Head and Adkinson (1978), reported that growth rate of all bovine fetuses in utero was maximal at 230 days of gestation with a peak rate of over 200 g/day by term.

Khachaturyan (1978), studied factors such as poor feeding and maintenance of the cow during pregnancy,which contribute in retarding the growth rate of calves. He distinguished three stages of hypodevelopment: in stage 1, the overall state of the calf is satisfactory, but the skin is adherent and lacking of elasticity. In stage 2, weight

is below normal, muscles lack turgidity and temperature is below normal. While in stage 3, mucosa are dry and pale, temperature is lower by 1-2°C, peristalsis is reduced, and exterimeties are cold.

Stary(1980), studied the relation between metabolic disorders of cows and diseases of their calves. He mentioned that, the main risk factors for calf health were alkalosis in cow, hypocalcaémia, hypomagnesaemia, sodium deficiency, chronic hepatic insufficiency, break downs in water metabolism and ketosis in dams.

I. **Many references are reviewed in respect to blood biochemical constituents of dams during the periparturient period.**

Lomba, Ghauvoux and Bionfet (1972),measured total diffusable and bound calcium in addition to total protein in blood of 21 cows, before, during and after parturition. They concluded that reduction in calcium was attributed to the increased drain calcium at onset of lactation. The fall in total calcium involved mainly its bound form, while total protein content remained unchanged.

Barnett, Vercellotti, Cragle and Doherty (1974) , estimated correlation of bovine serum macroglobulin and calcium at parturition. They found that serum globulin varied slightly in cows sampled at parturition and onset of

lactation, while serum protein remained constant. The drop in serum calcium at birth from 3-1.9 mM accompanied the macroglobulin changes.

Bostedt (1974), examined serum enzymes concentrations (GOT,GPT,LDH and CPK) of 29 primiparal heifers and 45 multipara cows. These enzymes were noticeably higher after normal parturition, in animals after fifth parturition than in primpara.

Arave, Miller and Lamb(1975) proved that serum cholesterol increased with increasing age. It averaged 172.8 mg/100 ml in cows and 121.4 mg/100 ml in heifers. Cholesterol was relatively low at onset of lactation , increased at mid lactation and decreased in late lactation. Month of calving, year of sampling and ration did not influence serum cholesterol in cows at first lactation, however, variation in both month and year of sampling was significant for heifers.

Blaüärmel and Krüger (1976), measured total protein and its fractions in blood plasma of healthy pregnant Jersey cows. They recorded that normal average level of total protein was 6.9 gm/100 ml. The percentage of albumin fraction and α_1, α_2 and B-globulins were 37.7 $\pm$ 5.8, 11.22 $\pm$ 2.22, 14.25 $\pm$ 1.95 and 12.5 $\pm$ 0.91 % respectively. The same authors found also that the average of plasma protein close to date of

parturition was 6.5 gm/100 ml. The albumin and α_1 - globulin fractions were inversely proportional to the gamma globulin concentration before, during and after parturition, but started to increase 10 minutes before parturition. The concentration of gamma globulin increased slightly but not significantly, before parturition,

Jadhan, Velhankar and Deshpande (1977), estimated the variation in serum cholesterol levels of Gir cows during pregnancy, parturition and puerperium. The blood serum cholesterol levels averaged 232 ± 16 mg/100 ml two months before parturition, decreased gradually ata rate of 11 mg/100 ml per week until on the day of parturition it was 134 ± 5 mg/100 ml. Values then rose gradually at rate of 15 mg/100 ml per week reaching 310 ± 14 mg/100 ml eight week postpartum.

Suleimanov, Cheremisinov and Kovalchuck (1977), detected the role of trace elements such as Cu, Zn, Co and Mn, administered to cows from dry period until two months after calving. Calves of treated cows had higher serum total protein, improved calcium and potassium metabolism, great resistance to infection, and improved thyroid gland cells and follicles than control cases.

Jagoš,Surynek, Škollova-Slámova, and Illek(1978), investigated blood calcium in cows and their suckling calves at 0-7 days or 8-14 days after parturition.Calcium values of calves were significantly higher than those of dams. The increased level in calves was associated with bone formation.

Surynek,Illek and Mošik(1978), determined blood calcium in fetuses of 20 cows at 8 th or 9 th months of pregnancy. They found that fetuses had much higher calcium level (13.22 ± 0.92 mg/100 ml) than their dams. The high calcium concentration in fetal blood was associated with the rapid bone formation in the last third of intrauterine life.

Wälchli-Suter(1978) measured total cholesterol,AST and calcium values in cows during late pregnancy, parturition and puerperium. At parturition serum total cholesterol and calcium levels were notably decreased, while AST enzyme rose significantly.

Baumgartner(1979),recorded the values of calcium in serum and blood of female cattle from the age of 4-6 weeks up to their second calving. Values were (9.3 - 12.3 mg/100 ml) in whole blood and (4.65-6.15 m Vol/L) in serum.

Baumgartner and Skalicky (1979) detected the values of some enzymes and metabolites in the serum of female