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RELATIONSHIP OF DAM MILK OFFTAKE AND LAMB'S STRONGYLE EGG COUNT, HAEMATOLOGICAL, BIOCHEMICAL AND PHYSIOLOGICAL PARAMETERS IN WEST AFRICAN DWARF AND YANKASA SHEEP

O.O. ADEWUMI, O. J. OLATUNDE AND O. J. OGUNDIPE

Department of Animal Production and Health, Federal University of Agriculture, Abeokuta, Postcode 110001. Nigeria
***Corresponding author:** badewumi2003@yahoo.com

ABSTRACT

Milk offtake of dam, strongyle egg count, haematological, biochemical and physiological parameters of lambs were examined in West African Dwarf and Yankasa sheep. Rectal temperature, pulse rate and respiratory rate were also determined. The West African Dwarf (WAD) lambs had higher haemoglobin concentration (9.12g/dl), lymphocytes (54.93%), glucose content (48.80mg/l), serum glutamate oxaloacetate transaminase (65.97ul/L), pulse rate (65.90beats/minute) and rectal temperature (38.34^{0}C) while the Yankasa lambs had higher packed cell volume (28.93%), white blood cell (15540Cumm^{3}), red blood cell (10.03x10^{6}mm), total protein (69.96g/l), serum glutamate pyruvate transaminase (18.12ul/L) and respiratory rate (38.90breath/minute). The West African Dwarf Dams had higher value of milk offtake and their lambs had lower percentage of strongyle egg count. Milk offtake was significantly correlated with lamb's white blood cells (r=0.84) and lymphocytes (r=0.55) in WAD sheep while it was significantly correlated with red blood cells (r=0.65) and neutrophils (-0.61) in Yankasa sheep. There was a significant but negative correlation between milk offtake of dams and strongyle egg count (r= -0.48) in Yankasa sheep. White blood cell was superior to other blood parameters in estimating milk offtake in WAD sheep. Therefore, the West African Dwarf dams and lambs could be selected for milk production and better future performance because of the lower strongyle burden. High milk producing Yankasa ewes tends to confer immunity against strongyle burden in their lambs.

Keywords: Milk offtake, Strongyle , Haematology, Biochemical, Physiological, Lambs

INTRODUCTION

The significance of determining haematological and biochemical parameters of domestic animals has been well documented (Oduye and Adadevoh 1976), and changes in these parameters have been studied in adult sheep (Kaushish and Arora 1977; Vihan and Rai 1987). The use of blood examination as a way of assessing the health status of animals is also well documented; this is because it plays a vital role in the pathological status of organisms (Kaushish and Arora, 1997). Although, there has been a lot of works on the haematological and biochemical parameters of the adult sheep but research on lambs haematological and biochemical parameters in relation to dam's milk offtake is scanty. During lactation, the lamb feeds majorly on milk which means it depends more on the dam for its nutrient supply. The haematological and biochemical composition of lambs has been known to be strongly influenced by growth rate, weaning weight and future performance of lambs (Mandonnet *et al.,* 2003). Since some of the haematological and biochemical composition of lambs are inherited from parents and can affect both the health and nutritional state of an animal, knowledge of these factors will go a long way to determining future performance of lamb. Hence, selection can be done to improve the productivity and profitability of the flock. This study was conducted to determine some haematological, biochemical and physiological parameters in lambs during lactation and their relationship with milk offtake of their dams.

MATERIALS AND METHODS

Ten healthy West African Dwarf dams and their lambs and Yankasa dams and their lambs were used for the experiment which was conducted at the University of Agriculture, Abeokuta Teaching and Research Farm for a period of 6 weeks. The animals were first dewormed and treated with ivomec against endo- and ectoparasites. They were then housed separately in previously disinfected cages. The weight of the lambs and dams for West African Dwarf and Yankasa sheep was between 3.5-4.5 kg and 20.5-30kg respectively. The animals were semi-intensively managed. The ewes were allowed to graze from 9.00am to 3.00pm in the paddock. In addition, the ewes were supplemented with 0.2-0.5kg concentrate ration per head per day. They had access to clean water daily. Milk was collected starting from third week after parturition and thereafter on weekly basis for 6 weeks. The exact quantity of milk collected was measured using a measuring cylinder. Faecal sample was collected from the lamb three weeks after parturition and thereafter on weekly basis. The faecal samples were analysed using McMaster counting method as described by Soulsby, (1982) . Ten ml of blood was collected from each of the lambs using syringe and needles, and then collected into a plastic bottle containing Ethylene Diamine Tetra Acetic acid (EDTA) to determine the haematological and biochemical parameters at the beginning, and lastly, at the end of the experiment.

The haematological parameters taken include packed cell volume, white blood cell, red blood cell, neutrophils and lymphocytes counts and haemoglobin concentration. Biochemical parameters specifically glucose content, total protein, serum glutamate pyruvate transaminase and serum glutamate oxaloacetate transaminase were also determined. Packed cell volume was determined by the micro-haematocrit method according (Dacie and Lewis, 1991). Haemoglobin (Hb) concentration was determined by Cynometamoglobin method of Kelly (1079). Red blood cell (RBC) and white blood cell count (WBC) were determined using improved Neubauter Haemocytometer method as described by Jain (1986). Biuret method of serum total protein determination was employed as described by Kohn and Allen, (1995)

Also data on physiological parameters which include rectal temperature was collected directly on the farm using the method as described by Adewumi *et al.* 2007. Respiratory rate and pulse rate were determined by respiratory (flank) and femoral artery methods according to Adewumi *et al*. (2007).

STATISTICAL ANALYSIS

All data collected on the blood sample and milk were subjected to a Two-Way Analysis of Variance (ANOVA) and means were separated using Tukey Studentized Range Test. The relationship between milk offtake, haemoglobin content, biochemical, gastro-intestinal parasite and physiological parameters were determined using Pearson Correlation Matrix.

The model used was :

Yijk = U + Bi + Cj + Eijk

Where Yijk = Dependent variable e.g. Milk offtake

U = overall mean of all observations

Bi = effect of the i^{th} breed (i = West African Dwarf and Yankasa)

Cj = effect of j^{th} week of lactation (j = 3-8)

Eijk = random error normally, identically and independently distributed with 0 mean and variance $\ell^2 e$

RESULTS

The West African Dwarf dam were superior in milk offtake, and serum glutamate oxaloacetate transaminase while the Yankasa were only superior in neutrophils and strongyle egg count. The West African Dwarf (WAD) lambs had higher haemoglobin concentration (9.12g/dl), lymphocytes (54.93%), glucose content (48.80mg/l), serum glutamate oxaloacetate transaminase (65.97ul/L), pulse rate (65.90beats/minute) and rectal temperature (38.34^{0}C) while the Yankasa lambs had higher packed cell volume (28.93%), white blood cell (15540Cumm^3), red blood cell (10.03x10^{6}mm), total protein (69.96g/l), serum glutamate pyruvate transaminase (18.12ul/L) and respiratory rate (38.90breath/minute) (Table 1). The average weekly milk offtake was 83.07mls and 57.40mls for WAD and Yankasa dam respectively. There were no significant differences in all the parameters measured except

Table 1: Milk offtake of dams, strongyle parasite and physiological parameters of the lamb of West African Dwarf and Yankasa

Parameters	West African Dwarf	Yankasa	SEM
Milk offtake (ml)	83.07	57.40	6.52
Packed cell volume (%)	27.40	28.93	0.44
Hemoglobin content (g/dl)	9.12	8.93	0.24
White blood cells (Cumm3)	14850	15540	516.68
Red blood cells (x106mm-3)	9.53	10.03	0.20
Neutrophils (%)	48.80b	67.60 a	2.81
Lymphocyte (%)	54.93	48.66	2.20
Glucose content (mg/l)	48.85	48.42	1.24
Total protein (g/l)	65.61	69.96	1.70
Serum glutamate oxaloacetate transaminase (iul/L)	65.97a	55.81b	1.82
Serum glutamate pyruvate transaminase (iul/L)	17.97	18.12	0.78
Strongyle egg count (epg)	217.00b	897.93a	62.09
Pulse rate (beat/min)	65.90	66.60	0.48
Rectal temperature(0C)	38.34	38.36	0.04
Respiratory rate(breath/min)	34.90	34.70	0.51

^{a,b} means with different superscripts within columns are significantly (P<0.05) different neutrophils, SGOT and strongyle egg count.

Milk offtake of dam oscillates as lactation advanced and peaked at the 7^{th} week of lactation which corresponds to the 5^{th} week after parturition. Milk offtake of dam, hemoglobin content, white blood cells and total protein increased at the 6^{th} week and decreased at the 9^{th} week of lactation while red blood cells, neutrophils and lymphocyte decreased at the 6^{th} week and later increased at the 9^{th} week of lactation. However, packed cell volume and lymphocyte decreased as lactation advanced, though the decrease was not significant (Table 2).

Strongyle egg count significantly increases in WAD lambs as lactation advanced but the increase was not significant in Yankasa lambs. Strongyle egg count was lowest at 3^{rd} week and increased as lactation advanced (Table 3). Peak milk offtake , strongyle egg count and physiological parameters were observed between the 6^{th} and 8^{th} week of lactation. Week of lactation had no significant (P>0.05) effect on physiological parameters except pulse rate (Table 3) in both West African Dwarf and Yankasa sheep.

Milk offtake was significantly correlated with lamb's white blood cells (r=0.84) and lymphocytes (r=0.55) in WAD sheep while it was significantly correlated with red blood cells (r=0.65) and neutrophils (-0.61) in Yankasa sheep (Table 4 and 5).

Also, there was a high, positive and significant correlation (P<0.05) between serum glutamate oxaloacetate transaminase and total protein (r = 0.80) in Yankasa sheep (Table 5). There was a negative and significant (P<0.05) correlation between milk offtake and packed cell volume (r = -0.37) and white blood cells (r = -0.61). On the other hand, there was a positive and significant (P<0.05) correlation between milk offtake and lymphocyte (r = 0.38) in pooled West African Dwarf and Yankasa sheep. The highest correlation was obtained between neutrophils and lymphocyte (r = - 0.59) (Table 6). Similarly, serum glutamate oxaloacetate transaminase and total protein (r = 0.45) were significantly correlated (P<0.05).

High and negative significant correlation (P<0.001) was observed between milk offtake and strongyle egg count (r=-0.38) (Table 7). Milk offtake was low but positively correlated with rectal temperature (r=0.08) and respiratory rate (r=0.05) but negatively correlated with pulse rate (r=-0.08) (Table 7).

Also, there was a high, positive and significant correlation (P<0.05) between serum glutamate oxaloacetate transaminase and total protein (r = 0.80) in Yankasa sheep (Table 5). There was a negative and significant (P<0.05) correlation between milk offtake and packed cell volume (r = -0.37) and white blood cells (r = -0.61). On the other hand, there was a positive and significant (P<0.05) correlation between milk offtake and lymphocyte (r = 0.38) in pooled West African Dwarf and Yankasa sheep. The highest correlation was obtained between neutrophils and lymphocyte (r = - 0.59) (Table 6). Similarly, serum glutamate oxaloacetate transaminase and total protein (r = 0.45) were significantly correlated (P<0.05). Also, there was a high, positive and significant correlation (P<0.05) between serum glutamate oxaloacetate transaminase and total protein (r = 0.80) in Yankasa sheep (Table 5). There was a negative and significant (P<0.05) correlation between milk offtake and packed cell volume (r = -0.37) and white blood cells (r = -0.61).

Table 2: Least square weekly means for the effect of week of lactation on milk offtake, haematological and biochemical parameters in West African Dwarf and Yankasa sheep

Parameters		Week			
		3	6	8	SEM
Milk offtake (mls)	WAD	83.00	84.60	81.60	12.19
	YAN	55.80	56.80	56.80	2.00
	MEAN	69.40	72.10	69.20	6.52
Packed cell volume (%)	WAD	28.40	26.60	27.20	0.56
	YAN	29.20	29.60	28.00	0.65
	MEAN	28.80	28.10	27.60	0.44
Haemoglobin content (g/dl)	WAD	9.30	8.90	9.16	0.23
	YAN	7.84	9.78	9.18	0.40
	MEAN	8.57	9.34	9.17	0.24
White blood cells (cumm^3)	WAD	15770	14320	14460	762.23
	YAN	15490ab	17800a	13330b	712.71
	MEAN	15630	16060	13895	516.68
Red blood cells (x 106mm^{-3})	WAD	9.65	9.23	9.69	0.22
	YAN	10.27	9.76	10.06	0.34
	MEAN	9.96	9.49	9.88	0.20
Neutrophils (%)	WAD	55.40	43.60	47.40	2.93
	YAN	68.00	68.00	66.80	3.39
	MEAN	61.70	55.80	57.10	2.81
Lymphocyte (%)	WAD	53.40	57.80	53.60	2.12
	YAN	57.40	46.40	42.20	3.76
	MEAN	55.40	52.10	65.75	2.20
Glucose content(mg/l)	WAD	50.94	45.84	49.78	1.87
	YAN	48.46	49.92	46.88	1.69
	MEAN	49.70	47.88	48.33	1.24
Total protein (g/l)	WAD	67.16	68.96	60.72	2.76
	YAN	69.64	69.46	70.78	1.92
	MEAN	68.40	69.21	65.75	1.70
Serum glutamate oxaloacetate transaminase (Iu/l)	WAD	68.60	66.82	62.50	1.98
	YAN	62.72	55.10	49.60	2.48
	MEAN	65.66a	60.96ab	56.05c	1.82
Serum glutamate pyruvate transaminase (Iu/l)	WAD	19.78	16.68	17.46	1.11
	YAN	19.48	16.39	18.50	1.14
	MEAN	19.63	16.53	17.98	0.78

Table 3: Least square weekly means for the effect of week of lactation on strongyle infection and physiological parameters in West African Dwarf and Yankasa sheep

Parameters		Week						SEM
		3	4	5	6	7	8	
Milk offtake (mls)	WAD	78.00	84.60	84.60	81.60	85.40	82.40	6.35
	YAN	55.00	59.60	58.00	56.80	59.00	59.00	1.49
	MEAN	69.40	66.50	72.10	72.40	68.30	69.20	3.62
Strongyle egg count (epg)	WAD	100.00c	124.00c	186.00bc	260.00ab	281.00ab	351.00a	18.96
	YAN	537.6	550.0	860.0	1150.0	1140.0	1150.0	85.64
	MEAN	318.8b	337.0b	523.0ab	705.0ab	710.5ab	750.5a	62.09
Pulse rate (beat/min)	WAD	63.20b	62.00b	66.00ab	68.00ab	69.60a	66.60ab	0.72
	YAN	63.20b	63.80ab	68.80a	68.00ab	68.60ab	67.20ab	0.63
	MEAN	63.20bc	62.90c	67.40a	68.00a	69.10a	66.90ab	0.48
Rectal temperature (^{0}C)	WAD	38.28	38.32	38.34	38.50	38.12	38.46	0.07
	YAN	38.40	38.42	38.24	38.40	38.20	38.50	0.05
	MEAN	38.34	38.37	38.29	38.45	38.16	38.48	0.04
Respiratory rate (breath/min)	WAD	33.20	34.20	35.60	35.40	35.60	35.40	0.41
	YAN	31.20	31.20	35.60	39.40	35.60	35.20	0.94
	MEAN	32.20b	32.70ab	35.60ab	37.40a	35.60ab	35.30ab	0.51

WAD=West African Dwarf, YAN=Yankasa

[a,b,c.] means with different superscripts within columns are significantly (P<0.05) different

On the other hand, there was a positive and significant (P<0.05) correlation between milk offtake and lymphocyte (r = 0.38) in pooled West African Dwarf and Yankasa sheep. The highest correlation was obtained between neutrophils and lymphocyte (r = - 0.59) (Table 6). Similarly, serum glutamate oxaloacetate transaminase and total protein (r = 0.45) were significantly correlated (P<0.05).

High and negative significant correlation (P<0.001) was observed between milk offtake and strongyle egg count (r = -0.38) (Table 7). Milk offtake was low but positively correlated with rectal temperature (r=0.08) and respiratory rate (r=0.05) but negatively correlated with pulse rate (r=-0.08) (Table 7).

Table 4: Correlation between milk offtake and blood parameters in West African Dwarf sheep

Parameters	1	2	3	4	5	6	7	8	9	10	11
Milk offtake	1	-0.47	0.16	-0.84***	-0.41	-0.09	0.55*	0.00	0.24	0.18	0.23
Packed cell volume (%)		1.00	-0.07	0.58*	0.33	0.10	-0.20	0.02	-0.06	-0.16	-0.01
Haemoglobin content			1.00	-0.33	0.50	0.50	0.19	0.04	-0.02	-0.20	0.18
White blood cells				1.00	0.17	0.24	-0.67	0.17	0.00	0.22	-0.08
Red blood cells					1.00	0.34	-0.09	-0.13	-0.10	-0.34	0.29
Neutrophils (%)						1.00	-0.47	0.08	0.01	0.13	0.13
Lymphocyte (%)							1.00	-0.35	0.17	-0.00	0.14
Glucose content								1.00	0.10	0.29	-0.24
Total protein (g/l)									1.00	0.80	0.14
Serum glutamate oxaloacetate transaminase (lu/l)										1.00	0.12
Serum glutamate pyruvate transaminase (lu/l)											1.00

***** Significant at (P<0.05), ** Significant at (P<0.01), *** Significant at (P<0.001)

Table 5: Correlation between milk offtake and blood parameters in Yankasa sheep

Parameters	1	2	3	4	5	6	7	8	9	10	11
Milk offtake	1.00	0.13	-0.27	-0.05	-0.63**	-0.61**	0.36	-0.09	-0.45	-0.28	-0.13
Packed cell volume (%)		1.00	0.10	0.04	-0.04	-0.16	0.12	0.20	-0.22	-0.17	-0.23
Haemoglobin content (g/dl)			1.00	0.26	-0.09	0.44	-0.51*	-0.11	-0.18	-0.25	0.27
White blood cells (cumm^3)				1.00	0.00	0.46	-0.21	-0.15	0.13	0.35	-0.37
Red blood cells (x106mm^{-3})					1.00	0.27	-0.42	0.25	0.54*	0.32	-0.40
Neutrophils (%)						1.00	-0.61	0.01	0.33	0.37	0.00
Lymphocyte (%)							1.00	0.11	-0.48	-0.13	0.21
Glucose content (mg/l)								1.00	-0.13	-0.17	-0.20
Total protein (g/l)									1.00	0.63**	-0.50*
Serum glutamate oxaloacetate transaminase (Iu/l)										1.00	-0.16
Serum glutamate pyruvate transaminase (Iu/l)											1.00

* Significant at (P<0.05), ** Significant at (P<0.01), *** Significant at (P<0.001)

Table 6: Correlation of milk offtake and blood parameters in West African Dwarf and Yankasa sheep

Parameters	1	2	3	4	5	6	7	8	9	10	11
Milk offtake	1	-0.37*	0.7	-0.61**	-0.35	-0.32	0.38*	0.06	0.05	0.25	0.13
Packed cell volume (%)		1	0.15	0.31	0.16	0.16	-0.07	0.09	-0.04	-0.28	0.11
Haemoglobin content (g/dl)			1	0.12	0.61	0.31	-0.29	-0.04	-0.11	-0.16	0.23
White blood cells (cumm3)				1	0.10	0.35	-0.38*	0.16	0.08	0.18	-0.21
Red blood cells (x106mm-3)					1	0.36*	-0.37*	0.08	0.26	-0.04	-0.12
Neutrophils (%)						1	-0.59**	0.014	0.25	-0.14	0.05
Lymphocyte (%)							1	-0.06	-0.22	0.06	0.16
Glucose content (mg/l)								1	0.005	0.05	-0.22
Total protein (g/l)									1	0.45*	-0.12
Serum glutamate oxaloacetate transaminase (Iu/l)										1	-0.04
Serum glutamate pyruvate transaminase (Iu/l)											1

* Significant at (P<0.05), ** Significant at (P<0.01), *** Significant at (P<0.001)

Table 7: Correlation of dam's milk offtake, strongyle and physiological parameters in West African Dwarf and Yankasa lambs

Parameters	1	2	3	4	5
West African Dwarf					
Milk offtake	1.00	-0.11	0.12	0.20	0.08
Strongyle egg count		1.00	0.58***	0.09	0.46*
Pulse rate			1.00	-0.03	0.09
Rectal temperature				1.00	-0.07
Respiratory rate					1.00
Yankasa					
Milk offtake	1.00	-0.45**	0.26	0.15	-0.38**
Strongyle egg count		1.00	0.13	0.23	0.19
Pulse rate			1.00	-0.19	0.34
Rectal temperature				1.00	0.35
Respiratory rate					1.00
West African and Yankasa lambs					
Milk offtake	1.00	-0.08	0.08	0.05	-0.38**
Strongyle egg count		1.00	-0.09	0.23	0.19
Pulse rate			1.00	0.01	0.04
Rectal temperature				1.00	0.23
Respiratory rate					1.00

The result of the forward stepwise multiple regression to determine the contribution of blood parameters to milk offtake is presented in Table 8.

Table 8: Regression of dam's milk offtake and physiological parameters in West African Dwarf and Yankasa lambs

	Model	R^2
West African Dwarf sheep	MKT = 282.69 – 0.01WBC	0.71
	MKT = 146.76 + 2.37SGOT	0.85
Yankasa sheep	MKT = 94.23 – 3.67RBC	0.40
	MKT = 105.15 – 2.92RBC – 0.273NEUT	0.60
	MKT = 125.93 – 3.93RBC – 0.25NEUT -0.69SGPT	0.73
West African Dwarf and Yankasa sheep	Milk offtake = 187.21 – 0.01WBC	0.37
	Milk offtake = 119.31 -0.01 WBC + 1.33SGOT	0.51
	Milk offtake = 119.31 -0.01 WBC + 1.33SGOT	0.58
West African Dwarf	Milk offtake = 82.53 – 0.02 STRG	0.12

MKT= Milk offtake, WBC= White blood cells, SGOT= Serum glutamate oxaloacetate transaminase , RBC=Red blood cells, NEUT=Neutrophils, SGPT= Serum glutamate pyruvate transaminase, STRG=Strongyle egg count

The result showed that white blood cell was superior to other blood parameters in estimating milk offtake. It gave a coefficient determination of 71% with a high relationship (r=-0.84). Forward stepwise regression shows that the model was highly significant (P<0.001). Addition of SGOT improved the model of the milk offtake by 11% in WAD sheep. In Yankasa sheep, red blood cells was the most related to milk offtake (r=0.63) , it gave a coefficient of determination of 40% (P<0.05). Addition of neutrophils and SPGT improved the model by 20% and 13% respectively.

DISCUSSION

Blood examination plays a vital role in physiological, nutritional and pathological status of organisms (Muhammed *et al*., 2000; Muhammed *et al*., 2004; Owoyele *et al*., 2003). The average milk offtake obtained in this study differs from 239.8mls and 307.7mls reported by Adewumi and Olorunisomo 2009. This may be due to differences in lactation length. In this study, the animals were managed for 6 weeks which gave a lower milk offtake as compared to 8 weeks The value of white blood cells observed in this study was comparable with 15350±1.69 no/mm3 reported elsewhere (Olayemi *et al.* 2000) but higher than the findings of Omiyale *et al.* 2012 . The red blood cell values were within the normal range of 9.00 – 15.00 x 106(ul) (Banergee, 2005). The red blood cell, packed cell volume and haemoglobin content were higher than that observed by Olayemi *et al.* (2000) but comparable to 9.00 x 10^6ul obtained by Okah *et al.* (2012). The higher red blood cell value observed in Yankasa as compared to the WAD is consistent with the report of Adewumi *et al.* 2007 while the higher haemoglobin concentration in WAD lambs implies that the blood of WAD lambs has higher oxygen carrying capacity than the Yankasa lamb blood. The haemoglobin content observed in this study was lower than the values reported by Omiyale *et al.* 2012. The packed cell volume values corroborates Akande *et al.* 2011 in cattle. The mean packed cell volume implied that the lambs under study were slightly anaemic. The anaemia may be due to the high strongyle burden. The increase and decrease of haemoglobin, white blood cells, red blood cells, lymphocytes, and total protein implies that these parameters oscillates as the lamb grows. White blood cell of lambs was the most related to dam's milk offtake followed by serum glutamate oxaloacetate transaminase and red blood cells. The reduction in some of the blood parameters as lactation advanced had implication on the health of the animal. As milk offtake increases, strongyle egg count in lamb's decreases. The milk from the dam has the ability to reduce strongyle load in lambs. It was observed from this study that the high strongyle eggs build up indicate the presence of peripaturent infection in the lambs. Since strongyle egg count also increases with the increase in the week of lactation, the pasture might have been heavily contaminated with strongyle egg count. However, the higher infection rate observed in the Yankasa lambs breed of sheep as compared to the West African Dwarf lambs showed that Yankasa lambs were more prone to infection. This support the findings of Azab and Abdel-Maksoud (1999) and Tambuwal *et al.* 2002) who demonstrated a great variation in the haematological and biochemical parameters between breeds of sheep. The significantly higher strongyle count in Yankasa lambs and higher respiratory rate in WAD lambs is in line with the findings of Ojo and Adewumi, 2011 in adult Yankasa and WAD sheep. The non-significant effect of week of lactation on rectal temperature corroborates the observation of Ojo and Adewumi, 2011. Significant correlation of strongyle egg count with respiratory agrees with the report of Ojo and Adewumi, 2011. The result above also shows that West African Dwarf sheep produce more milk than their Yankasa counterpart. Since, packed cell volumes were similar in both West African Dwarf and Yankasa lambs, the West African Dwarf lambs might have shown tolerance to the infection, ability to cope with the high load of strongyle, then, there must be a physiological mechanism to cope which is the basis of adaptation of this breed. The high coefficient of determination implied that white blood cells and red blood cells of lambs could be used to predict milk offtake in WAD and Yankasa sheep respectively.

The West African Dwarf lambs tend to utilize the protein consumed from the dam's milk more than the Yankasa lambs. The values 65.97g/l and 55.81g/l obtained for these lambs were similar to the values gotten from the studies made on extensive sheep during lactation (Olayemi *et al*., 2000). The mean pulse rate, rectal temperature and respiratory rate in Yankasa ewes were lower than the values observed by Adewumi *et al.,* 2007. This implies that the two lamb breeds were not stressed. The milk offtake of dam, rectal temperature and respiratory rate of lambs curve did not follow a particular trend during the experiment. This agrees with the findings of (Adewumi *et al.* 2007).

CONCLUSION

The West African Dwarf lambs were superior in milk offtake, haemoglobin content, lymphocytes, glucose content and serum glutamate oxaloacetate transaminase compared to Yankasa lambs. There was significant (P<0.05) increase in pulse rate as lactation advanced in West African and Yankasa lambs. Great reliability can be achieved in the prediction of milk offtake using white blood cells of the lambs. Therefore, lactating dams should be given adequate management system that will ensure high milk productivity to support the health challenges of their lambs. Supplemental feeding should not be overlooked as a means to control parasites.

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