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Correlation of Body Condition Score And Helminth Load of Goats (Capra Aegagrus H.) Raised Semi Intensively.

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ABSTRACT
This project was carried out to determine the correlation between Body Condition score and helminth load of goats raised semi-intensively. Twenty-five goats were used for this experiment. They were randomly assigned to two treatments based on their weights; Large group (>12kg) and small group. (>12kg). Each treatment had ten goats. The goats were allowed to graze on natural rangeland for about 8 hours daily. Clean fresh water was given at ad-libitum throughout the experiment. Goats were scored based on the subcutaneous fat content of their lumbar vertebrae and their feaces were observed for the presence ovals or adult of helminth parasites. Fecal samples were taken twice a week. It was generally observed that significant correlation existed between the BCS and helminth load in Large group of goats ($p<0.01$) and between BCS and helminth load in Small group of goats ($p<0.05$). The Large group of goats recorded higher BCS and helminth load. It can be concluded that goats with poorer BCS are more prone to helminthiasis.
KEYWORDS: Body Condition score, correlation, helminth load, semi-intensively, ovals.

I. INTRODUCTION

Nigeria has not been able to provide animal protein in sufficient quantities to meet the dietary animal protein requirement of her citizenry (Ibe, 2000). This protein gap is being filled by small ruminant production particularly goat (Anaeto et al., 2010). Goats are the most prolific of all domesticated animals with significant role to the economy; they are a good source of meat, milk yoghurt and by-products like hides and skin (Anaeto et al., 2010).Goats are important livestock species in developing countries and their production has witnessed a rapid and exceptional growth within the last 20 years by almost 50% at world level (Morand-Fehr and Boyazogly, 1999; Devendra, 2001). The total population of goats in the world was estimated to about 746million with 96% found in developing countries (FAOSTAT, 2003). Asia is home to about 514million goats and Africa to about 219.1million. These two areas are major repositories of goats (FAOSTAT, 2008). About 53.8million goats are produced in Nigeria making her the fifth largest goat producing country in the world (FAOSTAT, 2008).

Body condition score is a simple and fast method of assessing the overall condition of an animal. Body score provides an indication of available fat reserve that can be used by an animal in periods of high energy demand, stress or suboptimal nutrition (Langston University Goat Research, 2014). Body condition scoring is a cheap way of comparing animal performances in developing countries (Wosilat, 1998). Animals in good condition have been found to have high ovulation rates and lower gestational days (Steepkampet al., 1975; Wosilat, 1998). A parasite is any organism that lives inside or outside a host animal and derives nutrients from the host animal (Babayemiet al., 2014). Parasitic load is a measure of the number and virulence of parasites a host organisms habours (Wiki, 2013). Parasites are sources of economic losses to the development of goats in the world. Proper nutrition is of essence in controlling the effect of parasitism in animals (Cody, 2012). Poorly fed animals are more susceptible to parasitism. Parasitic loads could be due to intensification of production and poor sanitation amongst herds (Cody, 2012). Helminth parasites are worms that live inside the body of host. Three types of helminth parasites are

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recognized; the nemathelminthes (nematodes), cestodes (tapeworms) and the trematodes (flukes). Goats are very sensitive to the effects of internal parasitism. This effect is determined by interactions between the type of parasite present in that geographical area, parasite's life cycle, environmental conditions, farm management and the host factors (Smith, 2004). Helminths cause irreversible damage or death to the animal and economic loss to producers. Animals overburdened with helminth parasites can be hindered in their reproductive performance, experience reduced growth rates and become less productive; be it for meat, milk or skin (Christenson, 2005), such animals are unthrifty and prone to diseases (Smith, 2004).

The aim of this experiment is to investigate the relationship and determine the pattern of relationship if any, between Body Condition and helminth parasitic load in goats raised semi-intensively.Helminthiasis develops gradually from reduced appetite, reduced feed conversion and weight loss which translate to their body conditions. When animals become unstable, production from such animal would decrease, animals may die and farmers would spend more money. There is need for one to study the condition of animals to their worm load such that early signs of worm infestation can be identified through change in body conditions, and animals would be attended to before it gets too late.

II. MATERIALS AND METHODS

This study was carried out at the Teaching and Research Farm of Animal Production Department, School of Agriculture and Agricultural Technology, Federal University of Technology Minna, Gidan Kwano campus in Bosso Local Government Area of Niger State. Niger State is located in the Southern Guinea Savannah zone of Nigeria. Manna lies between Latitude 9^0 37' North and Longitude 6^0 33' East. The highest mean monthly rainfall is in September with almost 300m and mean annual precipitation is 130mm. Temperature rarely falls below 22^0C, the peaks are 40^0C from February to March and 35^0C from November to December (Federal University of Technology Minna Student Handbook, 2014).

The materials used in this experiment includes; test tube, centrifuge, cotton wool, methylated spirit, coffee filter, glass slide, Pasteur pipette, marker, saline, field microscope, polythene bags, disinfectant (buttol), cover slip, weighing balance and applicator sticks. The herd used consists of twenty-five (25) goats which were properly identified using neck tags. Animals were grouped into two (2) based on their weights into small (<12kg) and large groups of goats (>12kg). Ten goats were randomly assigned to each group. Animals were managed under a semi-intestine system. Animals were allowed to graze freely on natural rangeland within the research farm from 8:00am to 4:00pm daily. Fresh water was given at ad-libitum. The entire study lasted for twelve (12) weeks. Fecal samples were collected twice weekly directly from the animals' rectum using sterile polythene glove. Animals were restrained prior to sample collection. After collection, samples were taken immediately to the laboratory to observe for the presence of adult or ovals of helminth parasites using the sedimentation by centrifugation method (Taylor et al, 2007; Adama, 2013). One gram of fecal was properly dissolved in 5mls of saline in a test tube using an applicator stick. The mixture was topped with 5mls of saline and shacked with hands; mixture was then filtered through a coffee filter into an empty test tube. The residue is discarded and filtrate is topped to 10mls. Another test tube containing 10mils of saline is used as a standard solution for color comparism with test sample after centrifugation; both test tube was then placed in a centrifuge at 3000 revolutions for 3minutes. After centrifugation, test sample was as clear as the standard solution but if otherwise, the supernatant was discarded and saline was added then centrifugation was repeated until test sample was as clear as the standard solution. After obtaining a clear test sample, the supernatant was discarded and deposit was mixed with a Pasteur pipette. Using the pipette, two drops of this deposit was placed on a glass slide. A cover slip was placed on the slide covering the sample and the slide was viewed under the microscope. Number of parasites and eggs observed was counted based on the McMaster egg counting technique, recorded and analyzed statistically.

Body condition scoring was also done weekly on the research farm. Animals were assigned scores between one and five after feeling the extremities of the lumber vertebrae for fat and muscle (Ducker and Dikerman, 1989; Wosilat, 1998). Body condition scores range from 1 (very thin) to 5 (obese). Two persons were involved in scoring and an animal's score was concluded based on the instincts of the scorers. BSC 1-Animal look emaciated and weak. Their back bone ribs are clearly visible; the spinous processes of lumbar vertebrae can be grasped easily between thumb and forefinger.BSC 2- Animals look slightly raw-boned: their backbone and some ribs can be seen and there is a small amount of fat cover.BSC 3-Animal's backbone is not prominent and ribs are

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barely discernible, the spinous processes of their lumbar vertebrae cannot be easily grasped because the tissue layer covering the vertebrae is thick.BSC 4- Animal's backbone and ribs cannot be seen. The side of the animal is sleek in appearance, it is impossible to grasp the spinous processes of their lumbar vertebrae, which are wrapped in a thick layer of muscle and fat.BSC 5- Animal's backbone is buried in fat. Ribs are not visible.(Detweiler et al., 2008).

Statistical analysis
Data collected was subjected to T-test. The relationship was determined using the correlation matrix of SPSS 16.0 (SPSS, 2006).

III. RESULTS

Table 4.1 shows that the highest mean BCS was 2.73 recorded in week 1 and the least mean was 2.03 in the 12th week for the large group of goats. In the small group of goats, the least mean was 1.92 in the 5th week and the highest mean was 2.18 in the 8thweek. The higest mean helminth load in the large group of goats was recorded in week 11 (17300 EPG) and the least in week 1 (6300 EPG). In the small group, highest mean helminth load was also recorded in week 11 (16600 EPG) and the least in week 4 (3425 EPG). Figure 1 shows that week 11 recorded the highest mean helminth load in both groups. The first four weeks had the least helminth averages. Figure 2 shows that BCS averages were better in the large group than in the small group throughout the experiment.

The large group of goats had a higher helminth load than the small group. Haemonchus contortus was the most prevalent helminth and strongyle species were the least prevalent helminth in both groups. Small group of goats had higher Haemochus load than the large group of goats. There was no significant difference (t=0.028) at p>0.05. Small group of goats had higher Ascaris load than the large group of goats, although no significance differences was noticed at p>0.05 (t = -0.283). Strongyles were higher in the large group of goats than the small group with significant differences (t = 2.619) at p<0.05. Bunostomum species were higher in the large group than in the small group with significant differences (t = 2.139) at p<0.05. There was no significant difference in total helminth load between the two groups at (0.223) p<0.05. The large group recorded higher body condition scores than the small group. There was significant differences in BCS between the two groups (t = 3.737) at p<0.05.

An inverse and significant correlation exist between BCS and the total helminth load of the Large group of goats at p<0.05 level. There is also an inverse and highly significant correlation between the BCS and Haemonchus at p<0.01 level and between BCS and Fasciola at p<0.05 level. There is no significant correlation between BCS and Ascaris, Strongyle or Bunostomum (p>0.05). There was a significant correlation between Haemonchus and Bunostomum spps. at p<0.05 level, between Bunostomum and Ascaris spss. at p<0.01 level, between total helminth load and Haemonchus spp. at p<0.01 level, between total helminth load and Ascaris spp. at p<0.01 level and between total helminth load and Bunostomum spp. at p<0.01 level. There is no significant correlation between Haemonchus and Fasciola, Haemonchus and Ascaris, Haemonchus and Strongyles at p>0.05.

There is an inverse and highly significant correlation between BCS and the total helminth load of the Small group of goats at p>0.01 level, between BCS and Haemonchus spp. at p<0.01 level. There is an inverse and significant correlation between BCS and the Ascaris spp. at p<0.05 level. There is no significant correlation between BCS and Fasciola, Strongyle or Bunostomum spps. (p>0.05). Significant correlation exists between Ascaris and Haemonchus spps. p<0.01 level. There was no significant correlation between Haemonchus and Fasciola, Haemonchus and Ascaris, Haemonchus and Bunostomum at p>0.05.

IV. DISCUSSION

From this study, the increase in helminth load may be as a result of favourable ambient temperatures which are similar to FAO (1994) findings that temperatures between 22^{0}C and 30^{0}C are favourable for larval development of many helminth species and larvae survival depends on adequate moisture. Temperature range of 22.8^{0}C and 31.3^{0}C were recorded during this experiment hence the high helminth load in the goats. The predominance of nematodes on the farm coincided with Zeryehun (2012) findings that nematodes are the most predominant helminths in goats followed by Trematodes and Cestodes. From this study, nematodes were the most predominant as a result of favourable conditions for larval development on the pasture, Trematodes were the least predominant which may be due to the fact that the goats were not reared in a riverine area and suitable intermediary hosts for the survival of their species were absent. Incidences of cestode infestation not recorded in this experiment and this may be due to

their host specificity.The prevalence of Haemonchus contoortus on the farm coincided with Idika et al (2012) findings that Haemonchus species are the most prevalent of all GI nematodes due to favourable climatic factors like temperature, rainfall and vegetation that affects its development. Wanyangu et al (1997) discovered that few or no Haemonchus larvae were available during the dry season but Haemonchus larvae were available in the rainy seasons. Agyei (1997); Getachew et al (2007) reported that desiccation from lack of rainfall kills Haemonchus eggs and larvae rapidly, availability of pasture leads to further contamination. This study was carried out in a period that coincided with the rainy seasons and adequate pasture hence the abundance of Haemonchus species on the farm. The few incidences of Strongyles in both groups of goats on the farm disagrees with Kanyari (2009) findings that Strongyles were the most common GIT nematode in the tropics. From this study. Strongyles were the least prevalent nematodes in the goats which may be due to unfavourable climatic conditions for their survival. The better body condition scores of goats with lower helminth load agrees with Idika et al (2012) findings that goats with high helminth load had poorer BCS and those with low helminth load had higher BCS. In addition, Idika et al (2012) observed that goats with poorer BCS were more susceptible to helminth attack than those with higher body condition scores; this study is also in line with his suggestion that size had no significant effect on the susceptibility of goats to helminth attack and helminth load has significant effect on the body conditions of goats.

V. CONCLUSION

It can be concluded that significant relationship exists between the body condition and helminth load in large and small groups of goats. Gastro intestinal nematodes have remarkable effects on the body condition scores of goats. The larger group of goats had higher helminth load than the small group, together with better body condition scores which may be due to other factors than nutrition like management and environmental factors. In both groups of goats, animals with lower body condition scores had higher helminth load. In the large group of goats, Haemonchus contortus and Fasciola spp. significantly affected their body conditions. In other to ensure maximum growth, control and eradication of these species should be of great concern. For the smaller group of goats, Haemonchus contortus and Ascaris spp. had significant effect on their body conditions. In other to ensure maximum growth of these goats, control and eradication of Haemonchus contortus and Ascaris spp. should be eradicated for maximum production.Body condition scoring system can thus be used by farmers to ascertain the worm load of animals.

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Table 1. Average body condition scores and helminth load inLarge and Small groups of goats raised semi-intensively.

Average body condition scores			Average helminth load (EPG)	
Week	Large group	Small group	Large group	Small group
1	2.73	2.13	6300	7850
2	2.67	2.13	6850	6200
3	2.60	2.08	9150	8100
4	2.48	2.08	7600	3425
5	2.43	1.92	16100	11100
6	2.33	2.08	13550	15000
7	2.29	208	11850	14650
8	2.45	2.18	13050	11750
9	2.35	2.10	12200	15100
10	2.30	2.00	11950	11100
11	2.30	1.98	17300	16600
12	2.03	1.93	15750	13800

EPG= eggs per gram of feaces

TABLE 2. Correlation of BCS and helminth load in Large group of goats raised semi-intensively.

Haemonchus	Fasciola	Ascaris	Strongyle	Bunostomum	Total	BCS
Haemonchus spp	1					
Fasciola spp.	0.068 (0.753)	1				
Ascaris spp.	0.103 (0.632)	-0.182 (0.394)	1			
Strongyle spp.	0.035 (0.869)	0.339 (0.105)	-0.095 (0.659)	1		
Bunostromum spp.	0.431* (0.035)	0.210 (0.324)	0.550** (0.005)	0.185 (0.385)	1	
Total helminth	0.757** (0.000)	0.160 (0.456)	0.655** (0.001)	0.155 (0.470)	0.809** (0.000)	1
BCS	-0.633** (0.001)	0.419* (0.042)	-0.195 (0.361)	-0.105 (0.624)	-0.349 (0.094)	-0.510* (0.011)

*= significant at 5%
**= significant at 1%

TABLE 3. Correlation of BCS and helminth load in Small group of goats raised semi- intensively.

	Haemonchus	Fasciola	Ascaris	Strongyle	Bunostomum	Total	BCS
Haemonchus spp	1						

Fasciola spp.	0.205 (0.337)	1					
Ascaris spp.	0.759 (0.000)	0.218 (0.305)	1				
Strongyle spp.	0.465* (0.022)	-0.295 (0.162)	0.285 (0.177)	1			
Bunostro mum spp.	0.031 (0.887)	-0.047 (0.829)	0.217 (0.307)	0.160 (0.454)	1		
Total helminth	0.919** (0.000)	0.332 (0.114)	0.926** (0.000)	0.403 (0.051)	0.250 (0.239)	1	
BCS	-0.845** (0.000)	-0.300 (0.155)	-0.504* (0.012)	-0.381 (0.066)	0.158 (0.460)	-0.706** (0.000)	1

*= significant at 5%
**= significant at 1%