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CORRELATIONS BETWEEN BODY WEIGHT, HEAMOGLOBIN, PACKED CELL VOLUME AND FECAL EGG COUNT OF SHEEP IN GOMBE STATE

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ABSTRACT

Correlations between body weight, heamoglobin concentration, packed cell volume and fecal egg count of sheep in Gombe State, Nigeria were assessed between March and October, 2017. Three hundred faecal and blood samples comprising 130 Yankasa, 73 Balami and 97 Uda breeds were collected from households, sheep and goats markets and abattoir. The feacal samples were subsequently processed for gastro-intestinal parasite presence and identification using floatation method as described by Soulsby and faecal egg counts using the Mc Master Slide Technique while blood samples were analysed for some haematological parameters such as Packed Cell Volume (PCV) and Haemoglobin Concentration (HbC). Out of the 300 samples examined, 76.70% were positive while 23.30% were negative. Six genera of parasites were observed namely; Coccidia, Haemonchus, Trichuris, Fasciola, and Oesophagostomun. Coccidia infection (33.30%) was the most predominant while Fasciola and Haemonchus (2.50% each) were least. Infection varied significantly (P< 0.05) with breed with overall prevalence of 70.80, 74.00 and 86.60% for Yankasa, Balami and Uda respectively. Of the four quantitative factors considered; namely body weight (Bwt), PCV, HbC and FEC only Bwt and FEC had significant influence (P<0.001) on breed of sheep. Correlation coefficient was highest (0.99) between HbC and PCV and lowest between Bwt and FEC. Similarly, the correlations between Bwt and HbC and, Bwt and PCV were low while between Bwt and FEC was negative (-0,073, P < 0.05). Blood parameters needed to be monitored for health stability and gastrointestinal parasite infection must be appropriately controlled to ensure adequate health and nutritional status of sheep.

Keywords: Sheep, Haemaglobin, Packed cell volume, Body weight and Faecal egg count.

INTRODUCTION

Gastrointestinal parasites are common infections in domestic sheep and impact directly or indirectly on average daily weight gains, growth rate of wool and some haematological parameters (Ayele *et al*., 2014). Despite the remarkable achievement in the discovery of gastrointestinal parasite's drugs with increased spectra of activity, nematode infection and disease remain one of the greatest limiting factors in the production of sheep worldwide (Hassan *et al*., 2013). The present study on the correlations between body weights, heamoglobin concentration, packed cell volume and fecal egg count of sheep in Gombe State, Nigeria is an effort aimed at establishing the prevalence of gastrointestinal parasite and this could lead to increased productivity if treatment is instituted as a follow up strategy. In addition, the study might also provide useful information to breeders, livestock keepers and researchers.

MATERIALS AND METHODS

Study Design and Sampling

The study was carried out between March and October, 2017 where random faecal and blood samples were collected from 300 sheep. The total sample size was calculated according to Thrusfield (2005) using 95% confidence and expected prevalence of 89.1% from previous study of James (2014) and desired precision of 5% as follows: $n = 1.96^2 P_{exp} (1- P_{exp}) / d^2$ Where n = sample size, P_{exp} =expected prevalence (89.1%) and d = desired absolute precision of 5% (0.05). A sample size of 150 was arrived at; the value of 150 was multiplied by 2 to avoid sampling error. Stratified random sampling was applied to collect the 300 samples comprising of

130 Yankasa, 73 Balami and 97 Uda sheep used. The samples were collected from Gombe peri urban and urban households, abattoir and sheep and goat markets.

Faecal and blood samples collection and analysis

Fresh faecal sample (5g) was collected using the fingers, directly from the rectum of the sheep into the universal containers, labeled and stored. The samples were subsequently processed for gastro-intestinal parasite presence and identification according to Soulsby (1986). Blood samples (5 ml per animal) were obtained from the jugular vein. The blood samples collected was then placed in tubes coated with ethylene-diamine tetra-acetic acid (EDTA) as anticoagulant. Packed cell volume (PCV) was determined at the Laboratory using the micro-haematocrit technique. Haemoglobin concentration was however determined by dividing PCV value by 3 according to Addass (2010).

Data Analysis

Data collated were subjected to analysis of variance (ANOVA) using the general linear model (GLM) procedure of SPSS, version 22. Significantly different means were separated using the Duncan multiple range test (DMRT). The relationships among PCV, HbC, Bwt and FEC were determined using the Pearson's product moment correlation coefficient.

RESULTS

Overall Parasite Prevalence

Out of the 300 faecal samples examined, 76.7% were positive for parasite infection (Table 1). As presented in Table 2, six genera of parasites were screend. These included Coccidia, Haemonchus, Strongyle, Trichuris, Fasciola and Oesophagostomum. Coccidia infection (33.30%) was the most predominant while Fasciola and Haemonchus (2.50% each) were least. The overall helminth prevalence in Yankasa, Balami and Uda breeds were 70.80, 74.00 and 86.60% respectively and varied significantly ($P<0.05$).

Body Weight, PCV, HbC and FEC by Breed

The means and standard deviations of Bwt, PCV, HbC and FEC by breed are presented in Table 3. The overall values of Bwt, PCV, HbC and FEC were 35.67Kg, 34.25%, 11.42g/dl and 1083.45 epg while overall mean FEC (worm burden) for Yankasa, Balami and Uda were 678.46, 903.56 and 1271.65 epg respectively. Body weights and FEC significantly ($P<0.001$) differed with breed. Balami and Uda had higher body weights and worm burden. However, breed had non-significant effect on PCV and HbC.

Correlation coefficients between Bwt, HbC, PCV and FEC

Table 4 depicts correlation coefficients between Bwt, HbC, PCV and FEC. Correlation was highest (0.99, $P < 0.001$) between HbC and PCV, about average for HbC and FEC (0.22, $P < 0.01$) and, PCV and FEC (0.22, $P < 0.01$). The correlations between Bwt and HbC and, Bwt and PCV were however low. The value between Bwt and FEC was negative (-0,073, $P < 0.05$).

DISCUSSION

Overall Parasite Prevalence

The high percentage of sheep positive for gastrointestinal parasite in this study is in agreement with the findings Ayele *et al.* (2014) who reported overall prevalence of 79.10, 91.39 and 76.30% respectively. Furthermore, most gastrointestinal parasites genera reported in the study viz; Coccidian, Haemonchus, Strongyle, Trichuris, Fasciola and Oesophagostomum have also been observed in sheep in Nigeria and other parts of the world (Tariq *et al.*, 2010; Hassan *et al*., 2013). The result of the present study indicated that Coccidian infection was the most predominant; this disagrees with Asif (2008) who reported dominance of nematodes in his study. The prevalence of both Haemonchus and Strongyles were quite high. This agrees with the findings by Hassan *et al.* (2013) who reported 39.24 and 11.21% for Haemonchus and Strongyles respectively. The significant difference in gastrointestinal infection prevalence between breeds of sheep in the present study had similarly been reported by Hassan *et al.* (2013). The higher overall parasite prevalence in the Uda than the others suggest that it is more susceptible to gastrointestinal parasite infection. Mbap and Chiroma (1998) had similarly reported among Nigerian sheep breeds that Yankasa had the highest gastrointestinal prevalence while Balami had lowest value. This could probably be due to breed difference.

Body Weight, PCV, HbC and FEC by Breed

The finding in this study that Bwt differed among breeds with Balami and Uda exhibiting higher values than Yankasa has similarly been reported by Mason (1997). The FEC also varied with breed which is in agreement with Fantu *et al*. (2012). Furthermore, that Balami and Uda had higher FEC than Yankasa agrees with Hassan *et al*. (2013) but disagrees with Mbap and Chiroma (1998) who found that Yankasa breed had higher values than the others. The lower FEC in Yankasa in this study could probably be due to breed difference itself. The wetter Gombe environment with probably higher endoparasite incidences (Hassan *et al*., 2013) is likely to have more effect on Uda and Balami breeds that are not familiar with it. The lack of breed variation in PCV, and HbC in the study however agrees with Fantu *et al*. (2012).

Correlation coefficients between Bwt, HbC, PCV and FEC

Correlation coefficients are measures of relationship between variables. Correlation values will indicate whether the variables considered changed in one way or another with respect to their counterpart. The very high correlation coefficient between HbC and PCV shows that PCV directly indicated PCV as has been alluded to in the calculation of HbC from PCV as PCV/3. This is in agreement with the reports by Fantu *et al*. (2012) who stated that HbC and PCV are strongly correlated. The low correlation coefficients between Bwt and PCV, and HbC in this study indicate that they were not related parameters and disagree with the report of Fantu *et al*. (2012). On the other hand, the negative correlation between Bwt and FEC is an indication of an inverse relationship. This is in agreement with the findings of Dagnachew *et al.* (2011) who had similarly reported an inverse relationship between Bwt and FEC. Similarly, PCV was lowly correlated with FEC showing a low indication that, an increase or decrease in PCV might have translated to either an increase or decrease in FEC respectively. However, this is not in agreement with the reports by Fantu *et al*. (2012) and Tariq *et al.* (2010) who reported that PCV and FEC were negatively correlated.

CONCLUSION

In general, the study indicates that gastrointestinal parasite infection was an important health problem in the study area especially as regard to poly-parasitism. Coccidia parasite was the most predominant followed by nematode and trematode. Fecal egg count (FEC) did not vary with levels of PCV and HbC. Strong correlation exists between HbC and PCV while PCV was lowly correlated with FEC. Similarly, there was also low correlation coefficient between Bwt and PCV, and HbC.

Table 1: Infection prevalence by breed

	No. Examined	No. Infected	% Prev.	LS
Breed :				χ df 4 = 0.05*
Yankasa	130	92	70.80	
Balami	73	54	74.00	
Uda	97	84	86.60	
Total	**300**	**230**	**76.70**	

Key: %= Percentage, Prev.=Prevalence, LS= Level of significance, χ = Chi-square and df = Degree of freedom

Table 2: Gastrointestinal parasite prevalence by Class and Genera

Class	Genera	Number	% Prevalence
Protozoa:	Coccidia	107	33.30
Nematode:	Haemonchus	84	26.20
	Strongyle	105	32.70
	Trichuris	9	2.80
	Oesophagostomum	8	2.50
Trematode:	Fasciola	8	2.50
Total:		**321**	**100**

Key: % = Percentage

Table 3: Body weight, PCV, HbC, and FEC by breed

Factor	Parameter							
	Bwt		PCV		HbC		FEC	
	X	SD	X	SD	X	SD	X	SD
Overall	35.67	1.052	34.25	0.95	11.43	0.318	1083.446	71.602
Breed:	***		NS		NS		***	
Yankasa	28.58	1.04[b]	31.68	0.52	10.58	0.17	678.46	45.79[c]
Balami	32.80	1.57[a]	31.22	0.86	10.35	0.28	903.56	75.08[b]
Uda	36.26	1.46[a]	31.99	0.76	10.64	0.25	1271.65	88.05[a]

*** =P<0.001), NS =Not significant, PCV =Packed cell volume in percentage, HbC =Haemoglobin concentration in gramme per deci litre (g/dl), FEC = Feacal egg count, X = Mean, SD = Standard deviation, Bwt (Body weight, in kilogramme) and values in a column within a subset with different superscripts are significantly different.

Table 4: Correlation coefficients between Bwt, HbC, PCV and FEC

Parameter	HbC	PCV	FEC
Bwt	0.145*	0.137*	0.073[NS]
HbC		0.99***	0.22**
PCV			0.22**

*** = P<0.001, ** = P< 0.01, * = P<0.05, NS = Notsignificant, PCV = Packed cell volume, Bwt = Body weight, HbC = Haemoglobin conc entration and FEC = Feacal egg count.

REEFERENCES

Addass, P. A., Midau, A. and Babale, D. M. (2010). Haemato-biochemical findings of indigenous goats in Mubi Adamawa State Nigeria. Journal of Agricultural and Social Science, **6:14**-16.

Asif, M., Azeem, S., Asif, S. and Nazir, S. (2008). Prevalence of Gastrointestinal Parasites of sheep and goats in and around Rawalpindi and Islamabad.Pakistan. Journal of Veterinary Science, **1**: 14-17.

Ayele, G., Nugusa, F. and Tadesse, B. (2014). Prevalence and associated risk factors of major sheep gastro intestinal parasites in and around Bako town, Western Ethiopia. Livestock Research for Rural Development, **26** (10) 43-50.

Dagnachew, S., Amamute, A. and Temesgen, W. (2011). Epidemiology of gastro intestinal helminthiasis of small ruminants in selected sites of North Gondar zone, Northwest Ethiopia. Ethiopia Veterinary Journal, **15**: 57-68.

Fantu, A. K., Yacob H. T. and Gezahegn M. K. (2012). Experimental infection of Ethiopian highland sheep by different infective doses of Haemonchus contortus (L3): haematological andparasitological parameters, serum protein concentrations and clinical responses. Ethiopian Veterinary Journal, **16** (1), 41-57.

Hassan, D. I., Mbap, S. T. and Naibi S. A. (2013). Prevalence of worm infection in Yankasa sheep and West and African dwarf goats in Lafia town and Environs, Nigeria. Journal of Agriculture and Veterinary Science, **4**(4): 84-90.

James, G. J. (2014). Studies on Gastrointestinal Helminths of Small Ruminant Slaughtered in Dogarawa Slaughter Slab in Zaria, Nigeria, Nigeria. Msc. Thesis, Faculty of Veterinary Medicine, Ahmadu Bello University Zaria.

Mason, P. C. (1997). Internal parasites of goats in New Zealand. In:**Sustainable control of Internal Parasites in Ruminants.** Ed G.K. Barrell. Animal Industries Workshop: 10th August New Zealand, **5:**57-66.

Mbap, S. T. and Chiroma, B. Y. (1998). Breed and environmental factors on helminth infection of sheep at Bauchi, Nigeria. Proceeding of the 6th World Congress on Genetics Applied to Livestock Production Armidale, NSW Australia, **5**:261-264.

Soulsby, E. J. C. (1986). **Helminths, Arthropods and Protozoa of Domesticated Animals,** 8th Edition Bailliere Tindall, London, **Pp**. 119-218.

Thrusfield, M. (2005). **Veterinary Epidemiology**. 2nd Edition, Blackwell Science Limited, Oxford, United Kingdom, **Pp**: 182-198.