SUST Journal of Agricultural and Veterinary Sciences (SJAVS)
Vol. 20 No.(1)
ISSN: 1858 6775

June 2019

SUST
Journal of Agricultural and Veterinary Sciences
Journal homepage:
http:// journals.sustech.edu

Clinical, Haemotological and Biochemical Studies of Induced Frothy Bloat in Goats in South Darfur

Entisar M. Hussain[1] and Siham E. Suliman[2]Mohamed Abdelsalam Abdalla[2]

1- Faculty of Veterinary Science, University of Nyala, Sudan
2- College of Veterinary Medicine, Sudan University of Science and Technology

Article history: Received:
Accepted:

Abstract

The current study was conducted to examine the potential of fresh lush alfalfa to induce frothy bloat in goats and to evaluate some physical, haemotological and biochemical parameters. The study was donefrom September 2017 to February 2018 in the Department of Clinical Studies, Faculty of Veterinary Science, Nyala University, South Darfur State. A total of 25 clinically healthy male goats were utilized in the current investigation. Blood samples were taken from these animals before feeding alfalfa (25 samples) as control samples.The animals were feed the plant after fastening for 16 hours and the samples were taken every 2 hours for 24 hours (300 samples). Physical (pulse and respiratory rates, temperature, eye mucous membranes, percussion and auscultation), hematological (Pack cell volume,Total Red Blood Cell Count, Total White Blood Cell Count and Differential of White Blood Cell Count) and biochemical (Serum total protein, albumin, urea, calcium, sodium and potassium) parameters. The changes of rumen fluid (color, odor, consistency and pH) were also recorded using standard methods. The clinical signs of induced froth bloat appeared after 6 hours in goats, there was tachypnea, tachycardia and congested mucous membranes percussion and auscultation revealed tympanic sound and decreased ruminal motility. The pulse and the respiratory rates were significantly ($p<0.05$) with slight decrease in temperature after 6 hours of induction time. There was significant decrease in PCV and TWBCs with increased of TRBCs and neutrophils at 8 hours of induction time. Lymphocytes, monocytes and eosinophil were decrease at 22 hours of induction time. The changes of rumen fluid were observed with significant decrease of the pH at 6 hours of induction time. Biochemical parameters were also affected by the reaction of plant in the rumen. In conclusion fresh lush alfalfa has a high ability induce a frothy bloat in the goats, because of rapid severe changes of physical, hematological and biochemical parameters and this leading to death of the animal.

Keywords: Fresh lush alfalfa, goats, clinical and blood parameters.

Introduction

Ruminal tympany is abnormal distention of the rumen and reticulum caused by excessive retention of gases of fermentation process; either on the form of persistent foam mixed with the rumen contents or as free gas separated from the ingesta (Radostits *et al*., 2007).

The major factor that determines of whether bloat will occur is the nature of ruminal contents: Protein content and rates of digestion and ruminal passage reflect the

forage's potential for causing bloat (Dana *et al*., 2005). Based on grazing behavior sheep are severely affected than cattle because they selectively choose to end leaves over stem and chew what they ingest more frequently than cattle. Furthermore, sheep appear to select legumes over grasses because legumes can be eaten more rapidly (Clarke *etal*., 1974, Colvin and Baclcus, 1988). Young animals are considered more susceptible to acute and severe bloat than older animals. This occurs due to learning of grazing skills early in life from experimental mothers may have an impact on the offspringsubsequent bloat susceptibility (Romos and Tennessen, 1992). The plant stage growth should be monitored and the likelihood of bloat decrease within advancing maturity. Plants in the pre-bud stage are the most bloat-prone, so grazing should be kept to a minimum at this time point (Coulmen *et. Al.,* 2000; Majak *et al*,. 2003). The bloat potential of alfalfa is reduced when the moisture is insufficient and the soil is dark brown, to brown (Majak *et al*., 2003). Eructation mechanism is impaired of inhibited because of gases entrapped in high viscous rumen liquor and also forms stable foams that lead to bloat (Cheng *et al*., 1998). Another action due to a complex series of rumenoretcular muscle contractions then forces liquid material away from the cardia, creating an empty space for the dorsal sac to push gas forward (Findaly, 1998).

Frothy feedlot is common in cattle feeding grain. This type of the bloat has been attributed to small feed particles in grain rations mixed with slime secreted by rumen bacteria, and this slimy material is polysaccharide released from ruptured bacterial cells (Majak *et al*., 2003; Dana *et al*., 2005).

Diagnosis of the frothy bloat by using clinical methods and examination of the rumen fluid pH (Hopyfirek *et al*., 1998). The early symptoms include standing up and lying back down repetitively, distention of of the abdominal wall, kicking at the belly, frequent defection and urination, grunting and extention of the neck and head (Garry, 1990; Majak *et al*., 2003). Analysis of hematological parameters for determination of hydration. Also this disease leading to changes of blood chemistry especially total protein, albumin and calcium (Baraka *et al*., 2000; Ismail *et. al*., 2007; Kamal, 2008; Saber, 2016).

The treatment of frothy bloat by emergency rumenotomy that using of trocarization. Antizymotic agents are also used (Polymerized methyl silicon, Poloxalene, Polyethylene, sodium sulfosuncinate). Promotion of salivation and purgative drugs are also used. All these drugs and emulsion are administered to reduce the surface tension (Brander *et. al*., 1991; Radostits *et al*., 2997).

The aim of this study was to evaluate some physical, hematological and biochemical parameters induced by fresh lush alfalfa in goats.

Material and Methods:

Experimental Animals*:* The study was carried out from September 2017 to February 2018in the Department of Clinical Studies, Faculty of Veterinary Science, Nyala University, and South Darfur State.

A total of 25 clinically healthy male goats (6-12 years old) were utilized in the current investigation. Blood samples (25 samples) were collected before feeding alfalfa as the group for controlling. The animals were fed the plant after fastening for 16 hours and the samples were taken every 2 hours for 24 hours.

A 300 blood samples were taken directly from jugular vein using disposable 10 ml syringes (Changzhou Huichum Medical Equipment, China). Five ml of the blood

mixed with ethylene diamine tetraacetic acid (AFCO-DISPO, Jordon) for hematological indices. The remaining amount (5 ml) of the blood was used for separation of serum for biochemical analysis.

Rumen fluid samples (12 samples) were collected (10 ml) using a stomach tube from the caudo-ventral sac of the rumen (Keen, 2004).

Physical Parameters: All animals were examined clinically for estimation of respiratory and pulse rates, rectal temperature, eye mucous membrane, percussion and auscultation, (Kelly, 1984).

Hematological Indices: Total red blood cells (10^6 cell/ml) packed cell volume (PCV %), white blood cells (10^3 cell/ml) and different of white blood all count (%) were determined (Jain *et al*., 1986).

Biochemical Analysis: Serum concentration of total protein and albumin were measured according to the methods of King and Wooten (1956) and Bratholomew and Delany (1966). Serum urea concentration was determined by the method of Fawcett and Scott (1960). Serum calcium, sodium and potassium were also determined (Trinder 1960; Wooten, 1974).

Statistical Analysis: Complete randomized design was used for running the experiment. One-way analysis of variance was used to generate the analysis of variance table (ANOVA). Moreover, descriptive statistics in Tubular form was used for description different parameters obtained from goats.

Results:

Physical Parameters:

Clinical signs of experimentally induced frothy bloat in goats appeared after 6 hours of induction time. These signs were tachypnea, tachycardia and congested mucous membranes. Percussion of the rumen revealed tympanic sound with distention of the left side of the abdomen, while auscultation revealed decrease in ruminal motility. Also extension of the head, frequent urination, grunting, and diarrhoea was recorded.

Pulse (76± 8.09) respiratory (32 ± 10.88) rates were significantly increased at 8 hours ($p<0.05$), while rectal temperature was slightly decreased significantly (37.86±66) 2 hours after induction of frothy bloat (Table 1) when compared with control values.

Table 1: Physical Parameters: Respiratory rate/min, Pulse rate/min, Temperature °C in goats (n = 25) experimentally with frothy bloat

Parameters	Respiration	Pulse	Temperature
Time	Means± SD	Means± SD	Means± SD
0	25±7.01	54±13.81	39.52±33
2	23±7.02	58±15.20	37.81±66*
4	27±7.814	62±13.74	38.76±.77*
6	32±7.84*	65±12.7*	39.49±.45
8	32±10.88*	67±18.09*	39.38±.67
10	29±10.90	67±16.36*	39.37±.51
12	24±8.71	65±17.43*	38.95±.70*
14	205.28	58±14.84	37.79±.64*
16	22±5.29	57±13.08	37.90±.70*
18	25±7.29	57±.11.65	38.24±.76*
20	26±6.33	61±13.26	38.48±.63*
22	32±8.67*	62±13.84	38.89±.54*
24	31±9.05*	63±14.66*	38.95±.65*

SD: standard Deviation

Means within the same columns carrying stars are significant at ($P<0.05$).

Hematological Results:

There was significant decrease ($p<0.05$) in packed cell volume and increase of total red blood cells, whereas, total white blood cells were decreased (Table 2). These changes were recorded at 8 hours of induction time. Lymphocytes and monocytes were decreased (Table 3). Neutrophils were increased (41± 5.92), but eosinophils were decreased (3± 1.30) at 22 hours of induction time compared with control values ($p<0.05$). There was no changing in the number of basophil cells.

Table 2: Haematological indices: Packed cell volume (PCV%), Total white blood cells counts(WBCs) 10^3 cell/µ and red blood cells count (RBCs) 10^6cell/mlin goats (n = 25) experimentally with frothy bloat

Parameters	PCV	TWBCs	TRBCs
Time	Means± SD	Means± SD	Means± SD
0	30±5.29	12.4±1724.65	11±1922678.95
2	28±9.94	12.7±1963.62	13.4±1311256.01*
4	27±4.96*	11.7±2178.29	14.8±1434192.22*
6	2±4.73	10±2945.04*	13.1±1560922.48*
8	23±5.29*	9.3±2206.43*	14.3±1006581.34*
10	24±3.4*	11.8±.1229.66	10.7±2542161.94
12	29±4.76	9.9±1328.38*	12.6±2819052.62*
14	23±3.45*	10.8±1453.52*	12.6±1235963.59*
16	22±3.48*	10.2±1041.30*	13.4±1870178.51*
18	27±3.60*	10.3±.1178.28*	10.3±1294833.58
20	24±1.88*	8.3±1202.33*	13.1±563741.37*
22	24±1.73*	11.3±1084.268*	11±2115116.47
24	25±7.17*	11±2035.99*	12.6±1977107.91*

SD: standard Deviation

Means within the same columns with asterisk are significantly different at ($P<0.05$).

Biochemical Assessments:

As shown in Table 4, there was there was significant fluctuation in total protein and albumin, but were a significantly decrease ($p<0.05$) at 8 hours after induction compared with controlled animals; whereas, significant increased in urea concentration (50.56± 12.84) at the same time. Also calcium concentration was increased at 4 hours of induction time (9.35± 2.61), while sodium and potassium were increased at 16 hours of induced frothy bloat in goats (126.28± 10.89, 8.04± 0.84) ($p<0.05$).

Rumen fluid changes in bloated goats:

The color of the rumen fluid was changed from yellowish to green and the odor was changed from aromatic to foul with medium to large air rubbles in comparison to controlled animals. While the pH was significantly decreased (6.61± 0.24) at 24 hours (Table 5).

Discussion

Changes in rumen fluid were observed in bloated goats (Kubesy, 1983; Radostits *et al*., 2007; Saber, 2016). The changes of rumen pH depending on the type of diet ingested. Ruminal atony affecting the rate of fermentation and / or hydrolysis and thereby, the production of acid or alkaline intermediates (Bradford, 1990; Dana *et. al*., 2005; Saber, 2016). However, a high rumen pH (>8.0) was detected that rumen fluid mixed with volume of saliva (Peroski, 2017).

Fluctuation of total serum protein and decreasing of albumin are recorded in this result. Alteration in the total protein due to decrease in the quantity of albumin and this decreasing is often accompanied by hyperglobulinemia and this cannot usually sufficient to maintain the total protein concentration and hypoproteinemia results

(Coles, 1986). In dehydrated animals the packed cell volume, hemoglobin level and total erythrocyte count are increased. As with the erythrocyte count, the total serum protein concentration is increased if there is water loss from extra cellar fluid (Baraka *et al*., 2000; Ismail *et. al*., 2007; Kamal, 2008, Saber, 2016).

Table 3: The white blood cell differential counts (%) in goats (n=25) experimentally with frothy bloat

Parameters	Lymphocytes	Neutrophils	Eosinophil	Monocytes	Basophils
Time	Means± SD	Means± SD	Means± SD	Means± SD	Means± SD
0	62±4.56	29±5.53	4±2.30	4±2.89	0±.57
2	60±3.29	33±3.25	5±1.46*	2±1.41*	0±.40
4	60±4.61	32±4.48	5±1.73*	2±1.06*	0±.63
6	57±9.82*	36±8.07*	4±1.67	2±1.60*	0±.69
8	57±11.16*	36±9.51*	5±1.62	2±1.41*	1±1.11
10	57±11.63*	37±11.79*	4±1.33	2±1.41*	1±1.00
12	56±8.47*	38±7.42*	4±1.41	2±1.28*	1±.98
14	63±4.87	32±4.34	2±1.70*	2±1.05*	1±.95
16	57±5.38*	36±5.79*	4±1.58	2±1.29*	0±.75
18	59±5.45	36.4.41*	2±1.70*	2±1.47*	0±.75
20	55±9.05	39±7.42*	4±1.94	2±1.56*	0±.82
22	54±6.46*	41±5.92*	3±1.30*	2±1.05*	1±.82
24	55±6.06*	39±4.83*	3±1.25	1±1.23*	0±.98

SD: standard Deviation

Means within the same columns with asterisk are significantly different at (P<0.05).

Table 4: Blood biochemical parameters: Total protein mg/dl, Albumin mg/dl, Urea mg/dl, Calcium mg/dl, Sodium mg/dl, and Potassium mg/dl in goats (n=25) experimentally with frothy bloat

Parameters	T.protein	Albumin	Urea	Calcium	Sodium	Potassium
Time	Means± SD	Means± SD	Means± SD	Means± SD	Means± SD	Means± SD
0	8.39±2.31	3.04±.87	37.18±15.72	8.02±2.39	120.00±7.36	6.20±1.26
2	8.52±2.07	3.09±.61	33.20±11.90	9.26±1.91*	121.48±4.12	6.52±1.01
4	9.38±3.12*	2.87±.64	32.08±9.11	9.35±2.61*	121.44±6.71	6.28±.83
6	8.37±1.87	2.57±.42*	33.12±4.89	8.20±2.48	122.88±7.75	6.68±.95
8	8.31±1.88	2.46±.37*	36.73±10.15	9.07±2.24	124.64±6.10*	6.28±1.10
10	8.18±1.65	2.63±.63*	34.34±6.47	8.66±1.76	123.76±7.32	6.40±1.04
12	6.45±1.58*	2.64±.55*	39.79±10.43	8.21±2.60	120.76±6.88	7.32±1.18*
14	5.78±.93*	2.53±.53*	44.54±8.81*	7.64±1.79	125.21±6.90*	7.48±1.01*
16	6.49±1.31*	2.60±.47*	49.96±14.82*	7.66±2.24	126.28±10.89*	8.04±.84*
18	4.46±1.03*	2.72±.44*	45.60±8.87*	8.20±2.41	120.04±8.23	6.79±1.56*
20	6.94±2.25*	2.49±.56*	46.00±11.58*	8.20±1.44	119.96±8.57	6.20±1.00
22	6.84±1.09*	2.53±.51*	50.56±12.89*	8.49±1.81	122.96±6.85	6.04±.97
24	7.87±1.14	2.84±.76	39.27±12.27	7.93±1.91	123.80±9.83	6.52±1.23

SD: standard Deviation

Means within the same columns carrying stars are significant at (P<0.05).

Table 5: Rumen pH of goats (n = 25) experimentally with frothy bloat

Time	Rumen pH (Means± SD)
0	6.36±.15
2	6.32±.22
4	6.25±.22
6	6.12±.21*
8	6.14±.17*
10	6.13±.18*
12	6.38±.31
14	6.50±.18*
16	6.55±.16*
18	6.58±.21*
20	6.52±.29*
22	6.57±.22*
24	6.61±.24*

SD: standard Deviation
Means within the same columns carrying stars are significant at (P<0.05).

Total white blood cell (Table 2) was significantly increased with neutrophils (Saber, 2016). But lymphocyte monocytes and eosinophils were decrease (Table 3). In this study pathological leukocytosis is associated with increase of segmented neutrophilsgranulocytes due to stress reaction. Also alteration of the number of other cells resulted from the action of the disease as stress factor (Coles, 1986). Frothy bloat cause of the decreasing serum calcium levels this, may be due to anorexia accompanied with the disease and disturbance in absorption and utilization calcium (Mohamed, 1984; Baraka *et al*., 2000, Kamal, 2008). Blood *et al*., (1989) and Melivin (1970) recorded that increasing of sodium and potassium as result of secreted saliva and / or sequestration in the abomasum and the rate of renal excretion and absorption is affected by acid – base imbalance. This result is in accordance with our result, but on contrary to the result of Kamal (2008). Also the urea concentration was increased, may be attributed to kidney dysfunction following induced frothy bloat leading impairment of renal perfusion and hence decreased renal gromerular filtration rate (Smith *et al*., 1992).

Conclusion

The results of this study demonstrated fresh lush alfalfa has high ability to induce frothy bloat in goats in age 6-12 months. The physical parameters and examination of rumen fluid, especially rumen pH is most important for diagnosing of the disease. Evaluation of total protein and albumin are of values as prognostic indicator and low serum albumin levels correlate with an increase of mortality rates. Electrolytes must be avoided because of the disturbance in absorption and renal excretion.

References

Anderson, DE, and Rings, M. (2008), *Current Veterinary Therapy*: Food Animal Practice, Elsevier Heath Sciences. 715P.

Baraka, T. El-Sherif, M; Kubesy, A. and Illek, J. (2000). Clinical of Selected Ruminal and blood constituents, in dromedary camels affected by various diseases, *Acta Veterinalia Brono,* 69(1): 61-68.

Brander, G. C.; Pugh, D.M.; Bywatr, R. J.; Jenkins, W.L. (1991) *Veterinary Applied Pharmacology and*

Therapeutics, Fifth Edition. Bailliere Tindal, London, Philadelphia, Toronto, Sydney, Tokyo, PP. 212-214.

Brotholomew, r. J. and Delany, A. M. (1966). Blood Albumin Determination Proceedings *Australian Association Clinical Biochemists*. PP. 1-214.

Bradford, P.S. (1990). *Large Animal Internal Medicine* . C.V. Mosby Comp.PP. 747-780.

Chakrabarti, A. (2001). *Text Book of Clinical Veterinary Medicine.* Second edition, Jaj Press – India. P. 707.

Cheng, K. J.; McAllister, T.A.; Popp, J. D.; Mir, Z. and Shi, H.T. (1998). A review of bloat in feedlot cattle. *Journal of Animal Science*, 76:299-308.

Clarke, R. T. J.; Jones, W.T. and Reid, C. S. W (1974). Bloat in Cattle: XLI. Proteins of Salira as Possible Genetic Markers in Breeding Programmes to Reduce Blood Susceptibility in Cattle. *N.Z.J. Agric. Research* 17: 411-415.

Coles, H.E.T. (1986). *Veterinary Clinical Pathology*. Fourth edition. W.B. Saunders Company, Philadelphia, London, Toronto, Montreal, Sydney Tokyo. PP.139-140, 207.

Colvin, H. w. and Backus, R.C. (1988). Bloat in Sheep (*Ovis aries*). Comparative Biochemistry and Physiology Part AL *Physiology*, 91 (4): 636-644.

Coulman, B.E.; Gruber, M.; Allister, T.A.; Majak, W. and Thompson, D (2000). American Forage and Grassland. *Proceeding* P. 351-358.

Dana, G. A.; Dave, P.A.; Leo, B.J.; Katherine, E.Q.; Dotto, M.R.; Philip, T.R. and Alice, M.W. (2005). *The Merck Veterinary Manual.* Ninth edition Merck and Co.; INC.U.S.A. ISBN: O911 - 910-50-6.

Fawcett, J.K. and Scott, J.E. (1960). A rapid and Precise Method for the determination Urea *Journal of Clinical Pathology*, 31:156-159.

Findlay, A.L. R. (1998), Motility of Gastrointestinal Tract of Ruminantshttp://www.chu.com.ac.uk/ALRF/motility.htm. Accessed 4/30/2007.

Garry, F. (1990). Managing bloat in cattle. *Veterinary Medicine.* P. 643-650.

Hopfriek, B.; Jagas, P. and Dvorak, R. (1998) A metabolic profile test of rumen fluid and its application in diagnosis of rumen dysfunction. *Cornell Veterinarian Journal*, 80 (4, 10): 659-662.

Ismail, Z.B.; Al-Majali, A.; Al-Qudan, K. (2007). Clinical and Surgical Findings and Outcome following rumenotomy in adult dairy cattle affected with recurrent rumen tympany associated with non-metabolic foreign bodies. *American Journal of Animal and Veterinary Sciences.* 2(3): 66-71.

Jain, N.A. (1986) *Shallm's Veterinary Haematology*. Fourth edition. Lea and Fibiger Philadelphia, USA. P. 1221.

Kamal, A.M. (2008). Some biochemical, hematological and clinical studies of selected ruminal and constitutes in camels affected by various diseases. *Research Journal of Veterinary Science*, (1): 16-27.

Kelly, W. R. (1984) *Veterinary Clinical Diagnosis*. Third edition. Bailliere Tindal. London. PP 440.

King, E.S. and Wooton, J.G. P (1956). *Microanalysis: Medical*

Biochemistry. Third edition. Churchill, J. A. PP-57-60.

Kleen, J. L. (2004). *Prevalence of sub-acute ruminal acidosis Deutch Dairy Herd –A filed Study*, PhD thesis, School of Veterinary Medicine, Hanover 93-104.

Kubesy, A.A. (1983). *The role of protozoa in rumen digestion in sheep with special reference to the effect of some digestive troubles on such organisms.* M.V.Sc. thesis. Faculty of Veterinary Medicine, Cairo University, P. 135.

Leek, B. (1969) Reticulo – Ruminal Function and Dysfunction. *TheVeterinary Record.* 84 (10): 238-243.

Leek, B. (1983). Clinical diseases of the Italy rumen: physiologist's view. *The veterinary Record,* 113 (1): 10-14.

Majak, W.; Mcallister, T.; Mccartney, D.; Stanford, K. and Cheng, K. (2003). Bloat in Cattle, alberta Agriculture, Food and Rural Development, Information Packaging Centre.

Mohamed, H. A. and Selim, H. M. (2001). *Hankd Book of Veterinary Internal Medicine.* Second edition. PP 12.

Petrovski, K.R. (2017). Assessment of the rumen fluid of bovine patient. *Journal of Dairy and Veterinary Science.* 2 (3): 1-4.]

Radostits, O.M., Gay, CC, Blood, D.C. and Hinchliff, K.W. (2007). *Veterinary Medicine.* Tenth edition, Bailliere Tindal, London. PP 325.

Romas, a. and Tennessen, T. (1992). Effect of Previous grazing Experience on the Grazing Behavior of Lambs. *Applied of Animal Behavior of Science*, **33**: 43-52.

Saber, M. (2016). Effect of field and experimentally – induced cases of frothy bloat on physical examination, rumen fermentation pattern and blood constituents in BaladiEgyptian Sheep. *International Journal of Livestock Research*, **6**(10): 46-63.

Smith, R.; Underwood, w.; Petersen, G. and Harms, R. (1992). Abomasal dilatation and impaction in two Hampshire rams. *The Veterinary Record*.

Smith, B. P. (2014), *Large Animal Internal Medicine.* Fourth edition, Elsevier Health Sciences. PP. 1872.

Trinder, P. (1960). Colormetric Micro-determination of Calcium. *Analyst*– **85**:889-894.

Wootton, I.D.P. (1974). Plasma Sodium and Potassium Microanalysis. *Medical Biochemistry*. Fifth edition. PP 62-65.

SUST Journal of Agricultural and Veterinary Sciences (SJAVS)
Vol. 20 No.(1)
ISSN: 1858 6775

June 2019

الدراسات السريرية و المخطط الدموي و الكيميائية الحيوية لحدوث النفاخ الرغوي بالرسيم الغض في الماعز

انتصار محمد حسين[1] و سهام الياس سليمان[2] و محمد عبدالسلام عبدالله[2]

1. كلية العلوم البيطرية، جامعة نيالا
2. كلية الطب البيطري، جامعة السودان للعلوم و التكنولوجيا

المستخلص

أجريت هذه الدراسة لفحص إمكانية حدوث النفاخ الرغوي للماعز بواسطة البرسيم الغض وتقييم المعالم السريرية والدموية والكيميائية الحيوية. وذلك بقسم الدراسات السريرية كلية العلوم البيطرية، جامعة نيالا، ولاية جنوب دارفور. العدد الكلي للحيوانات الذي أستعمل لهذا الفحص 25 ذكر ماعز أصحاء سريرياً. أخذت عينات دم قبل حدوث النفاخ (25 عينة) للتقييم تحكم وبعده، ثم كل 2 ساعة لمدة 24 ساعة (300 عينة). بعد تجويع الحيوانات لمدة 16 ساعة. القراءات للمعالم السريرية (معدل النبض، التنفس، درجة الحرارة، الأغشية المخاطية المخاطبة للعين، الطرق، التسمع) والدموية (حجم الخلايا المكدس، العدد الكلي لكريات الدم الحمراء والبيضاء والعدد التفريقي لكريات الدم البيضاء). والكيميائية الإحيائية (البروتين الكلي، الألبيومين، اليوريا، الكالسيوم، الصوديوم والبوتاسيوم في المصل)، والتغيرات في سائل الكرش (اللون، الرائحة، المحتوى، الأس الهيدروجيني) وقد سجلت بإستعمال طرق قياسية. الأعراض السريرية في المعاز قد ظهرت بعد 6 ساعات بعد حدوث النفاخ الرغوي وهي إرتفاع معنوي في معدل النبض والتنفس وإنخفاض قليل في درجة الحرارة ($P<0.05$) بعد 6 ساعات من حدوث النفاخ. يوجد إنخفاض معنوي في حجم الخلايا المكدس وكريات الدم البيضاء ومع إرتفاع كريات الدم الحمراء والعدلات بعد 8 ساعات بعد حدوث النفاخ. كما يوجد إنخفاض في الخلايا اللمفاوية، خلايا وحيدة النواة، والخلايا الحمضية بعد 22 ساعة من حدوث النفاخ، بينما حدث تغيير في سائل الكرش وانخفاض في الأس الهيدروجيني للكرش بعد 6 ساعات من حدوث النفاخ. المعالم الكيميائية الحيوية قد تأثرت بفعل النبات في الكرش. وفي الختام ان البرسيم الغض له فعالية عالية لكي يحدث النفاخ الرغوي في المعاز و هذا يؤدي الي تفوق الحيوانات.