HAEMATOLOGIC TOLERANCE OF A RUMEN FISTULATION PROTOCOL IN UDA RAMS

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ABSTRACT
This experiment was conducted at the Federal University Dutsin-Ma Livestock Teaching and Research Farm in Dutsin-Ma Local Government area of Katsina State, Nigeria. The study was aimed at studying haematological tolerance level of Uda rams to a rumen fistulation protocol involving incision of skin and muscles separation along the direction of muscle fibers by divulsion. Blood samples were collected and evaluated at the intervals of 0, 24 and 48hours to assess blood line response to the protocol. A total of 3 rams were used and assigned T1, T2 and T3 in a completely randomized technique. A significant ($P< 0.05$) continuum of decreased packed cell volume and haemoglobin concentration was observed from 0hrs through to 48hours connoting anaemia condition associated with the rumen fistulation protocol. However, significant ($P < 0.01$) tolerance levels were observed with the cell mediated immune response as evident in the increased lymphocyte counts (lymphocytosis) and an initial acute increase in neutrophils (neutrophilia). This technique was able to demonstrate good tolerance level to rumen fistulation by Uda rams making this breed a good candidate for nutritional and physiological studies requiring rumen fistulation.

Keywords: Haematologic, Tolerance, Rumen, Fistulation, Uda, Rams

INTRODUCTION
Rumenotomy is one of the important and commonest surgical procedures in ruminants (Remi-Adwunmi *et al.*, 2006). In Nigeria, the most significant indication of the procedure in small ruminant is in the relief of rumen impaction especially due to indigestible materials such as polythene bag, pieces of leather, bailing rope, rubber, cloth, metal and glass (Sanni *et al.*, 1998). Other indications include surgicaltreatment of toxic indigestion, primarily of rumen origin, relief of obstruction of the rumino-recticular and reticulo-omasal orifices, a prelude to the treatment of omasal and abomasal impactions and removal of neoplasm such as papillomas at the cardia of the rumen (Gyang, 1992). Another very important area where rumenotmy is indicated is in *in-vivo* nutritional studies where it is usually accompanied by implantation of rumen fistula alone or together with intestinal (duodenal) cannula. In nutritional studies such as rumen degradation of forages, manipulation of fermentative activities, bioengineering of rumen functions and nutrient digestibility trials, rumen fistulation and duodenal cannulation are very essential. This is so because they afford the researcher opportunities to investigate digestive events under unaltered physiologic conditions (Leng, 1993).
Two surgical procedures for the ruminal fistulation and cannulation have been described. The first technique described by Schalk and Amadon (1928)is a one stage procedure and later a new technique in two stages was described by Jarret (1948). The ideal fistula is one that forms a seal around the cannula, preventing the leakage of the experimental period. In this study, two-stage technique was done in two different ways with the intention to compare and find out which one is better to reduce postoperative necrosis of the wound edges and consequent loosening of cannula and other complications (Malik *et al*., 2015).

MATERIALS AND METHODS
The experimental animals were 9 Uda rams aged between 9 to 12 months. The average live weight of the rams was 15kg. The animals were rested for 10days before the conduct of the rumenotomy protocol. The animals were prepared for surgery under local anaesthesia. The protocol was based on the methods of Malik *et al*., 2015. However, a modification was made through the use of an improvised cannula in the form of a sterilized empty

top gum rubber bottles. The skin was marked with an indelible marker along the circumference of the improvised cannula to be used. Cruciate incision was made through the skin and the pieces of skin were undermined and removed along the marking. The muscles were separated along the muscle fibre direction by divulsion. The abdominal wall muscles were sutured with skin using silk of varying sizes for each treatment: T1 (size 1), T2 (size 2) and T3 (size 3) to retract the muscles thereby giving a regular circular shape to the hole for ease at the time insertion of improvised cannula. Sufficient portion of the rumen wall was seized and pulled through the abdominal incision, exposing part of the rumen wall. The exposed portion of the rumen was sutured to the peritoneum around the surgical opening; using chromic catgut No. 2 in simple continuous pattern. Post-surgery, gauze was fixed to cover the rumen wall and dressed regularly. Kepro Penstrep® (procaine penicillin and streptomycin combination) was administered for 4 days. Blood samples were collected using commercial sample bottles pre-coated with EDTA as anticoagulants. Time intervals for blood sample collection were 0, 24 and 48hrs and at morning hours. The data obtained were analyzed statistically using ANOVA (Steel and Torrier, 1980).

Results and Discussions

Hematological results of this study revealed remarkable positive progressive physiological changes within 48 hours of the study. Packed Cell Volume (PCV) and Haemoglobin concentration decreased ($P<0.05$) from 0 hour through to 48 hours (Table 1.0). Invasive surgical procedures are associated with blood loss with resultant slight to moderate anaemia usually within the range the body homeostasis can address.

Table 1.0: Packed Cell Volume, Haemoglobin Concentration and Total Leucocytes Count in Uda Rams with Rumen Fistula

Expt. Period (Hours)	Packed Cell Volume (%)			Haemoglobin concentration (g/L)			Total leucocyte count (x 10^3 µl)		
	T1 N = 3	T2 N = 3	T3 N = 3	T1 N = 3	T2 N = 3	T3 N = 3	T1 N = 3	T2 N = 3	T3 N = 3
0	28±1.41^a	30±1.36^b	34±1.35^b	9.3±1.34	10.1±1.48	11.3±1.36	11.4±2.71^a	15.6±1.38^b	10.4±1.45^a
24	27±2.62^a	29±1.24^a	33±1.30^b	9.6±0.44	10.2±1.53	11±1.45	10.8±1.33^a	9.9±1.58^b	14.1±4.33^c
48	27±2.71^a	28±1.38^a	31±2.16^b	8±2.31	9.8±1.24	10.3±1.55	11.9±1.35^a	10.2±0.95^a	13.8±2.54^b

Means within row with different superscript are significantly ($p<0.05$) different, N = number of animals per treatment

Post-surgical anaemia has been demonstrated few days after surgery (Dougherty, 1981) and is usually associated with the extent of blood loss during surgery (Gyang, 1992; Venugopalan 1997), post surgical complication (Santra and Karim, 2002), post surgical feeding behaviour and quality of feed offered (Ragab, 1989; Appleby and Hughes, 1997). In this study, they were relative low blood loss. This level of blood loss together with the suppressed appetite and decreased feed intake post surgery could be attributed to the decrease in PCV and haemoglobin concentration.

Table 2.0: Lymphocytes and Neutrophils Counts in Uda Rams with Rumen Fistula

Expt. Period (Hours)	Lymphocytes (%)			Neutrophils (%)		
	T1 N = 3	T2 N = 3	T3 N = 3	T1 N = 3	T2 N = 3	T3 N = 3
0	40±4.15^a	48±12.70^b	28±12.70^c	58±4.11^a	85±12.71^b	80±12.71^c
24	44±3.91^a	59±11.71^b	36±14.20^c	46±3.28^a	83±18.88^b	71±6.45^c
48	54±2.82^a	59±0.95^b	42±2.86^c	46±3.41^a	79±2.43^b	58±3.04^c

Means within row with different superscript are significantly different, N = number of animals per treatment

Acute neutrophilia and subsequent lymphocytosis as shown in Table 2.0 suggest physiologic response to inflammation and enhanced immune response (cell mediated immunity). In localized traumatic conditions such

as rumenotomy, leucocytosis due to lymphocytosis and neutrophilia has been reported (Weisis, 1984; Hassanein *et al*; 1988; Aka *et al*.,2006). Tissue destruction, irrespective of its cause will produce an increase in the number of circulating neutrophils. Increase in neutrophils occurs in prolonged surgical procedures where there has been considerable tissue damage (Buckner, 1995). These observations, which have been represented in this study, made it apt for us to conclude that the increase in total leucocytes in this study was more of a physiologic cell mediated immune response seen as leucocytic lymphocytosis that was triggered by an initial neutrophilia.

CONCLUSION

In CONCLUSION, the study was able to demonstrate haematologically that Uda rams have a good physiologic tolerance to rumenotomy and fistulation.

Recommendation

Going by the findings of this study, Uda rams could be considered as suitable candidates for carrying out nutritional and physiological studies requiring rumen fistulation.

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