

Effect of Garlic Powder (*Allium sativum*) Supplement on Blood Chemistry of West African Dwarf Rams

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Abstract: This study was designed to evaluate the effects of supplementing ruminant diets with garlic powder as source of natural feed additives on blood chemistry in sheep. Forty West African Dwarf (WAD) rams with average live weight of 12.41 ± 0.3 kg, aged 1-2 years were randomly allocated to five dietary treatments with eight animals per treatment in a Completely Randomized Design. The garlic powder was supplemented at 0%, 2%, 4%, 6% and 8% in a formulated diet. Feeding trials lasted for a period of twelve weeks after four weeks period of acclimatization to the experimental pen. The effect of the dietary treatments on blood chemistry revealed significant difference ($P < 0.05$) in high density lipoprotein (HDL), low density lipoprotein (LDL) and total cholesterol but no significant difference in triglycerides (TG) levels among dietary treatments. It is evident that garlic powder can be supplemented up to 8% without any side effect on biochemical indices of West African Dwarf (WAD) ram.

Keywords: West African Dwarf rams, blood chemistry, garlic powder, supplementation, treatments

INTRODUCTION

Production of sheep contributes immensely to livestock subsector of the Nigerian agricultural economy [1]. Sheep is an important livestock species in the socio-economic lives of people around the world including Nigerians [2]. The most common breed of sheep found in the humid zone of Nigeria is the West African Dwarf (WAD) because of its resistance to trypanosomiasis which is prevalent in the zone and an important source of animal protein to the people [3].

The blood parameters have been shown to be major/important indices of the physiological, pathological and nutritional status of an animal and change in the constituent compounds of blood when compared to normal values could be used to interpret the metabolic state, health status of an animal as well as the quality of feed [4-7]. Adulugba and Joshua [8] suggested that it is often difficult to assess the correct health status of an animal without recourse to an examination of its blood. Haematological values are also of great help to the veterinarian in diagnosis, treatment and prognosis in many diseases in the tropics. Blood indices are important for the evaluation of the nutritive component of a given diet [9]. Previous research work had shown that nutrient level in blood sample may be considered to be appropriate measure of long term nutritional status of animals [10].

Variations in blood parameters of animals are due to several factors such as altitude, feeding level, age, sex, breed, season, temperature and physiological

status of animals [10]. The serum biochemistry and haematological Components of the blood are influenced by the quantity and quality of feed, level of anti-nutritional elements or factors present and also in monitoring level of feed toxicity present in feed constituents that affect the formation of blood [11, 12].

Consumption of red meat is rampant among Nigerian as the major source of their animal protein, most especially lambs and mutton. Lambs and mutton muscles contain high fat content as revealed in literatures [13, 14]. The level of lipids present in blood constituents of sheep needs to be regulated by the use of natural anti-oxidants as feed additives in order to establish a normal level of lipid content of blood constituents. One of such is the use garlic (*Allium sativum*) as feed additives.

Garlic (*Allium sativum*) has been used as a spice [15], possessed bioactive components [16], and these components have antibacterial, antifungal, antiviral, antioxidants, antithrombotic and vasodilator properties [17]. Therefore, the study is aimed at investigating the effect of varying level of garlic powder as feed additives on the blood lipid profile of West African Dwarf rams.

MATERIALS AND METHODS

Experimental site

The study was conducted at Ruminant Unit of the Teaching and Research Farm, Ekiti State University, Ado-Ekiti. Ado-Ekiti is in the Humid Zone of West Africa (HZWA), with a tropical climate and a bimodal rainfall distribution between April and October accompanied by a break in August and the peak during June and September. Dry season occurs between November and March. The site is between Latitude 07° 37' 15" N and Longitude 05° 13' 17" E, with a temperature range of 21°C to 28°C and high humidity [18].

Experimental animals and diets

A total of forty (40) West Africa Dwarf rams were randomly assigned to five (5) treatments of eight rams per treatment, each treatment having two replicate of four rams per, replicate. Five experimental diets were formulated containing garlic inclusion level at 0%, 2%, 4%, 6% and 8% respectively. The rams were individually housed. The experiment lasted for 12 weeks at end of which blood samples were collected from the rams.

Table 1: Experimental diet composition of West African Dwarf sheep

	Level of Garlic Inclusion (%)				
	Diet 1	Diet 2	Diet 3	Diet 4	Diet 5
Ingredient	0%	2%	4%	6%	8%
Soy bean meal	10.0%	10.0%	10.0%	10.0%	10.0%
Maize	35.0	35.0	35.0	35.0	35.0
Rice bran	15.0	15.0	15.0	15.0	15.0
Brewer's dry grain	37.5	37.5	37.5	37.5	37.5
Bone meal	1.0	1.0	1.0	1.0	1.0
Salt	1.0	1.0	1.0	1.0	1.0
Vitamin/Mineral	0.25	0.25	0.25	0.25	0.25
Premix	0.25	0.25	0.25	0.25	0.25
Total	100	100	100	100	100
Calculated protein %	16.07	16.07	16.07	16.07	16.07
Calculated Energy (Keal/kg)	2605.7	2605.7	2605.7	2605.7	2605.7

Data Collection

Three rams was randomly selected from each replicate. 2mls of blood samples were collected for the determination of the serum biochemical indices. Blood samples collected without coagulant were used to determine the biochemical components such as high-density lipoprotein, low-density lipoprotein, Cholesterol and triglycerides using the methods described by Spencer and Price [19].

STATISTICAL ANALYSIS:

All the data collected were subjected to one-way analysis of variance (ANOVA) and means were separated using Tukey's pairwise comparison probability at 5% Minitab Release 11.12 edition.

RESULTS AND DISCUSSION:

The result of the blood chemistry obtained is shown in Table 2 or Figure 1. The blood chemistry

revealed significant difference (P<0.05) in high-density lipoprotein (HDL), low density lipoprotein (LDL) and total cholesterol but not significantly different (P>0.05) in triglycerides (TG) levels among dietary treatments. This is at variance with the reports of Horton *et al.* [20] and Anassori *et al.* [21] that garlic had no effects on plasma cholesterol and triglycerides concentration in sheep. The values obtained in the study for total cholesterol; diet 1 (74.99±6.77mg/dl) (4.162mmol/l); diet 2 (65.95±5.12mg/dl) (3.66mmol/l); diet 3 (65.57±6.8mg/dl) (3.634mmol/l); diet 4 (58.29±16.96mg/dl) (3.234mmol/l) were higher than the values of cholesterol in Yankasa ram (2.5mmol/l), Ouda ram (2.5mmol/l) and Balami ram (3.5mmol/l) reported by Njidda *et al.*; [22] but diet 5(39.8±8.22mg/dl) (2.209mm/dl) was lower than the values reported in the literature.

Table 2: blood lipid profile of WAD sheep fed garlic supplemented diets

Trait (mg/dl)	Level of garlic inclusion (%)				
	Diet 1(0%)	Diet 2 (2%)	Diet 3 (4%)	Diet 4 (6%)	Diet 5 (8%)
HDL (mg/dl)	43.55±4.02 ^c	44.95±12.07 ^c	45.93±18.71 ^c	48.06±2.90 ^b	51.60±3.65 ^a
LDL (mg/dl)	12.54±3.28 ^a	2.83±2.62 ^b	2.19±0.67 ^b	2.06±1.88 ^b	0.85±0.8 ^c
CHOL (mg/dl)	74.99±6.77 ^a	65.95±5.12 ^b	65.57±6.80 ^b	58.27±16.96 ^b	39.80±8.22 ^c
TG (mg/dl)	23.20±0.38	22.86±6.50	18.74±1.00	18.43±2.74	17.25±2.07

HDL- high-density lipoprotein, LDL- low-density lipoprotein, CHOL- cholesterol, TG-triglycerides; a,b,c, means of different superscripts on same row are significantly (P<0.05) different

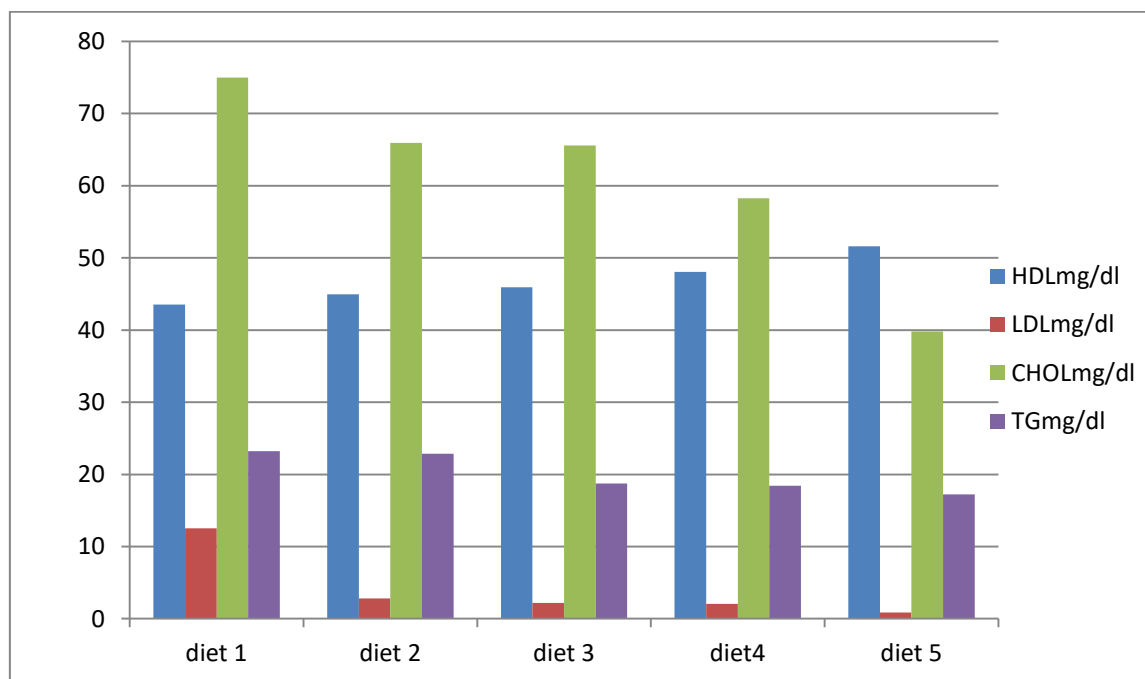


Fig 1: blood lipid profile of WAD sheep fed garlic supplemented diets

HDL- high-density lipoprotein, LDL- low-density lipoprotein, CHOL- cholesterol, TG-triglycerides

The result of triglycerides recorded indicated no significant different ($p>0.05$) among the dietary treatments, but there were variations among treatment diets. This is in support of Gofman *et al.* [23] that garlic has a potential to reduce lipid accumulation in the liver and triglycerides level in the plasma by inhibiting hepatic fatty acid synthesis.

CONCLUSION

The results of the study revealed that varying levels of garlic in West Africa Dwarf (WAD) rams diets is safe and reduce lipid level in the serum. Garlic powder can be used as additives up to 8% without any side effect on biochemical indices of West Africa Dwarf (WAD) rams.

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