



Effect of Dietary Growth Promoters on Some Physiological Responses of Growing Rabbits

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Abstract

This study was conducted to investigate the effects of phytogetic additives i.e. turmeric powder, ginger powder, fenugreek seeds powder, dried lemon powder on some physiological responses of growing rabbits. A total of 30, New Zealand White rabbits (NZW) at 5 weeks of age were randomly assigned to five treatments with three replicates. The dietary treatments consisted of 5 groups as follows; the basal diet as control, phytogetic additives groups were supplemented with 0.5% turmeric powder, 0.5% ginger, 1.0% fenugreek seeds and 1.0% dried lemon added to the basal diet. The data revealed that, there were no significant ($P > 0.05$) differences in total erythrocyte count (RBC's), Packed Cell Volume (PCV%), Hemoglobin percentage (Hb%), total protein, albumin, globulin, total cholesterol, glucose among dietary treatments and control. Rabbits fed diets incorporated with 0.5% ginger, 1.0% fenugreek, or 0.5% curcuma showed significant decreased ($p \leq 0.05$) in triglycerides.

Keywords: Rabbits; Physiological Responses; RBC'S

Introduction

Rabbits are hoped to play an important role in solving meat production deficiency particularly in developing countries, because they have several advantages (small body size, high growth rate, high efficiency in converting feed into meat, short gestation period, high prolificacy, relatively low cost of production and high nutritional quality of its meat which includes low fat, sodium and cholesterol levels, [1] that support the increase of its use for human consumption [2]. This requires the increase of the production of livestock to meet the protein demand from the population.

Feed additives represent various classes of molecules, compounds, or organisms that promote ingestion, absorption, assimilation of nutrients, growth, and health. They affect physiological processes, such as immune function, stress resistance, and reproduction. Feed additives include feeding attractants, immunostimulants, prebiotics, probiotics, acidifiers, essential oils, or other inclusions [3].

The aim of this study was to evaluate the consequence of adding some natural feed additives i.e. turmeric, ginger, fenugreek and dried lemon to rabbit diets at the levels of 0.5, 0.5, 1.0, and 1.0% respectively, on some physiological responses.

Materials and Methods

Experimental animals

A total number of 30 males, 5 weeks old growing New Zealand white rabbits were used to study the effect of some natural feed additives on growth performance, some carcass traits and digestibility of nutrients. Rabbits distributed into (5 treatments x 3 replicates x 2 rabbit = 30 rabbits). All rabbits were housed in open house. The rabbits were allocated in a cage with slatted floor of iron. The dimensions of the cage were (45 × 45 × 38cm) for length, width and high, respectively. Feed and water given to the rabbits ad-libitum during the experimental periods.

Experimental Diets

Growing rabbits were distributed to same five dietary treatment groups as their mothers. The first group fed control diet formulated to contain adequate levels of nutrients for growing New Zealand White rabbits as recommended by the National Research Council, [4]. The formulation and chemical composition of control diet is shown in (Table 1). Chemical analysis of ingredients and diets was determined according to [5]. Four additional dietary treatment groups were formulated to contain control diet incorporated with feed supplementation according to the source of addition such as 0.5% curcuma, 0.5% ginger, 1.0% fenugreek and 1.0% dried lemon respectively.

Ingredients	%
Ground yellow corn	54.0
Soya bean meal	20.3
Wheat bran	5.0
Lime stone	0.3
Berseem hay	18.8
Dicalcium phosphate	1.0
Salt	0.3
Premix*	0.3
Total	100
Calculated analyses%	
Crude protein,	17.4
ME (Kcal/ kg)	2561.7
Crude fiber,	7.8
Calcium,	0.68
Available phosphorus,	0.33
Methionine+ cysteine,	0.57
Lysine,	0.85

Table 1: The composition and chemical analysis of control diet of growing New Zealand White rabbits.

*Each 2.5kg of vitamins and minerals mixture contains: 12000.000 IU vitamin A acetate; 2000.000 IU vitamin D3; 10.000 mg vitamin E acetate; 2000 mg vitamin K3; 100 mg vitamin B1; 4000 mg vitamin B2; 1500 mg vitamin B6; 10 mg vitamin B12; 10.000 mg pantothenic acid; 20.000 mg Nicotinic acid ; 1000 mg Folic acid; 50 mg Biotin; 500.000 mg chorine; 10.000 mg Copper; 1000 mg Iodine; 300.000 mg Iron; 55.000 mg Manganese; 55.000 mg Zinc, and 100 gm Selenium.

Heamatological blood parameters

Total erythrocyte count

Total erythrocyte count (RBC's), were performed using a veterinary hematology analyzer (Vet Scan HM5 Haematology System Abaxis Europe, UK).

Hemoglobin percentage (Hb%)

Whole blood hemoglobin concentration (Hb) was performed using a veterinary hematology analyzer (Vet Scan HM5 Hematology System Abaxis Europe, UK).

Packed Cell Volume (PCV%)

Packed Cell Volume was performed using a veterinary hematology analyzer (Vet Scan HM5 Hematology System Abaxis Europe, UK).

Serum biochemical parameters

Total protein concentration (g/dl)

Serum total protein content was determined according to the method of [6] using reagent kits purchased from Biodiagnostic chemical company (Egypt).

Albumin concentration (g/dl)

Serum albumin concentration was determined according to the method of [7] using reagent kits purchased from Biodiagnostic chemical company (Egypt).

Globulin concentration (g/dl)

Serum globulin concentration was calculated using the following equations:

$$\text{Globulin (g/dl)} = \text{Total proteins (g/dl)} - \text{Albumin (g/dl)}$$

Serum triglycerides (mg/dl)

Serum triglycerides were determined according to [8] using reagent kits purchased from Biodiagnostic chemical company (Egypt).

Total cholesterol (mg/dl)

Serum cholesterol was determined according to [9] using reagent kits purchased from Biodiagnostic chemical company (Egypt).

Glucose concentration (mg/dl)

Serum glucose concentration was determined according to the method of [10] using reagent kits purchased from Biodiagnostic chemical company (Egypt).

Statistical analysis

Data were summarized using Microsoft® Excel 2010 (10.2614.2625) Microsoft Egypt. The general liner model (GLM) was applied to test the differences among the five experimental groups. P-values less than 0.05 were considered to be statistically significant [11]. The statistical analysis was calculated using the following equation:

$$Y_{ij} = \mu + T_i + E_{ij}$$

Where:

Y_{ij} = Experiment observations.

μ = The overall mean.

T_i = The effect of dietary treatment.

i = T1, ----- T5.

E_{ij} = The experimental error.

Duncan's test was used to examine the significance degrees among means [12].

Results and Discussion

Hematological parameters

Averages of RBC's count, Hb.% and PCV% of New Zealand White rabbits fed different diet supplemented with 0.5% curcuma, 0.5% ginger, 1.0% fenugreek and 1.0 dried lemon are presented in (Table 2). No significant ($P > 0.05$) difference was detected among all dietary treatments on RBC's count, Hb% and PCV%. Whereas, rabbits fed dietary ginger recorded slightly higher values ($P > 0.05$) in the previous items compared with other dietary treatments.

Treatment	Hematological responses		
	RBC's $10^6/\mu^l$	Hb. %	PCV%
Control	6.19	12.90	41.92
Curcuma, 0.5%	5.82	12.63	38.38
Ginger, 0.5%	7.16	13.33	44.54
Fenugreek, 1.0%	6.37	11.87	38.82
Lemon, 1.0%	6.64	12.40	43.69
±SE	0.30	0.56	2.46
Sig.	NS	NS	NS

Table 2: Effect of natural feed additives on hematological parameters.

SE: - standard error (\pm). NS: - Not significant ($P > 0.05$).

Spice as an additive in the diet of chickens is very common. Active principles of the plant or plant chemicals present in certain parts of the plant or the effect of the rape tic activity that accompanies them [13]. In this study, the apparent improvement of dietary ginger powder could be due to their antioxidant and antimicrobial properties [14,15]. Hence, ginger could play an important role in rabbit feeding strategy. Moreover, important compound in ginger, gingerol, ginger diol and ginerdione had the ability to stimulate the digestive enzymes, the impact on microbial activity [16] in broiler. Reported that various medical properties of ginger (such as showing pain) analgesic, antiemetic, antiulcer (febrifuge) antipyretic and Cardiac relaxing. [17-19] and reduced anti oxidation free harm, increased reuse and improve the health and production of animals.

The previous results are in line of the finding of [20] and [21] who observed the infusion of ginger root powder in broiler chick was not significantly affecting the blood parameters with respect to hemoglobin concentration, RBC and Packed cell volume percentage. However. [22] found an increasing in packed cell volume and hemoglobin concentration in broiler chickens provided with ginger root powder.

Biochemical blood parameters

Data of blood biochemical studied such as total protein, albumin, globulin, glucose, triglycerides and cholesterol for dietary treatments are presented in (Table 3). The results revealed that there was a significant difference in triglycerides among all dietary treatments. Rabbits fed diets incorporated with 0.5% ginger, 1.0% fenugreek, or 0.5% curcuma showed significant decreased ($p \leq 0.05$) in triglycerides. However, no significant difference ($P > 0.05$) was detected in total protein, albumin, globulin, glucose and cholesterol among all dietary treatments.

The reduction of lipids profile triglycerides (TG) may be due to that curcumin enhances bile production and hence lipid digestion [23].

The previous results are parallel with the finding of [24] found that male rabbits fed 2% ginger powder showed significant decreased in triglycerides. Moreover, [25] showed significant ($P \leq 0.05$) decrease in serum triglycerides level when rabbits fed on diet contain 0.0, 0.5 and 1 gram of fenugreek compared to the control group. Also, [26] demonstrated that, triglycerides were statistically decreased with increasing turmeric levels to 7 g/kg diet in broilers.

Treatment	Total protein (g/dl)	Albumin (g/dl)	Globulin (g/dl)	Glucose (mg/dl)	Triglycerides (mg/dl)	Total cholesterol (mg/dl)
Control	5.51	2.76	2.75	103.75	168.58 ^a	190.17
Curcuma, 0.5%	5.46	2.88	2.58	104.85	156.89 ^{abc}	210.88
Ginger, 0.5%	5.60	2.96	2.64	101.09	146.41 ^c	212.57
Fenugreek, 1.0%	5.68	2.75	2.93	99.54	150.52 ^c	206.50
Lemon, 1.0%	5.78	2.92	2.68	103.68	163.92 ^{ab}	210.93
±SE	0.11	0.10	0.16	2.38	5.00	7.71
Sig.	NS	NS	NS	NS	*	NS

Table 3: Effect of natural feed additives on some biochemical parameters.

[27] Established that cholesterol due to the dietary of broilers rabbits inclusion of turmeric powder rhizome supplementation at 0, 0.15 and 0.30 percent did not show significant difference among the treatment groups.

Also, [28] reported that, supplementation of ginger at the rate of 2 g, 4 g and 6 g/kg did not affect total cholesterol in the serum of broiler chickens. In addition, [29] found that, serum cholesterol level were not significantly ($p > 0.05$) altered by dietary fenugreek. Likewise, [30] revealed that there were no statistically significant differences in terms of total cholesterol, after feeding growing rabbits dried citrus pulp. Likewise, [31] revealed that, there were no statistically significant differences in terms of blood serum cholesterol, after the groups were fed according to the diets as 0.5% sumac, 0.5% turmeric, and 0.25% sumac + 0.25% turmeric in the diet of laying hens.

Ethics statement

In this study, the animal care and use procedures were approved by the Department of Animal and Poultry Production, Faculty of Agriculture, Minia University, Egypt. Animal care and maintenance were following the guidelines of the Egyptian Research Ethics Committee and the instructions contained in the Guide for the Care and Use of Laboratory Animals (2011).

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