

Blood Profile and Carcass Characteristics of West African Dwarf Goats Fed Groundnut Haulms and Cowpea Husk Supplemented with Brewers' Dried Grain

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Abstract

Blood profile and carcass characteristics of West African dwarf (WAD) goats fed groundnut haulms and cowpea husk supplemented with brewers' dried grain, were investigated. Twelve growing WAD goats of average age of 12 months, mean live weight of 12 kg, were randomly allotted to four dietary treatments. The treatments: T₁, T₂, T₃ and T₄ had groundnut haulms at 10, 30, 70 and 90% combined with cowpea husks at 90, 70, 30 and 10% basal diet and supplemented with 150g of brewers' dried grain (BDG). Randomized Complete Block Design (RCBD) was employed in the study. Parameters determined were growth, carcass characteristics and hematological indices. All data obtained was subjected to analysis of variance (ANOVA) using the SAS (2001) package. Means were separated using Duncan's multiple range test (Duncan, 1955). Effects of the experimental diets on blood profiles of the animals showed PCV values of 39.61 to 41.23%, hemoglobin (Hb) 5.75 - 6.55 g/dl, White blood cells, 9.20 to 11.00, Red blood cell counts (RBC) 4.75 - 6.55 mg/dl. Total proteins (mg dl⁻¹), albumin (mg dl⁻¹) and globulin (mg dl⁻¹) of 3.95 - 4.51, 3.45 - 4.51 and 3.72-4.32 respectively were obtained in this study. Results of total proteins (g dl⁻¹) showed no significant (P > 0.01) differences between treatments T₁ - T₃. In case of albumin (mg dl⁻¹), there was significant (P > 0.01) difference between treatment groups. Values for globulin (mg dl⁻¹), also showed significant difference (P < 0.01) among the treatment. For carcass parameters significant (p < 0.05) differences were obtained across treatments with the exceptions of weights of flanks, rack and loins. Results of the research revealed that substitution of groundnut haulms in place of Cowpea husk gives healthier animals and impacts superior qualities of carcass.

Keywords: Blood; Carcass; Goats; Groundnut Haulms; Cowpea Husk and Brewer's Dried Grain

Introduction

Meat is one of the most important foods in the world and in some countries; it is considered an essential product with high consumption rate [1]. Differences in carcass, fat and conformation affect meat quality [2]. Carcass dimensions give information on its development, helping in determining the main assessment indices [3]. Carcass conformation is an important indicator of commercial value because carcass with better conformation has advantages of high lean content, proportion of high price cuts and greater muscle area [4]. A carcass composition determines yield and meat sensorial characteristics. Therefore, carcass economic value is based on its conformation and composition [5].

It is reported [6] that the nutritional and health status of animals cannot be compromised, hence the health status of the animal requires close scrutiny and proper examination of the blood. This verity is further supported by Babatunde, *et al.* [7] that the state relating to diet and wellbeing of animals can be examined/assessed and checked using hematological parameters. Therefore, the swift and straight away obtainable method of judging scientific and dietary effects of feed experiments using animals is with the aid of blood examination [7]. Ibhaze [8] further stated that dissimilarity in the features of blood of animals may be brought about by numerous influences, for ex-

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ample level of feeding, stage of development, gender, type of animal and functional state of the animal. The variations have stressed the demand to bring about suitable physiological reference point standards for a number of Nigerian livestock breeds which could aid in a truthful appraisal of the handling of animals, nourishment and identification of the nature of their state of wellbeing [9].

Determination of blood chemistry parameters such as glucose, total protein, blood urea nitrogen and cholesterol have been used in assessing nutritional status in cattle [10]. Reduced feed or protein consumption in goats alters some blood chemistry profiles such as glucose, lipids and proteins [11]. Aletor, *et al.* [12] reported that the effects of diets on blood and serum chemistry should be of paramount interest since blood transports gases, nutrients and excretory products within the body. Information on blood profile and carcass features of West African Dwarf goats nourished with cowpea husk and groundnut haulms complemented with brewers' dried grain is scanty. The research was therefore carried out to bridge this gap.

Methodology

Location of study

The trial was carried out at the Teaching and Research Farm of the Department of Animal Production, Adamawa State University, Mubi. Mubi is situated in the northern part of Adamawa State on Latitude 9°11' north of the equator and Longitude 13°45' east of the Greenwich Meridian at an altitude of 696m above sea level. It covers a region of about 4,728.77m² with a populace of about 245,460. The area lies within the Sudan Savanna vegetative region of the country (Saidu and Gadiga, 2004).

Management of experimental animals

Twelve West African Dwarf (WAD) bucks with a mean age of 12 months and average mass of 12 kg were obtained from the local markets within Mubi environs. Their age determination was performed through dentition/teething process. They were then placed in individual pens which measures 1.5m × 1.5m × 1.5m. The pen floor was made up of concrete and to absorb moisture from the animals' dung and urine, wood shaving was used as litter material.

The animals were placed in isolation for a forth night. During this period, they were offered the experimental diets acclimatize with the feed and environment; deworming was also done with Albendazole. After the period of adjustment, the animals were identified via tagging, randomly assigned to the treatments groups and tallied based on weight. Initial weight of the animals was determined before data collection commenced.

Experimental diets

Four dietary treatment groups were compounded; the animals were replicated three times in each of the group, to make a total of 12 animals. The treatments were T₁, T₂, T₃ and T₄ that received groundnut haulms at 10, 30, 70 and 90% combined with cowpea husks at 90, 70, 30 and 10% basal diet which was supplemented with 200g of brewers' dried grain (BDG) across treatments. The WAD bucks were randomly allotted to 4 treatment groups comprising of 3 goats per treatment group and each treatment was randomly assigned to one of the 4 treatment diet in a Randomized Complete Block Design (RCBD).

Variables observed and proximate analysis

The features measured were proximate compositions of dietary feed ingredients; dry matter intakes; initial and final weight; digestibility of feeds; efficiencies of feed; utilization of nutrients and blood profiles. Proximate compositions of the samples of feed collected were determined using the procedures of AOAC (2005). Metaboliseable energy of the diets was estimated with the aid of a bomb calorimeter.

The animals received a known amount of feed in this trial to investigate the nutrient utilization of the formulated feeds. The animals were housed separately in metabolism cages, with provision for separate collection of faeces and urine.

Daily urine samples for each animal were collected in urine collector container holding sulphuric acid; 10 ml 0.1N H₂SO₄, the volume was also measured for each day. The daily urine collected for each animal over a fortnight was mixed all together and a sample (20 ml) was collected in sample bottles. Daily feces excreted by each animal were collected and weighed. AOAC (2005) described the technique used in revealing the proximate components of the feces. The level of crude protein (for feeds and feces) and nitrogen content (for urine) was established by Kjeldahl method (AOAC, 2005). Samples from each treatment were gathered in pair.

Blood from each animal was collected using 10 ml syringe from the neck vein over EDTA (Ethylenediaminetetraacetic acid) bottle for analysis of hematologic constituents. White blood cell counts (WBC), Red blood cell counts (RBC), Haemoglobin (Hb) concentration, and packed cell volume (PCV) were established from the blood samples collected. Micro hematocrit approach was used to gage the PCV. Hb concentration was assessed using Sahl's (acid haematin) procedure as reported by Oni, *et al* (2010). Hemocytometer (Neubaur counting chamber) was applied to acquire the RBC count. For the WBC count, Blood smears were utilized for its verification.

The blood was allowed to settle so as to separate the serum from the plasma. From the serum, blood glucose, globulin, albumin and total protein were ascertained. Total cholesterol and blood urea were also determined from the serum (Fasuyi, *et al* 2010).

The data obtained in the study was analyzed using the SAS (2001) package in a one-way analysis of variance (ANOVA). Means were separated using the Duncan's multiple range test (Duncan, 1955).

Results and Discussion

	Treatments			
Ingredients	T1	T2	T3	T4
GNHH (%)	10	30	70	90
CPHK (%)	90	70	30	10
BDG (g)	200	200	200	200

Table 1: Experimental diets.

Effects of the experimental diets on blood profiles of the experimental animals are presented in table 2. The PCV values which indicate the relative proportion of plasma and red blood cells of 39.61 to 41.23% obtained in this study were higher than 22 - 31% reported by Daramola, *et al*. [13] for healthy female WAD goats, and compared favorably with 36.9 - 40.12% obtained by Taiwo and Ogunsanmi [14]. Hemoglobin (Hb) values of 5.75 - 6.55 g/dl observed in this trial were a little below the values (9.9 g/dl) reported by Opara, *et al*. [9] for well fit feminine WAD goats. Olafadehan [15] reported that this may be an indication of the nonappearance of microcytic hypochromic anemia which is triggered by deficiency of Iron and inappropriate use of hemoglobin formation.

	Treatments				
Parameters	T ₁	T ₂	T ₃	T ₄	LOS
PCV (%)	40.50	41.23	39.61	41.22	NS
Hb (%)	7.33 ^a	5.75 ^c	6.05 ^b	6.30 ^b	**
RBC (10 ⁶)	6.55 ^a	4.75 ^c	5.45 ^b	5.72 ^b	**
WBC (10 ⁹)	10.50 ^b	9.20 ^c	10.20 ^b	11.00 ^a	**
Blood prot (mg/dl)	4.51 ^a	4.35 ^a	4.45 ^a	3.95 ^b	**
Albumin (mg/dl)	4.22 ^a	3.45 ^b	3.95 ^b	4.51 ^a	**
Globulin (mg/dl)	4.32 ^a	3.72 ^b	3.94 ^b	4.23 ^a	**
Glucose (mg/dl)	4.12 ^a	4.35 ^a	3.96 ^b	4.06 ^a	NS
Blood N	3.92 ^b	3.55 ^b	3.85 ^b	4.16 ^a	**

Table 2: Blood Profiles of goats fed the experimental diets.

PCV: Packed Cell Volume; Hb: Hemoglobin; RBC: Red Blood Cell; WBC: White Blood Cell; N: Nitrogen;

LOS: Level of Significance; NS: Not Significant.

White blood cells (WBC) of 9.20 to 11.00 ranges obtained in the study; this attributes to the resistant reaction to pathogens within the body. Waziri, *et al*. [16] obtained similar findings which is comparable to the increase in WBC of the present study.

The red blood cell count (RBC) values obtained in this study (4.75 - 6.55 mg/dl) were lower than those of Okunlola, *et al* [17].

Total protein values ranges from 3.95 - 4.51 mg dl⁻¹; albumin 3.45 - 4.51 mg dl⁻¹ and globulin 3.72 - 4.32 mg dl⁻¹ as obtained from this study. The results of total proteins (g dl⁻¹) showed no significant (P > 0.01) differences between treatments T₁ - T₃. However, for albumin (mg dl⁻¹) and globulin (mg dl⁻¹), the values obtained showed significant difference (P < 0.01) among the treatment groups. For globulin values, that of T₄ proved to be the highest. These suggested the importance of microbiologically increased level of supplementation in improving the nutritive value of small ruminant diets and performance.

The values of the plasma total lipids (mg dl⁻¹), being glucose (3.96 - 4.35 mg dl⁻¹) and blood-N (3.55 - 4.16 mg dl⁻¹) were obtained in this research. There was no difference significantly among the treatment groups. Values for glucose were similar to 3.00 - 3.81 mg/dl obtained by Olafadehan [15].

Effects of the diets on carcass characteristics of goats are shown in table 3. The weights of blood ranged from 0.93 (T₃) to 1.14 Kg (T₄). Though, the values did not comprehend any specific pattern, it was significant (p < 0.05), statistically. The Hides/skin, non-carcass, digestive organs, fore and hind limbs weights were significantly (p < 0.05) different across treatments. The values in this study were similar to those reported by Ukanwoko., *et al.* [18], when they fed West African dwarf goats with cassava leaf- meal based diets. The resemblances in this trial may be as a result of the presence of the following in the dressed carcass: legs, visceral (liver, heart, spleen, lungs, and kidney), head and gut. Percentage of dressing may be affected by several factors e.g. fat portion of the body; fill and size of alimentary canal; hair and hide weight etc [19]. While some consider offal as part of the dressing process, some don't. So, it may also influence the dressing percentage. Let's say for example, hot carcass weight is well-thought-out to include the alimentary canal and the head without the legs as reported by Fasae., *et al* (2007). Nevertheless, warm carcass weight was thought to rule out the all visceral including head, feet, skin not leaving out the abdominal fat as reported by Ukanwoko., *et al* [18]. When the latter is compared to the former, we tend to have a low percentage of dressing.

Parameters (kg)	Treatment				SEM	LOS
	T ₁	T ₂	T ₃	T ₄		
Live weight	12.75 ^a	12.95 ^a	11.75 ^b	12.90 ^a	1.23	*
Blood weight	0.95 ^b	1.08 ^a	0.93 ^b	1.14 ^a	0.05	*
Hides/skin	2.90 ^a	2.95 ^a	2.78 ^b	2.78 ^b	0.67	*
Non carcass	2.77 ^b	2.95 ^b	3.20 ^a	3.22 ^a	0.72	*
Digest organs	3.23 ^a	2.33 ^b	3.15 ^a	3.05 ^a	0.69	*
Fore/hind limb	2.98 ^a	2.98 ^a	2.77 ^b	2.94 ^a	0.43	*
Breast	0.88 ^c	0.85 ^c	0.95 ^b	1.10 ^a	0.03	*
Shoulder	1.61 ^c	1.91 ^a	2.02 ^a	1.72 ^b	0.43	*
Legs	1.11 ^b	1.21 ^a	1.32 ^a	1.26 ^a	0.03	*
Shanks	0.97 ^b	0.98 ^b	1.05 ^a	1.08 ^a	0.02	*
Flanks	0.92	0.94	0.95	0.96	0.04	NS
Racks/loins	1.30	1.32	1.32	1.28	0.05	NS
Fats (g)	10.45	10.65	10.35	10.23	1.16	NS

Table 3: Effects of Diets on carcass characteristics of goats.

SEM: Significant Error of Means, LOS: Level of Significance.

Effects of the diets on whole sale cuts of growing West African dwarf goats showed that the weight for the breast, shoulder, legs and shanks were significantly (p < 0.05) different. However, the weights for flanks, racks, loins and total fat deposit showed no significant (p > 0.05) differences. Treatment T₄ which received the highest level of groundnut haulms had the highest values for all the parameters.

Conclusion and Recommendation

Results of the research revealed that substitution of groundnut haulms in place of Cowpea husk gives healthier animals and impacts superior qualities of carcass. It is therefore recommended that groundnut Haulms and Cowpea husk could be combined and used as basal diet for fattening goats with little supplementation. However, the groundnut haulms should be substituted at higher levels.

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