

DOWNER COW SYNDROME IN LATE PREGNANCY IN COWS AND BUFFALOES (With One Table & One Fig.)

By

R.E. EL-SAYED; ASMA, O.A.
and H. FETAIH*

(Received at 25/6/1994)

ظاهرة الرقاد فى الأبقار والجاموس فى فترة الحمل المتقدم

رشدى فوزى السيد ، أسماء على
جمدى فتاح

اشتملت هذه الدراسه على عدد ١٥ من الأبقار (٥ - ٧ سنوات) تعانى من ظاهرة الرقاد وعدد ١٠ من الأبقار و ١٠ من الجاموس سليمه ظاهرياً وكليئياً مماثلة فى العمر وفترة الحمل كمجموعه ضابطه . اظهرت الحيوانات المصابه رقاد قصى مع عدم القدره على النهوض بالرغم من محاولات المساعده وذلك بعد مرور ١٢ - ١٨ ساعه منذ مشاهدتها فى حالة طبيعیه . تم فحص هذه الحالات للحمل عن طريق الجس من المستقيم ووجد أنها فى حالة حمل متقدم يتراوح بين ثمانية أشهر فأكثر . اسفر الفحص الاكليئيكى عن وجود احتقان بالاغشيه المخاطيه والشعيرات الدمويه الظاهره ، كما وجد انخفاض فى معدل حركة الكرش وكان معدل ضربات القلب متغيراً حيث وجدت بطيئه وضعيفه فى بعض الحيوانات وفى البعض الآخر كانت فى الحدود الطبيعیه وفى جميع الحيوانات المصابه لم تسمع أى اصوات غير طبيعیه بالقلب . وباستخدام جهاز الكشف عن المعادن كانت النتيجة سالبه . كما لم يسفر الفحص الاكليئيكى عن وجود اضطرابات فى درجة الحراره ومعدل التنفس .

بالتحليل البيوكيميائى لمصل الدم لوحظ انخفاضاً معنوياً فى مستوى كل من البروتين الكلى ، الالبيومين ، الجلوبيولين وسكر الدم مع زيادة معنويه فى مستوى انزيم الكرياتين فوسفوكينيز فى الحيوانات المصابه بالمقارنه بالحيوانات السليمه . كما لم تلاحظ تغيرات معنويه لمستوى الكالسيوم ، الفوسفور الغير عضوى والماغنيسيوم فى مصل دم كل من الحيوانات المصابه بالمقارنه بالسليمه .

أوضح البحث الظاهري للحيوانات بعد الذبح الاضطرارى أو النفوق هزالاً شديداً وضموراً عاماً فى العضلات مع شحوب لونها وكذلك وجود الضمور المصلى للنسيج الدهنى بالجسم وخاصة التى تحيط بالقلب وحول الكلى . وبالفحص النسيجى الميكروسكوبى للعضلات لوحظ تنكز الألياف العضليه بنسبة عاليه . حيث أخذت معظم هذه الألياف صبغة باهته مع تحللها فى بعض الأحيان كما لوحظ أيضاً حبيبات ذو صبغه زرقاء اللون فى بعض الألياف مما يدل على تجمع بلازما الخلايا بها .

*: Dept. of Pathology, Fac. Vet. Med. SCU.

SUMMARY

The clinical, serum biochemical, gross and histopathological findings on 10 buffaloes and 15 cows showed downer syndrome in late pregnancy were described. This syndrome developed at the period from the 8 th. month of pregnancy up to one week precalving. All affected animals showed unsatisfactory clinical response to calcium and fluid therapy and they were either emergency slaughtered or died. Significant ($P < 0.05$) hypoproteinaemia, hypoalbuminaemia and hypoglycaemia with highly significant ($P < 0.1$) elevation of SCPK were the essential biochemical findings in affected animals. Emaciation, serous atrophy of body fat and myonecrosis of skeletal muscles were prominent autopsy findings. The primary factor implicated to develop this syndrome in late pregnancy might be the protein-energy malnutrition resulting from underfeeding of the heavily pregnant animals.

Keywords: Downer cow syndrome, late pregnancy, cows, buffaloes

INTRODUCTION

The term downer cow is typically refers to acow which is in a sternal recumbency and unable to rise the thoracic limbs are usually functioning but the pelvic limbs are unable to support body weight (COX, 1982) In dairy cows periparturient recumbency is a common problem having etiologically a complex syndrome, the clinical picture of which often appears the same (COX 1982, ANDREWS, 1983 and WARNOCK et al. 1978). The downer animals dies or emergency slaughtered after varying periods of recumbency due to the severe muscle damage, sepsis or shock (COX et al. 1982, FENWICK et al. 1986 and CLARK et al., 1987). Biochemical and haematological tests have been used to identify factors involved in recumbency, predict likely outcome and to determine treatment plan (CURTIS et al., 1970 and CLARK et al., 1987).

The intention of this work was to describe the clinical, biochemical and skeletal muscle histopathological features of alert downer cows and buffaloes in late pregnancy.

MATERIALS AND METHODS

This study was conducted on 15 cows and 10 buffaloes (5-7 years old) which manifested clinical picture of recumbency in late pregnancy (> 8th month of gestation to 1 week before parturition). For comparison, 10 cows and 10 buffaloes which were clinically normal at the same stage of gestation were included. These animals were belonged to the animal farm station of the Fac. of Vet. Med. Suez Canal University. The animals were freely stalled, fed on 4 kg/head daily of commercial concentrate ration. Rice straw was offered ad lib. and the animals were freely watered.

Serum samples were obtained from both clinically healthy and recumbent animals. Colorimetric determination of serum calcium, inorganic phosphorus, magnesium, creatin phosphokinase (CPK), glucose, total protein, and serum albumin was performed using test kits after GINDLER and KING, (1972), EL-MERZABANI et al., (1977); NEIL and NELLY, (1956); STEIN, (1985); TRINDER, (1969); WEICHSELBAUM, (1946) and DRUPt., (1974), respectively.

Gross and histopathological examinations were conducted on dead and emergency slaughtered animals. Pieces of muscles about 5 mm thick were taken from the different parts showed abnormal discoloration, fixed in neutral formaline. Samples were then dehydrated; embeded in paraffin, sectioned at 4-5 μ m and stained by H & E (DRURY and WALLINGTON, 1980).

Routine treatment of recumbent cows in the farm included I.V administration of 2 litres of normal saline; 500 ml of 25% dextrose solution, and 500 ml Cal D. Mag. A further dose 4 gm streptomycin and 4 million I.U peniciline was given intramuscularly. This treatment was given daily for 3 days.

The obtained results were statistically evaluated using students t-test after KALTON, (1967)

RESULTS

Clinical Findings And Response For Treatment:

The affected animals were presented with a history of a sternal recumbency and inability to stand even with assistance, 12-18 hours after being seen standing normal on feet. Pregnancy diagnosis revealed late pregnancy (> 8th of pregnancy). Clinical examination showed that body temperature and respiratory rates were within normal range. Heart were variable in rate; some affected cows & buffaloes recorded less than 50/mine., otherwise rythmic. Other individuals recorded normal rates, In all downer animals no abnormal heart sounds

were heared. Ruminal atony (< 2/2 minutes), congested capillaries and pale mucous memberanes were prominant signs in affected animals.

The recumbent cows and buffaloes were alert, have intact pupillary light reflex and menace reflex, the appetite not greatly affected. When the animals were proaded by electric goad, they make unsuccessful triels to get up.

One recumbent buffalo was found dyspnoeic, with distended and pulsating jugular vein. Chest and heart examination revealed hydropericardium, and bilateral hydrothorax. This was confirmed later by thoracocentesis which gave a large quantity of clear yellow fluid free of cells on microscopic examination. Medical treatment of this syndrome was not successful, and emergency slaughter or death were the fate.

Serum Biochemical Analysis:

Table (1) presents the results of the biohcemical analysis of the sera of the cows and buffaloes showed downer condition and normal non recumbent animals.

The results showed significant ($p < 0.05$) hypo-proteinaemia, hypoalbuminaemia, hypoglycaemia and elvation of serum creatine phosphokinase levels in downer cows and buffaloes in comparison with healthy non recumbent animals. Serum calcium, inorganic phosphorus, and magnesium concentrations were not significantly ($p > 0.05$) changed in downer animals in comparison with healthy ones.

Pathological Findings:

a. Gross Picture

The animal carcass as a whole exhibited marked emaciation and serous atrophy of the body fat. The skeletal muscles particularly of the thigh, shoulder region and diaphragm as well as intercostal muscles were pale in color and atrophied in variable degress

b. Histopathology

Histological examination of the skeletal muscles (Fig.1) showed necrosis in individual muscle fibers in a high proportion. Most of the affected muscles appeared pale-staining and showed myolysis. Meanwhile some other muscle fibers were filled with coarse granular bluish - staining meterial indicating clumping of sarcoplasm.

DISCUSSION

Serum biochemical analysis (Table,1), gross and histopathological examination (Fig 1) together with some clinical findings may suggest that protein-energy malnutrition might be the cause of the present downer conditions in late pregnant cows and buffaloes. In this respect protein is known to be essential for maintenance, growth and reproduction, and its storages in cattle occurs mainly in blood, liver, and muscles (PLATT *et al.*, 1964. These stores may be used over a short-term period to face protein deficiency especially to maintain gestation and lactation (PAQUAY *et al.*, 1972). OETZEL and BERGER (1986) and SMITH (1990) reported that in protein-energy malnutrition, cattle progressively lose body condition and may become recumbent particularly when they are heavily pregnant. The authors added that, death in such cases usually occur 1-2 weeks of recumbency. HANIF *et al.*, (1990) reported a muscular weakness and recumbency unrelated to parturient hypocalcaemia in late pregnant beef cows. Underfeeding in late pregnancy in cattle results in reduced muscle fiber diameter and loss of vast oxidative glycolytic fibers perdisposing to muscular weakness and recumbency (REID *et al.*, 1980)

Hypoproteinaemia (5.7 ± 0.18 and 5.88 ± 0.14 gm /dl); and hypoalbuminaemia (2.38 ± 0.14 and 2.42 ± 0.11 gm/dl) were recorded in late pregnant buffaloes and cows, respectively. These results were coincided with the data presented by PAYNE *et al.*, (1973) and BIDDLE & EVANS (1973) who stated that a marked decline in serum albumin (<2.5 gm%) is an indicator of protein deficient diet in cattle. Hypoglycaemia (40.9 ± 1.2 and 41.9 ± 1.4 mg / dl) was noticed in late pregnant downer buffaloes and cows, respectively. This may be attributed to the negative energy balance caused by decreased quantity and quality of feed when caloric requirements are increased by fetal development (SMITH, 1990). Furthermore, PLATT *et al.*, (1964) stated that chronic protein deficiency reduces food intake which results in combined deficiency of protein and energy.

Serum creatine phosphokinase (SCPK) was significantly elevated ($p < 0.1$) in late pregnant downer animals in comparison with healthy non pregnant ones. The obtained data were in agreement with those recorded by KORNFELD, (1980), COX *et al.*, (1982) and CLARK *et al.*, (1987) in periparturient recumbency in cattle. The elevated levels of SCPK recorded in the downer conditions may be attributed to pressure damage and subsequent ischemic muscle necrosis, which results in its

leakage into circulating blood. The histopathological picture of myonecrosis observed in downer animals in this study may support the elevation of SCPK in such conditions and was in accordance with that previously reported by CHEIVILLE (1988). The author stated that progressive nutritional deficiency in pregnancy was associated with microscopic tissue changes in muscle, myocardium and brain. FURTHERMORE, COX et al (1982) reported that, the increased weight of the late pregnancy in cattle which almost lie on one pelvic limb, may predispose to critical myopathy associated with precalving recumbency

The mean serum values of calcium, inorganic phosphorus and magnesium were within the normal range of late pregnant cows and buffaloes in both downer and healthy animals. The reported results coincided with that reported by AWAD et al., (1978), HASSANEIN et al. (1983) and EL-FADALY and RADWAN (1992).

REFERENCES

- Andrews, A.H. (1983); prognosis of downer cow syndrome. The bovine pract. 18:41-43
- Awad, Y.A.; Georgy, M.E.; Fawzia Fahmy and Moustafa, M.A. (1978): Average levels of some minerals, vitamin A and alkaline phosphatase in serum at late pregnancy of friesian cows and their calves. J. Egypt. Vet. Med. Assoc. No. 2, :5-8
- Biddle, G.N. and Evance, J.I. (1973): Nitrogen utilization in cattle using anitrogen depletion -repletion technique. J Anim. Sci, 36 : 123-129.
- Cheiville, N.F. (1988): Introduction to veterinary Pathology. 1st ed. Iowa State University Press, Ames, Iowa.
- Clark R.G.; Henderson, H.V.; Hoggard, G.K., Ellison, R.S. and Young, B.G. (1987): The ability of biochemical and haematological tests to predict recovery in periparturient recumbent cows. N.Z. Vet. J. 35: 126-1333.
- Curtis, R.A.; Cote, J.F. and Willoughby, R.A. (1970): The downer cow syndrome. A complication not adisease. Mod. vet. pract. 51:25-28.
- Cox, V.S. (1982): pathogenesis of the downer cow synderome. Vet. Rec. 111:76-79.
- Cox, V.S.; McGrath, C.G. and Jorgensen, S.E. (1982): The role of pressure damage in pathogenesis of the downer cow syndrome. Amer. j. Vet. Res., 43, 1:26-31.
- Drupt, F. (1974) Colorimetric determination of albumin in serum. Pharm. Biol., 9:77.
- Drury, R.A. and Wallington, E.A. (1980): Carleton, s Histological Technique. 5th. ed., Oxford University press, Oxford. New York, Toronto.

- El-Fadaly, M. A. and Radwan, Y. A. (1992): The effect of pregnancy, parturition and lactation on serum electrolytes and blood picture, as well as liver and kidney functions in buffaloes. *J. Egypt. Vet. Med. Ass.* 52, 1: 105-118.
- El-Merzabani, M. M.; El-Aaser, A. A. and Zakhary, N. I. (1977): Colorimetric determination of inorganic phosphorus. *J. Clin. Chem. Clin. Biochem.* 15: 715-718.
- Ferwick, D. C.; Kelly, W. R. and Daniel, A. C. W. (1986): Definition of anon alret downer cow synderome and some case histories. *Vet. Rec.* 118: 124-128.
- Gindler, E. M. and King, J. D. (1972): Rapid colorimetric determination of calcium in biological fluids. *Amer. J. Clin. Path.*, 58: 376-382.
- Hanif, K.; Weeks, F. G. and Chandler, S. P. (1990): Hypocalcaemia associated with muscular weakness and recumbency in beef cows. *Can. Vet. J.* 31, 1: 34-35.
- Hassanien, M. R.; Yousef, A. A.; Shehata, Y. M.; Shalaby, A. S.; Wehasih, F. B. S. and Ibraheim, I. A. (1983): Biochemical variations of blood constituents of buffaloes and cows during pregnancy and puerperium. *Egypt. J. Vet. Sci.*, 2: 159-163.
- Kalton, G. (1967): Introduction to statistical ideas from social scientists. 2 nd ed. Acad. Press London.
- Kornfeld, D. S. (1980): The downer problem : In: Amstutz, H. E. (ed.): *Bovine Medicine and Surgery*. 2nd. ed. Santabarba, Calif. Amer. Vet. Puplication Inc., Vol. 1, 576-581
- Neill, D. W. and Nelly, R. A. (1956): Estimation of magnesium in serum using Titan yellow. *J. Clin. Path.*, 2, 161.
- Oetzel, G. R. and Berger, L. L. (1986): Protein-energy malnutrition in domestic ruminants. II. Diagnosis, Treatments and Prevention. *Comp. Cont. Ed. Pract. Vet.*, 8: S 16-s 21.
- Paquay, R. R.; DeBaere and Lousse, A. (1972): The capacity of the mature cow to lose and recover nitrogen and the significance of protein reserves. *Brit. J. Nutr.* 27: 27-36
- Payne, J. M.; Rolands, G.; Manston, R. and Dew, S. M. (1973): A statistical apprasial of the results of metabolic profil tests on 75 dairy herds. *Brit. Vet. J.*, 129: 370-381.
- platt, B. S.; Heard, C. R. C. and Stewart, R. G. (1964): Experimental protein -calorie deficiency : IN : Munro, H. N. (ed.) *Mammalian protein Metabolism*. Vol. 2, Academic Press, New York.

- Reid, I.M.; Roberts, C.J. and Baird, G.D. (1980): The effect of underfeeding during pregnancy and lactation on structure and chemistry of bovine liver and muscle. *J. Agric. Sci.*, 94, 1:239-245.
- Smith, B. (1990): *Large Animal Internal Medicine*. The C.V. Mosby Company. U.S.A.
- Stein, W. (1985): Colorimetric determination of CPK in serum, heparinized plasma and EDTA plasma. *Med. Welt.*; 36; %&@.
- Trinder, P. (1969): Enzymatic determination of glucose. *Ann. Clin. Biochem.*, 6:24.
- Warnock, J.R.; Caple, I.W.; Halpin, C.G. and McQueen, C.S. (1978): Metabolic changes associated with the downer condition in dairy cows at abattoirs. *Aust. Vet. J.*; 54:566-569
- Weichselbaum, P.E. (1946): Colorimetric determination of total protein in serum based on the principle of the biuret reaction. *Amer. J. Clin. path.* 16: 46

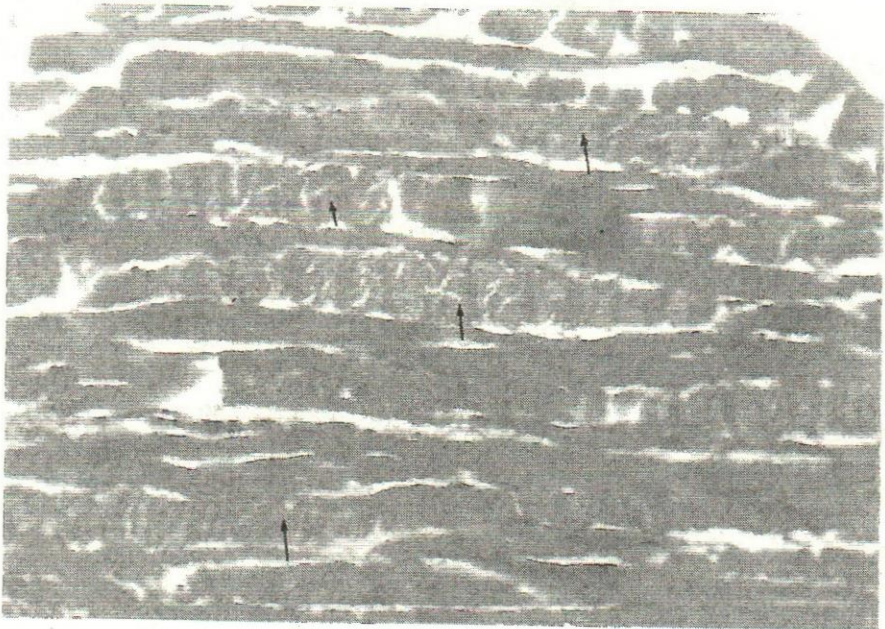


Fig. 1: Photomicrograph of skeletal muscles showing necrosed muscle fibers (Arrows). H&E (x 300)

DOWNER COW SYNDROME & LATE PREGNANCY

Table (1) Mean (± S.E) of some serum constituents in late pregnancy downer buffaloes and cows in comparison with clinically healthy ones

Parameters	Unit	Downer buffaloes (N= 10)	Healthy buffaloes (N= 10)	Downer cows (N= 15)	Healthy cows (N= 10)
Total proteins	g / dl	5.7 ± 0.18 *	8.1 ± 0.29	5.88 ± 0.14 *	8.2 ± 0.32
Albumin	g / dl	2.38 ± 0.14 *	3.76 ± 0.17	2.42 ± 0.11 *	4.01 ± 0.1
Globulin	g / dl	3.3 ± 0.1 *	4.34 ± 0.25	3.32 ± 0.06 *	4.2 ± 0.26
Glucose	mg /dl	40.9 ± 1.2 **	60.79 ± 2.2	41.9 ± 1.4 **	65.0 ± 2.5
CPK	×10 ³ i u/l	2.1 ± 0.12 **	0.16 ± 0.09	2.3 ± 0.1 **	0.15 ± 0.086
Calcium	mg /dl	9.34 ± 0.2 N.S	10.1 ± 0.35	9.22 ± 0.17N.S	9.49 ± 0.35
Inorg. P	mg /dl	4.6 ± 0.3 N.S	6.3 ± 0.27	4.45 ± 0.22N.S	5.8 ± 0.46
Magnesium	mg /dl	2.35 ± 0.1 N.S	2.65 ± 0.12	2.36 ± 0.09N.S	2.46 ± 0.13

N = Number of animals .

* Significant at P < 0.05.

** Significant at p < 0.1

N.S non significant .