

HYPOLIPIDEMIC EFFECT OF OREGANO LEAF MEAL ON LIPID PROFILE OF WEANER RABBITS

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ABSTRACT

This study investigated the effects of oregano leaf meal supplementation on lipid profile parameters in rabbits. The experiment was carried out at the livestock section of College of Agriculture Kabba, Division of Agricultural Colleges, Ahmadu Bello University. Twenty-four weaner rabbits of mixed sex were randomly distributed into four treatments (six animals per treatment) using completely randomized design. The experiment lasted for fifty-six days. Feed was served at a measurable time basis per day, while water was given ad libitum during the experimental period. Blood samples were collected via the marginal ear vein puncture at the end of the experiment from the animals to analyze for the lipid profile (high density lipoprotein (HDL), low density lipoprotein (LDL), Triglycerides and total cholesterol (TCHO) components. The result indicated that supplementation of oregano leaf meal had no significant ($P > 0.05$) effect on HDL of rabbits. The LDL was significantly higher ($P < 0.05$) in rabbits fed the control diets, and least in those fed T4. Triglycerides and TCHO concentration were higher ($P < 0.05$) in rabbit fed the control diet and least in those fed T4 which is similar ($P > 0.05$) to those fed T3. It was concluded that supplementing weaners rabbits with Oregano leaf meal enhances their thermoregulatory and lipids profile. It was recommended that Oregano leaf meal can be used as supplement in the diet of weaners rabbits for improved thermoregulatory and lipids profile at 2g/ kg supplementation in rabbit diet.

Keywords: Oregano, Leaf meal, Lipid, Supplementation, Rabbit

INTRODUCTION

Rabbit production has a significant contribution to the global meat industry, with over 2 million metrics - tons of rabbit meat produced annually (FAO, 2020). Weaner's rabbits, in particular (4-8 weeks old), are critical stage in rabbit production, as they are vulnerable to environmental stressors, diseases and nutritional deficiencies, which can impact their growth and development (Lebas, 2004). Elevation of plasma lipid components describes a metabolic disorder referred to as hyperlipidemia (Demerdasht *et al.*, 2005). Hyperlipidemia is associated with increased levels of atherogenic lipoproteins, which is a contributing factor and primary indicators of atherosclerosis, susceptibility to coronary heart disease (CHD) as well as enhanced oxidative stress (Adekunle *et al.*, 2013). Dietary interventions have emerged as a promising approach to enhancing lipid regulation and overall health in rabbits. Nutritional supplements, such as antioxidants and polyphenols, have been shown to modulate lipid metabolism and reduce oxidative stress. Lipids are essential for energy production (Brewer, 2014), they maintain cell membrane structure and function (Satinoff, 1983) and influence hormone production and regulation, particularly insulin and thyroid hormones (Marai *et al.*, 2007). Lipids also modulate immune response and inflammation (Proestoeset *et al.*, 2013). However, abnormal lipid profile values can impair thermoregulation in rabbits, leading to heat stress and reduced productivity (Marai *et al.*, 2007). Impaired lipid metabolism disorders are prevalent in rabbit populations, exacerbating cardiovascular risks (Nobre *et al.*, 2015). Omar, (2020) reported that oregano (*Origanum vulgare*) leaf meal is rich in bioactive compounds and has garnered attention for its potential benefits in animal nutrition. Oregano's antimicrobial, anti-inflammatory, and antioxidant properties make it an attractive feed additive for promoting rabbit health and productivity. It improved lipid profile, mitigating cardiovascular risks and boosting antioxidant defenses (Adekunle *et al.*, 2013). Previous studies have demonstrated the efficacy of herbal supplements in modulating lipid metabolism and antioxidant status in animals (Adekunle *et al.*, 2013; Kivilompolo *et al.*, 2007 and Lai *et al.*, 2014). Therefore, this study seeks to examine the impact of dietary oregano leaf meal supplementation on lipid profile of rabbit's weaners.

MATERIALS AND METHODS

Collection and Preparation of Sample

Table 1 shows the composition of the diets. The oregano leaf was bought from Horticulture section of Kabba College of Agriculture, Division of Agricultural Colleges, Ahmadu Bello University. The leaves were thoroughly screened for debris after which it was air-dried to remove excess moisture. The dried oregano leaves were grinded into a fine powder using a grinder and was kept in air – tight container. Commercial grower diet was used as basal diet and was supplemented with the oregano leaf Meal. The experimental diets were assigned to each of the four (4) treatments groups and fed *ad - libitum*, fresh and clean water was adequately provided daily. The oregano leaf meal was supplemented at 0%, 1%, 2% and 3% and the treatment arrangements were as follows:

Treatment 1 (T1): the basal diet only (control)

Treatment 2 (T2): 1kg basal diet + 1g oregano leaf meal.

Treatment 3 (T3): 1kg basal diet + 2g oregano leaf meal

Treatment 4 (T4): 1kg basal diet + 3g oregano leaf meal.

Table 1: Composition of the Basal Diet

Nutrients	Composition
Crude protein	15%
Fat	5%
Crude fiber	6%
Calcium	1.0%
Available phosphorus	0.4%
Metabolic energy	2600kcal/kg

Experimental Animals and Management

Twenty-four (24) weaner rabbits of both sexes of about 6-8 weeks old were purchased from college of Animal Science, Mando, ABU/ Kaduna. On arrival they were given prophylactic treatment and were acclimatized for one weeks during which they were treated against ecto-parasite using Diasentol and dewormed with Albendazole (2.5% oral suspension) per kg body weight. After acclimatization, they were balanced for both sexes and body weight and randomly allotted to four treatments with three replicates of two rabbits each in a Completely Randomized Design (CRD). The experimental period lasted for 63 days

Blood samples were collected via the marginal ear vein puncture at the end of the experiment from the Animal to analyze for the lipid profile (high density lipoprotein (HDL), low density lipoprotein (LDL), triglycerides and cholesterol) components. The samples were collected in sample bottles without anti-coagulant, the blood was allowed to clot and the serum was collected. The determination of serum levels of cholesterol was carried out using colorimetric enzymatic end point method. Serum triglyceride was analyzed using colorimetric method after enzymatic hydrolysis with lipases. High density lipoprotein (HDL) and cholesterol were determined using precipitant method and glucose was also determined. All these analyses were carried out using standard commercial test kits (RANDOX Laboratories Ltd., Ardmore, Diamond Road, Crumlin, Co. Antrim, United Kingdom), following strictly the instructions provided by the manufacturers. Low density lipoprotein measured in mg/dl, was calculated from the values of total cholesterol, triglycerides and HDL-cholesterol using the formula described by Friedewald *et al.* (1972). $LDL\text{-Cholesterol} = \text{Total Cholesterol} - \text{Triglycerides} / 2.2 - \text{HDL-Cholesterol}$.

Effect of Varying Levels of Oregano Leaf Meal on Lipids Profile of Weaner Rabbits

Effect of varying levels of oregano leaf meal on lipids profile of weaner rabbits were as presented in Table 2. The result indicated that supplementation of oregano leaf meal had no significant ($P > 0.05$) effect on high density lipoprotein (HDL) of rabbits. Low density lipoprotein (LDL) was significantly higher ($P < 0.05$) in rabbits fed the control diets, and least in those fed T4. Triglycerides and total cholesterol (TCHO) concentration were higher ($P < 0.05$) in rabbit fed the control diet and least in those fed T4 which is similar ($P > 0.05$) to those fed T3. The results of this study demonstrated that oregano leaf meal supplementation improves lipid profile parameters in rabbits. The increased HDL reduced LDL, triglycerides and TCHO indicate enhanced lipid metabolism and reduced cardiovascular risk. This observation may be due to the antioxidant nature of oregano. Omar, (2020) reported that antioxidant supplementation regulates the synthesis of fatty acids and promotes the utilisation of HDL for proper transportation of lipids within the body system. This reduction may be due to the ability of oregano leaf meal to stimulate the genes involved in lipid metabolism (Zhang *et al.*, 2001). The consistence reduction in lipids concentration in rabbit may be due to bioactive compounds present in oregano leaf meal, such as carvacrol and thymol, which might have contributed to its lipid-lowering effects by surprising lipid metabolism (Kivilompolo *et al.*, 2023). A decrease in lipid metabolism will result into lower blood lipid concentration in the body of the animal.

Table 2: Lipid Profile Values of Weaner Rabbits Fed the Experimental Diet

Lipid profile Mg/dL	T1	T2	T3	T4	SEM
High density lipoprotein	62.30	63.50	65.50	64.00	1.67
Low density lipoprotein	61.20 ^a	39.00 ^b	37.50 ^b	34.00 ^c	0.95
Triglycerides	85.00 ^a	55.50 ^b	25.00 ^c	24.10 ^c	1.20
Cholesterol	100.80 ^a	61.00 ^b	55.56 ^c	55.52 ^c	2.35

^{a, bc} Means with different superscript letters on the same row differ significantly ($P < 0.05$) T – Treatments and SEM – standard error of mean,

CONCLUSION

It was concluded that supplementing weaners rabbits with Oregano leaf meal enhances the lipids profile with consistent reduction in serum LDL, triglycerides and cholesterol.

RECOMMENDATION

It was recommended that Oregano leaf meal can be used as supplement in the diet of weaners rabbits for improved thermoregulatory and lipids profile at 2g/ kg supplementation in rabbit diet.

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