EFFECTS OF SEASON, SEX AND AGE ON BODY WEIGHT, PACKED CELL VOLUME, HAEMOGOLOBIN AND FEACAL EGG COUNT IN INDEGENOUS BREEDS OF SHEEP IN GOMBE STATE

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ABSTRACT
The study investigated the effects of breed, season, sex and age on body weight, packed cell volume, Haemoglobin concentration and Faecal egg count of some indigenous breeds of sheep in Gombe State between March and October, 2017. Stratified random sampling was applied to collect the 300 samples comprising of 130 Yankasa, and 73 Balami 97 Uda sheep. Faecal egg count was measured using the modified McMaster technique for faecal samples found positive forgastro intestinal parasite eggs. Packed cell volume (PCV) was determined by micro-haematocrit technique. Faecal egg count (FEC) significantly (P<0.001) differed among the breeds with highest value of 1271.65epg recorded in Uda. Balami and Uda had higher values of body weight than Yankasa. There were no breed effects on PCV and HBC recorded in this study. Seasonal effects on BWT, PCV, HbC and FEC was observed with the wet season recording higher values of 32.32kg,36.04%, 11.99g/dl and 1140.95epg.This could be attributed to the fact that wet season is the period of lush pasture which has positive influence on BWT, PCV, and HbC. Furthermore, the wet season is a suitable period for the development of the infective stages of the Gastro intestinal parasites and hence higher burden. Age of sheep affected the values of BWT, PCV, HbC and FEC significantly. The values of 45.02kg,32.43%,10.82g/dl and 725.34epg forBWT, PCV, HbC and FEC respectively were significantly higher in adult than the younger sheep. This could be attributed to the fact that these parameters normally increase with age and physiological changes.
Key note: Season, Sex, breed, Packed cell volume, Haemogolobin Concentration, Faecal egg count.

INTRODUCTION
Nigerian sheep population is estimated at 44.3 million and over 70% is found in the Savanna regions where three of the four breeds of sheep (Balami, Yankasa and Ouda) predominate. Sheep thrive in a wide variety of environments in the tropics and sub tropics and requires less capital as they can be completely maintained on pastures, browse and agricultural waste products (FAO, 2007).Gastro-intestinal infections among other variables are significant constraints to livestock production (Badran*et al*. 2012). The major factor that influences gastrointestinal parasites infection in small ruminants, especially sheep is exposure to faecal contamination of grazing land (Pathak, 2011).Greer (2008) stated that the degree of disease infection varies with the host immune response. Males are generally more susceptible than females due to the production of androgen hormone which lowers immune response (Asif*et al*., 2008). Heavy animals also show more resistance due to sufficient body fat reserves that aids immune responses (Bilbo and Nelson, 2001). During rainfall the number of infective larval stages increase and animal are also more susceptible to infection (Kantzoura*et al.*, 2012). Blood properties are indices of the physiological and pathological changes in animals (Cambell, 2007). Haemotological tests have been widely used for the diagnosis of disease and nutritional status of animals. Information gained from blood parameters substantiates physical examination and together with medical history provide the basis for judgment and decision making (Schalm *et al*., 1975). Several researches were conducted on the effects of breed, season, sex and age on PCV, HbC and FEC on sheep in Nigeria particularly the northern part however; there was scant information on that in Gombe state. This study was carried out to bridge the gap in information, provide useful information for further research and to make recommendations.

MATERIALS AND METHODS
Area of the Study
The research covered the three senatorial zones of Gombe State comprising North, Central and South. Gombe State. It is situated in North East region of Nigeria and occupies a total land area of about 20,265 Km^2. The state is located between latitude 9^0 30' and $12^0$30'N and longitude $8^0$45' and $11^0$45'E of the Greenwich Meridian (Abubakar, 1974).

Experimental Animals

Three indigenous breeds of sheep namely Yankasa, Balami and Uda commonly reared by peri urban and urban households in Gombe state were used for this study.

Study Design.

Faecal and blood samples were collected randomly from 300 sheep for laboratory analysis. Stratified random sampling was applied to collect the 300 samples comprising of 130 Yankasa, 73 Balami and 97 Uda 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% of James, 2014)

d = desired absolute precision of 5% (0.05).

$n = 1.96^2 \times 0.891 (1-0.891)/ (0.05)^2$

$n = 3.8416 \times 0.891(0.109)/ 0.0025$

$n = 0.3731/ 0.0025$

n = 150 samples approximately

The value of 150 was multiplied by 2 to avoid sampling error in accordance with (Jatau*et al*., 2011).

Faecal sample collection and analysis

Fresh faecal sample (5g) was collected using hand gloves, directly from the rectum of the sheep into clean universal containers, labeled and stored. The samples were subsequently processed for gastro-intestinal parasite presence and identification.Samples found positive were counted using the modified Mcmaster technique according to Soulsby (1986).

Blood sample collection and analysis

Blood samples (5 ml per animal) were obtained from the jugular vein using a10 ml syringeattached to 21gauge x ½ inch needle. Air was first cleared from the syringe before puncturing at 20^0 angle (Pratt, 1985) and the syringe was aspirated to confirm insertion and collection of blood. The blood sample collected was then placed in labeled tubes coated with ethylene-diamine tetra-acetic acid (EDTA) as anticoagulant. Packed cell volume (PCV) was determined at Gombe State Specialist Hospital laboratoryusing the micro-haematocrit technique (Pratt, 1985) and classified into low, normal and high.Haemoglobin concentration wasdeterminedby dividing PCV values by 3 according to (Addass, 2010) and also classified as low, normaland high whilehaemoglobin type was identified through electrophoresis (Wintrobe, 1967).

Data Analysis

Data collected were analyzed using descriptive statistics and were further subjected to analysis of variance (ANOVA) using the general linear model (GLM) procedure of SPSS, version 22 (Allen *et al.,* 2013) as in the following model. Significantly different means were separated using the Duncan multiple range test (DMRT).

$Y_{ijk} = \mu + B_i + E_j + e_{ijk}$

Where;

Y_{ijk}= Observations on dependent variables

μ = common mean

B_i = effect of i^{th} breed

E_j= effects of all other factors, but taken individually; number and types (of factor) varied with the dependent variable.

e_{ijk}= random error term.

The relationships among PCV, HbC, Bwt and FEC were determined using the Pearson's product moment correlation coefficient.

Table 1: Effects of Breed, Season, Sex and Age on BWT, PCV, HbC and FEC

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]
Season:	*		***		***		***	
Dry	30.99	0.92[b]	27.41	0.40[b]	9.14	0.14[b]	714.80	59.43[b]
Wet	33.32	1.26[a]	36.04	0.44[a]	11.99	0.15[a]	1140.95	53.33[a]
Sex:	NS		NS		NS		NS	
Male	30.81	1.00	31.31	0.55	10.42	0.18	871.13	60.30
Female	33.37	1.19	32.02	0.54	10.67	0.18	978.93	57.70
Age:	***		*		*		***	
Young	21.79	0.34	31.06	0.51	10.32	2.17	1087.07	52.37
Adult	45.02	0.80	32.43	0.59	10.82	2.28	725.34	63.60

*** =P<0.001), * =P<0.05, ** =P<0.01, NS =Not significant, PCV =Packed cell volume inpercentage, HbC =Haemoglobin concentration in gramme per decilitre (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 2: Effects of Faecal egg count on PCV, HbC and BWT

Category	PCV	HbC	Bwt
LS	NS	NS	**
Low	1060.13	1023.97	1023.30[a]
Normal	890.42	894.43	578.93[b]
High	1126.67	1080.00	955.74[a]

LS = Level of significance, PCV = Packed cell volume (percent), HbC = Haemoglobin concentration (gramme per decilitre), Bwt= Body weight (Kilogramme), NS = Non-significant. Values in a column with different superscripts are significantly different.

RESULTS AND DISCUSSIONS

The means and standard deviations of BWT, PCV, HbC and FEC by breed, season, sex and age are presented in Table 1. The overall values of BWT, PCV, HbC and FEC were 35.67Kg, 34.25%, 11.42g/dl and 1083.45 epg.Faecal egg count (FEC) significantly (P<0.001) differed among the breeds with highest value of 1271.65epg recorded in Uda. This finding is similar to observations reported byFantu*et al*. (2012) and Hassan *et al*. (2013) but disagrees with Mbap and Chiroma (1998) who found that Yankasa breed had higher FEC values than the others. The body weights recorded in this study were similar for Balami and Uda but differed significantly from value obtained for Yankasa.Balami and Uda had higher values than Yankasa, this report corroborates with earlier findings of Mason (1997).There were no breed effects on PCV and HbC recorded in this study, similar observations was reported by Kasali*et al*. (1988). The lower FEC in Yankasa in this study could probably be due to breed difference. Significant (P<0.001) seasonal effects on BWT, PCV, HbC and FEC was observed with the wet recording higher values, and this concur with earlier reports of Kasali*et al*. (1988) and Fantu*et al*. (2012). The wet season is the period of lush pasture which has positive influence on BWT, PCV, and HbC (Pathak and Pal, 2008). Furthermore, the wet season is a suitable period for the development of the infective stages of the Gastro intestinal parasites and hence higher burden. Sex had no influence on the parameters assessed in this study, this contradicts earlier reports by (Dangnachew*et al*., 2011; Hassan *et al.*, 2013), the authors reported significant sex variation on faecal egg count. Male sheep are generally more susceptible than females due to the production of androgen which lowers immune response. Oestrogen in females increases resistance to worm burden. However, female sheep become prone to parasitism due to hormonal changes during pregnancy; especially in the later stages (Asif*et al*., 2008). Age of sheep affected the values of BWT, PCV, HbC and FEC significantly; this is in agreement with earlier report of James (2014). Body weight, packed cell volume, haemoglobinand faecal egg count are usually higher in adult than the young because these parameters normally increase with age due to physiological changes (Fantu*et al*., 2012). This is however, contrary to reports of Winkler (1982), Mbap and Chiroma (1998). The authors reported higher FEC in the younger sheep and attributed it to low innate immunity and so-called self-cure phenomenon and/or high acquired immunity which increasewith age. Table 2 shows the influence of PCV, HbC and Bwt on worm burden. There was significant influence of Bwt (P<0.01) on FEC. The value of 578.93 epg, for the medium weight category was lower than 1023.30 and 955.74 epg for the lower and higher respectively. The PCV and HbC however had no significant influence on FEC.The PCV, HbC and Bwt are all indicators of body condition and thus are related to the physical, physiological and health status of animals.

CONCLUSIONS AND RECOMMENDATIONS

In conclusion, the study revealed that three indigenous breeds of sheep studied harbors gastrointestinal parasite however, the level of infection is more in Uda. Balami and Uda had higher body weights and worm burden. However, breed had non-significant effect on PCV and HbC. Body weight differed among breeds with Balami and Uda recording higher values than Yankasa. Furthermore, Balami and Uda had higher FEC than Yankasa. Season had significant influence on Bwt, PCV, HbC and FEC with the wet season recording higher values. Sex had no influence on the parameters assessed but, there were significant age differences in BWT, FEC, PCV and HbC .Proactive measures are required to sensitize farmers on the need to ensure routine deworming exercise and adherence to good husbandry practices all year round. Further study should be conducted using molecular marker to determine the genetic distance between the sheep breeds in terms of resistance to gastrointestinal parasite infection.

REFERENCES

Abubakar, Y. A. (1974). The Establishment and Development of Emirate Government Bauchi, Ph.D. Dissertation, Department of History, Ahmadu Bello University, Zaria, Nigeria. 1805-1903.

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.

Allen, M. S., Greenlees, I. and Jones, M. (2013). Statistical Package for Social Sciences.

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

Badran, I., Abuamsha, R., Aref, R., Alqisi, W. and Alumor, J. (2012). Prevalence and diversity of gastrointestinal parasites in small ruminants under two different rearing systems in Jenin district of Palestine. *An-Najah University Journal of Research*, **26**:1-18.

Bilbo, S. D. and Nelson, R. J. (2001). Sex Steroids hormones enhance immune functions in male and female hamsters. *American Journal of Physiology*, **280**:207-213.

Campbell, T.W. (1988). **Avian Haematolgy and Cytology**. Iowa State University Press, Annes, I.A., **Pp**. 43-51.

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.

F.A.O (2007).Food and Agricultural Organization of the United Nation, Rome.Quartely Bulletin of Statistics, Volume 1.

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

Greer, A. W. (2008). Trade-offs and benefits: implications of promoting a strong immunity to gastrointestinal parasites in sheep. *Parasite Immunology*, **30**:123-132.

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.

Kantzoura, V., Kouam, M. K., Theodoropoulou, H., Feidas, H. andTheodoropoulos, G. (2012). Prevalence and risk factors of gastrointestinal parasitic infections in small ruminants in The Greek temperate Mediterranean environment. *Open Journal of Veterinary Medicine*.**2**:25-33.

Kasali, O., Njau, B. C. and Bekele, T. (1988).Controlling livestock diseases in the tropics breeding: A perspective. In: Thomson E. F and Thomson F. S (eds), Increasing Small Ruminant Productivity in Semi-arid Areas. 2nd edition, Oliver and Boyd Publishers, Edinburgh London.

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.

Pathak, A. K. (2011). Nutritional status and performance of ruminants as influenced by gastrointestinal nematodes: An overview. *Veterinary World*, **13**(3):20-26.

Pathak, A. K. and Pal, S. (2008). Seasonal prevalence of gastrointestinal parasites in goats from Durg District of Chhattisgarh. Veterinary World. **1**(5):136-137.

Pratt, W. P. (1985). **Laboratory Procedures for Animal Health Technicians.**1st Edition, American Veterinary Publication Inc.

Schalm, O. W., Jain, N. C. and Carol, E. I. (1975) **Veterinary Haematology**. 3rd Ed. Lea and Fibiger Philadelphia, **Pp**. 144-167.

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

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

Winkler, J. (1982).Gastrointestinal infection of small ruminant.*Australian Veterinary Journal*, **13**:14-15.