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مستوى الكالسيوم والفسفور والماغنسيوم خلال مرحلة ما قبل الولادة في الأغنام

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أستهدف البحث دراسة ديناميكية مستوى بعض مكونات السيرم (الكالسيوم والماغنسيوم والفسفور) فى الأغنام خلال الستة أسابيع قبل الولادة ثم ثلاثة أسابيع بعدها .

أجرى هذا البحث على عشرون نعجة تخص مزرعة الأنتاج الحيوانى بكلية الزراعة .

ولقد لوحظ أن نسبة الكالسيوم والفسفور تصل الى أقل مستوى خلال ٣ ـ ٤ أسابيع قبل الولادة ثم تزداد النسبة بعد ذلك خلال الفترة الباقية من الحمل ثم أثناء الرضاعة ، أما مستوى الماغنسيوم فأنه يزداد تدريجيا فى فترة ما قبل الولادة ثم ينخفض بحدة خلال مرحلة الولادة وبداية مرحلة الرضاعة حيث يعود ثانية لمستواه الطبيعى بعد ذلك .

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BLOOD SERUM CALCIUM, INORGANIC PHOSPHORUS AND MAGNESIUM OF EWES AT PREPARTAL AND POSTPARTAL PERIODS

(With One Table)

By

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SUMMARY

Average level of calcium, inorganic phosphorus and magnesium in serum of sheep during the last six weeks of pregnancy, at lambing and three weeks after birth were estimated.

The level of calcium and phosphours reached a minimum concentration three to four weeks before lambing, while the level increased one week before lambing, at lambing and during the puerperium. Magnesium level shows a marked increase three weeks before lambing, then sharp drop in its level was observed during lambing. Magnesium level returned to its normal level during the puerperium.

INTRODUCTION

Blood analysis of pregnant animals throw some light on the nutritional requirements of both the dam and its foetus during this critical period. Moreover the level of the blood constituents may be considered as a guide in evaluating the diet or nutritional provision of the animal.

Sheep do not commonly suffer from calcium responsive disease at lambing, but this could be mostly occurs during the last four weeks before lambing (GERALD and BLOSSER, 1952).

It has been reported that hypo-calcaemia & magnesemia occur usually and most commonly in the pregnant ewes carrying twins or triplets and especially during the last month of pregnancy (BLOOD and HANDERSON, 1974).

Sheep has a great demand for calcium during late pregnancy when the mineralization of foetal skelton is at its maximum rather than during the period of lactation after birth (KRAFT and HOFMANN, 1967).

On the other hand, NILSON (1960) observed non significant differences between the plasma calcium concentration in ewes carrying either single or twins.

However, under our local managerial environment there is little informations about the concentration of calcium, phosphorus and magnesium in ewes during late pregnancy as well as

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lactation period. The changes in these mineral during these critical periods may reflect the animal's demand for these constituents and decide the susceptibility of either mother or the newcomming birth for post-lambing diseases.

MATERIAL and METHODS

This study was conducted on 20 ewes belonging to the farm of Faculty of Agriculture, Assiut University. The age of animals ranged from 3-6 years. All Animals were apparently healthy and free from internal external parasites. They were bred under the same environmentql and nutritional conditions. Animals were fed on concentrated ration containing cotton seed cake 65%, rice polish 20%, wheat bran 9%, molases 3%, calcium carbonate 2% and sodium chloride 1%. Each animal was given 1.5 kg. of concentrated ration daily and 2 kg. Barseen (Trifolium Alexandrinum). Animals were examined by abdominal palpation to detect pregnancy. Ultrasonic doppler sound apparatus (Jasso) was used to confirm pregnancy with abdominal palpation. The probe is placed directly on the abdominal wall just cranial to the udder.

Coagulated blood samples were collected from all animals weekly before and after lambing. Sera were separated from the blood samples and were used to estimate blood serum calcium (CITELMAN, 1967), serum phosphorus (ANTONOVA and PLENOVA, 1971) and serum magnesium (ORANYE and RHEIN, 1951).

RESULTS

Table (1) shows the concentration of blood serum calcium, inorganic phosphorus and magnesium at weekly intervals 6 weeks before and 3 weeks after lambing.

Calcium concentration reached a minimun concentration three to four weeks before lambing. During one to five weeks before lambing, a marked decrease of phosphorus concentration was observed, while this concentration began to increase at lambing and continued so to increase afterwards.

From table (1), a higher magnesium concentration was also found during the last three weeks before lambing but at time of lambing the concentration decreased sharply and returned to normal level after lambing.

DISCUSSION

The lowest concentrations of calcium that occured in the present status, between third and fourth weeks before lambing could be a reflex demand to the increased rate of the growing foetus and its skelton which needs calcium for mineralization. Similar findings were previously reported by ARTHUR (1964) and BLOOD and HANDERSON (1974). Plasma calcium concentration recovered persumbly as the mechanism for haemostasis adopted to the increasing skeletal drain (NILSON, 1960). Such hypocalcaemia in the pregnant ewes in the view of GERALD and BLOSSER (1952) was due to an increase in the rate of calcium mobility out of the blood plasma, but such case is not balanced by the rate of absorption of calcium from the gut or by the rate of resorption from bones.

HODGE; PEACE and TRIBE (1973) advised that the diet of the ewes should have more amounts of calcium salts at 5-6 weeks before lambing because the tendency of hypocalcaemia was more increased about a month before lambing, as well as mobilization of calcium from their skeltons will occur resulting in lambing sickness. The authors also suggested that the diet of ewes during the last month before lambing should be not only rich in calcium but have also a high dose of Vitamin D or its metabolits. This may be usefull to prevent hypocalcaemia at this period.

BEST and TAYLOR (1950) reported that over 60% of the skeletal calcium of the offspring is the results of deposition during the last two months.

However, sheep which have not been bred for milk production will not suffer from sudden increase in the demand for calcium at the begining of lactation period (SYMONDS and TREACHER, 1967).

ALLCROFT and FOLLEY (1941) and CHURCH (1971) stated that phosphorus is an important component of nucleoprotein,therefore it is considered one of the most vital factors in tissue growth. SYMONDS and TREACHER (1967) found that not only the calcium decreases before parturition but also inorganic phosphorus reached its lowest level between 1-5 weeks before lambing in ewes. This in the openion of the authors may be due to that phosphorus is one of the minerals required in a large quantituies for skeletal mobilization.

It is well known that the growth rate of the foetus in domestic animals have much increased during the last stage of gestation (ROBERTS, 1971 and ARTHUR, et al. 1982).

BEST and TAYLOR (1950) reported that during the last month of gestation there was a much demand of Ca, P, Mg for the foetus. This perhaps explains also the liability of post parturient hypophosphataemia.

Our results revealed that blood serum magnesium level was slightly increased during the 3-4 weeks before lambing. COLES (1977) found that magnesium in much smaller quantities than calcium and phosphorus is essential in bony & somatic growth in domestic animals.

L'ESTRANG and AXFORD (1963) observed that in lactating ewes hypocalcasemia followed usually hypomagnesaemia and though serum Mg level depends mainly on its intake and availability, yet little is known about factors regulating Mg-metabolism and its content in the blood particularly during pregnancy and lactation in sheep. AYOUB and AWAD (1961) estimated 2.93, 2.18 and 1.74 mg of Mg per each 100 ml serum in non pregnant, pregnatn and lactating buffaloes respectively.

LANE; CAMBELL and KRAUSE (1968) and LOMBA, CHAUVAUX and BIENRET (1972) cited that months of pregnancy in cattle affect P, Na and K but months of lactation affect Ca, P, Mg and Na.

ROBERTSON, et al. (1960), HERD (1966) and LOMBA, et al. (1972) observed a combined hypo Ca-Mg in the lactating cows.

Magnesium is considered one of the main factors which regulates metabolism and energy production (BLOOD and HANDERSON, 1974). This may explain the low serum magnesium level during lactation.

Table (1)
Mean concentrations of Calcium, Magnesium and Inorganie. Phosphorus at intervals before and after lambing

Time	Calcium mg/100 ml	Inorgan. Phosphorus mg/100 ml	Magnesium mg/100 ml
Before Lambing			
6 weeks	10.30±0.33	5.40±0.13**	2.10±0.11
5 "	10.90±0.33	4.12±0.13	2.22±0.01*
4 "	7.90±0.22**	4.12±0.22	1.99±0.11
3 "	8.10±0.66*	3.11±0.33	3.10±0.10**
2 "	9.90±0.17	3.00±0.32	3.32±0.12**
1 "	10.11±0.38	2.99±0.31	3.44±0.10**
Lambing			
0	10.9±0.19	3.91±0.35	1.33±0.11
After lambing			
1st week	10.30±0.18	3.99±0.42	2.00±0.12
2nd "	10.80±0.39	4.10±0.51	2.33±0.12*
3rd "	10.33±0.58	4.55±0.31*	2.11±0.13

* P/ 0.05
** P/ 0.01

REFERENCES

Allcroft, W.M. and Folley, S.J. (1941): Observation on the serum phosphatase of cattle and sheep. Biochem. J. 35, 254-262.

Antonova, V.Y. and Plenova, P.H. (1971): Laboratory Methods in Veterinary Medicine. 1st Ed. Koloc, Moscow, USSR.

Arthur, G.H. (1964): Wrights Veterinary Obsterics. 3rd Ed. Bailliere and Tindall cox, London.

Arthur, G.H.; Noakes, D.E. and Pearson, H. (1982): Veterinary Reproduction and Obstetrics. 5th Ed. The English Language Book Society and Bailliere Tindall. London.

Ayoub, M.H. and Awad, Y.L. (1961): Magnesium level in serum of Egyptian farm animals (Buffaloes, cattle and camel). J. Egypt. Vet. Med. Ass., 19, 155-161.

Best, C.H. and Taylor, N.B. (1950): The physiological basis of medical practice. 5th Ed., Baillier, Tindall and Cox, London.

Blood, D.C. and Handerson, J.A. (1974): Veterinary Medicine. 4th Ed. Baillier, Tindall, London.

Church, D.C. (1971): digestive physiology and nutrition of ruminants. Nutrition, 2, 417-445.

Coles, E.H. (1977): Veterinary Clinical Pathology. W.B. Saunder's Company, Philadel0phia and London.

Gerald, M. and Blosser, T. (1952): The relation of prepartal and postpartal mineral balance. J. Dairy Sci., 55, 581-588.

Gitel man, H.S. (1967): Determination of serum calcium in biological specimens. Animal, Biochem. 18, 737.

Herd, R.P. (1966): Fasting in relation to hypocalcaemia and hypomagnesaemia in lactating cows and ewes. Austr. Vet. J., 42, 269-272.

Hodge, R.W.; Peace, G.R. and Tribe, D.E. (1973): Calcium requirements of the young lamb. Aust. J. Agric. Res., 24, 229-236.

Kraft, W. and Hoffmann, W. (1967): Hypophosphataemia; Deutsche Tierarztl. W-schr. 74, 638-645.

Lomba, F.; Chauvaux, G. and Bienfet, V. (1972): Variations in certain time of calving. Annales de Medicine Veterin. 116, 6, 563-569.

Lane, A.G.; Cambell, J.R. and Krause, G.F. (1968): Blood minerals composition in ruminants. J. Animal Sci. 27, 766-770.

L'Estrang, T.L. and Axford, R.F. (1963): The effects of low magnesium intake on lactating ewes. Proc. Nutr. Soc., 22, 1-11.

Nilson, L.S. (1960): Hypocalcaemia in cattle and sheep. J.A.V.M.A., 137, 705-711.

Oranye, M. and Rhein, M. (1951): Microestimation of mgnesium in body fluids. J. Biol. Chem. 189, 379.

Roberts, S.J. (1971): Veterinary Obsterics and Genital Diseases. 2nd Ed., Publ., Ithaca, N.Y.

Robertson, A.; Paver, H.; Barden, P. and Morr, T.G. (1950): Res. Vet. Sci., 1, 117-121.

Symonds, H.W. and Treacher, R.J. (1967): The experimental induction of hypophosphataemia in goats. J. Physiol. 193, 619-629.