

CLINICAL ASSESSMENT OF NATURALLY OCCURRING RUMEN ACIDOSIS IN GOATS

R. Thangathurai^{*1} and L. Darwin²

¹Associate Professor, Department of Veterinary Pathology, Veterinary College and Research
Institute, TANUVAS, Tirunelveli – 627 358

²Veterinary Assistant Surgeon, Department of Animal Husbandry, Kanyakumari district,
Government of Tamilnadu

E-mail: thangspath@gmail.com (*Corresponding Author)

Abstract: Clinical evaluation of natural case of rumen acidosis was carried out on sixty acidotic goats. The animals were classified as mild (Group I), Moderate (Group II), severe (Group III) and healthy individuals (Group IV). Twenty animals each were randomly selected. The common clinical findings observed were anorexia, inappetence, distended abdomen, and reduced rumen motility, semi solid to pasty dung, grinding of teeth, wobbling and recumbency. However, recumbency was observed only in group III animals.

Keywords: Rumen acidosis, Goats, Natural case, Clinical evaluation.

Introduction

Rumen acidosis in goats is a well known managemental disorder which occurs naturally due to unintended consumption of large quantities of grain, overnight store rice, left over after feast, riped fruits, over eating of kitchen, market, hostel waste and baker's dough (Cao *et al.*, 1987). It is characterized by severe toxemia, dehydration, ruminal stasis, weakness, recumbency and high mortality rate (Radostits *et al.*, 2000). The clinical evaluations have been extensively studied in bovines and in sheep (Vihan *et al.*, 1982). However, information on goat acidosis is sparse. The present study was tuned with aim of assessing the clinical status of naturally occurring acidotic goats which inturn indicate the overall health status of the animals.

Materials and Methods

Sixty goats age ranged from 6 months to 4 years, brought to the Large Animal Clinical Medicine Gastroenterology unit of Madras Veterinary College with symptoms suggestive of rumen acidosis were selected for the study. Based on the clinical symptoms, haemogram, leukogram and biochemistry the animals were randomly selected and allotted to each groups. Twenty animals were allotted for each group and animals with ruminal pH: 6.0 to 6.8 were graded as Mild (Group I), pH: 5.5 to 5.8 as Moderate (Group II) and pH: 4.0 to 5.2 as Severe

(Group III). Twenty apparently healthy Kanni breeds aged 1 to 2.5 years were kept as Group IV for standardization of various parameters in the study.

The animals brought to Large Animal Clinical Medicine Gastroenterology Unit with the history of anorexia, distension of rumen and diarrhoea were subjected to a detailed routine physical, laboratory (Schalm *et al.*, 2000) and special examinations (Gnanaprakasam *et al.*, 1992).

Results and Discussion

Twenty healthy goats selected in this study showed normal signs and habit of good health, which were in concurrence with Rosenberger (1979). The prominent clinical signs exhibited by the animals in all the three groups were depression, reduced or absence of rumen motility, anorexia or inappetence, distended abdomen, recumbency, tremor, grinding of teeth, anuria and pasty to watery diarrhoea (Table). The present finding substantiated those of Gnanaprakasam (1970) and Ramaswamy (1972). Anorexia and inappetence observed in the present study might be due to accumulation of lactic acid in the rumen (Dunlop, 1972).

Reduced motility was observed in group I whereas in group II and III it was completely absent. This was in agreement with those of Gnanaprakasam (1970) and Ramaswamy (1972). The loss of reticulo-ruminal motility is due to the release of intestinal hormone, secretin. The duodenum becomes acidified by lactic acid in rumen or by central inhibition brought by absorbed acids or by absorbed amines or toxins (Crichlow and Chaplin, 1985). The increased lactic acid production in rumen causes decreased pH of the rumen content which in-turn reduced the amplitude and frequency of rumen motility (Radostits *et al.*, 2000).

The distension of rumen was observed in all the three groups of goats but in group I, it was mild. This might be due to increased fluidity of rumen contents. Increased production of lactic acid in rumen increases the osmolality, which draws water from the circulation, and this might be a reason for distension, dehydration and haemoconcentration (Radostits *et al.*, 2000). The fluidity of the rumen contents together with impairment of colonic absorptive activity might be responsible for the diarrhoeic syndrome. Anuria might be due to reduced renal blood flow and dehydration.

The grinding of teeth observed in acidotic goats was due to chemical rumenitis and due to stimulation of the free pain endings of autonomic nerves by distended rumen wall (Radostits *et al.*, 2000). Recumbency was observed only in group III in which acidosis was severe and it might be due to laminitis. Laminitis occurred in this group might be due to increased level of rumen histamine (Brent, 1976).

Temperature

The mean rectal temperature in apparently healthy animals was $39.34 \pm 0.14^{\circ}\text{C}$ (102.81°F , Pillai, 1988), $39.35 \pm 0.22^{\circ}\text{C}$ (102.83°F , Thachil, 2000). The mean temperature $39.29 \pm 0.07^{\circ}\text{C}$ (102.72°F) recorded in the present study was in accordance with the findings of above authors.

A significant decrease in rectal temperature was observed in all groups of animals when compared to healthy animals (Table). Pillai (1988) observed a decrease in mean temperature from $102.81 \pm 0.14^{\circ}\text{F}$ at 0 hour to $101.04 \pm 0.20^{\circ}\text{F}$ at 72 hours. Reduced rectal temperature in all the groups of acidosis was recorded and concurred with that of Pillai (1988). The reduction in rectal temperature could be due to dehydration, fall in plasma volume, fall in blood pressure and peripheral circulatory failure.

Respiration

Kelly (1984) stated that the respiratory rate in normal goat ranged from 20 to 30 per minute. Thachil (2000) observed that the mean respiratory rate in healthy goat was 21.33 ± 0.67 per minute. In the present study, the mean respiratory rate in apparently healthy animals was 20.85 ± 0.58 per minute and it was within the normal range as recorded by above authors. A significant increase in respiratory rate was observed in all acidotic goats of all the groups when compared to that of apparently healthy animals (Table). This observation was in accordance with that of Thachil (2000).

The lactic acid produced from the rumen content entered into the blood circulation causing a reduction in blood pH and an increase in the blood lactate. The plasma bicarbonate buffering system buffered this lactic acid and the utilization of bicarbonate and elimination of carbon dioxide maintained the acid base balance by increased respiration. The increased carbon dioxide and decreased blood pH stimulate the respiratory centre bringing about an increased rate of carbon dioxide elimination through increased respiration (Radostits *et al.*, 2000). Thus, the increased respiratory rate would be to combat the rise in hydrogen ion concentration in blood by removing excess carbon dioxide (Braun *et al.*, 1992).

Pulse

The pulse rate of a normal goat ranged from 70 to 90 per minute (Kelly, 1984 and Radostits *et al.*, 2000). The recorded pulse rate of 72.35 ± 0.48 per minute was in the normal range of aforesaid authors. A significant increase in pulse rate was observed in all groups when compared with that of apparently healthy animals (Table). This observation was in

accordance with that of Thachil (2000). Increased pulse rate may be due to the accumulated lactic acid in the system.

Mucous membrane

This was pale roseate in all the apparently healthy groups and slight to moderately pale in group I but congested in both group II and III. The present observation was in agreement with the observation made by Gnanaprakasam (1970). Congestion in the mucous membrane may be due to haemoconcentration.

Rumen motility

In the present study, the rumen motility of apparently healthy animals was recorded as 1 per minute and was in concurrence with the findings of Pillai (1988) and Thachil (2000). Reduced motility was observed in group I whereas it was completely absent in both group II and III. This was in concurrence with the report of Gnanaprakasam (1970) and Braun *et al.* (1992). Loss of reticulo-rumen motility in rumen acidosis may be mediated by intestinal hormone especially secretin, that was released when duodenum was acidified by lactic acid or by central inhibition by absorbed acid or amines or toxins (Crichlow and Chaplin, 1985).

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Table: Clinical signs and Mean \pm S.E. values of respiration, pulse and temperature of apparently healthy and rumen acidotic goats.

Clinical Signs	Mild		Moderate		Severe	
	Number	Per cent	Number	Per cent	Number	Per cent
Anorexia	3	15	12	60	18	90
Inappetance	17	85	8	40	2	10
Abdomen distension	6	30	13	65	17	85
Anuria	Nil	-	Nil	-	16	80
Consistency of dung						
* Semi solid	13	65	3	15	3	15
* Pasty	4	20	10	50	4	20
* Loose	3	15	7	35	13	65
Rumen motility						
* Reduced	20	100	6	30	2	10
* Absent	Nil	-	14	70	18	90
Regurgitation of rumen content	7	35	12	60	14	70
Recumbency	Nil	-	Nil	-	4	20
Wobbling gait	Nil	-	4	20	12	60
Grinding of teeth	6	30	8	40	11	55
Clinical Parameters	Group I	Group II	Group III	Group IV	'F' value	
Respiration (per minute)	25.05 ^b \pm 0.74	34.10 ^c \pm 0.40	39.45 ^d \pm 0.41	20.85 ^a \pm 0.58	234.85 ^{**}	
Pulse (per minute)	82.65 ^b \pm 1.02	102.7 ^c \pm 1.51	124.6 ^d \pm 1.75	72.35 ^a \pm 0.48	321.87 ^{**}	
Temperature (^o C)	39.09 ^{ab} \pm 0.06	39.01 ^b \pm 0.05	38.62 ^c \pm 0.05	39.29 ^a \pm 0.07	27.21 ^{**}	

Sample size in each group comprises of 20 goats

** Highly significant (P \leq 0.01).

Mean bearing the same superscript in the same column do not differ significantly.