

Effect of Use Different Levels of Caraway (*Carum carvi* L) Powder on Performance, Some Blood Parameters and Intestinal Morphology on Broiler Chicks

¹Y. Khajeali, ¹F. Kheiri, ²Y. Rahimian, ¹M. Faghani and ³A.N amjo

¹Departemant of Animal Science, Islamic Azad University, Shahrekord branch, Shahrekord, Iran

²Departemant of Animal Science, Islamic Azad University, Khorasgan branch, Isfahan, Iran

³Departemant of Veterinary, Islamic Azad University, Shahrekord branch, Shahrekord, Iran

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Abstract: For determine effect of use different levels of caraway powder on performance of broiler chickens a total 240 one day broilers chicks (Ross 308) were divided into 4 groups of 15 birds each and assigned to 4 treatment diets. Chicks were fed by basal diet with control diet and 1(T₁), 1.5(T₂) and 2(T₃) percentage added caraway. At the end of experiment 2 birds form each group were slaughtered and some parameters such as feed intake (FI), body weight gain (BW) and feed conversion ratio (FCR) were determined. Data showed that use caraway caused decrease FCR with increasing BW. Although the use of *Caraway* was reduced abdominal fat but statistically significant effects in terms were not observed. Drumstick percentage was increase were broilers fed with T₁, T₂, T₃ (p<0.05). Breast meat percentage was higher than others for T₃ but there were no significant effects about breast meat percentage between treatments. Some blood factor such as triglyceride, calcium and phosphorus changed with use experimental diets Amount of triglyceride was lower when chicks used T₃ diets. in this case increasing of use *Caraway* in the broilers diet cause to significant decrease blood triglyceride content of broilers chicks (p<0.05). blood calcium increased when chicks used T₁, T₂, T₃ respectively and amount of Phosphorus was lowest when chicks used T₂ diet (p<0.05). Bed moisture percentage was increasing none significantly when increasing addition of *Caraway* on broilers diets. Antibody titers against New Castle Vaccine were measured and showed that antibody titers were significantly higher when broilers fed with higher content of *Caraway* (p<0.05). Small intestine mucosa and sub mucosa diameters were significantly increased by T₁, T₂, T₃ diets (p<0.05). Musclaris and serosa parts diameter were higher in T₂ than others and use of *Caraway* in broilers diets cause increase total diameter of small intestine parts (p<0.05). It seems use of *Caraway* in broilers' diets can be benefits for increase performance of them.

Abbreviations: FI: Feed intake, BW: Body weight, FCR: Feed conversion ratio, T₁, basal diet with 1% added caraway, T₂, basal diet with 1.5% added caraway, T₃, basal diet with 2% added caraway

Key words: Caraway • Performance • Broilers • Blood parameters • Intestinal morphology

INTRODUCTION

Today one of the methods for increase in productive of broilers is append medical plants to poultry diets as a nutritional and medical sources [1]. *Carum carvi* L. (*Bunium persicum*) commonly known as *Caraway* (*Umbelliferae*) is a globally distributed spice with a history as a medicinal plant since ancient times [2]. *Carum carvi* L. is biennial herb, widely cultivated in west Asia, Europe and North America. Caraway is grown for its content of essential oils that are present in the whole plant, but their concentration is highest in achenes [3].

There approximately 30 compounds contained in this plant while carvone and limonene account for about 95% of them. Seeds contain trace amounts of other compounds such as (acetaldehyde, furfural, carveole, pinene, thujone, camphene, phellandrene, etc). The main constituents of *Carum Carvi* are the volatile oils including carvone (40-60)%, limonene, carveol, dihydrocarveol and thymol in addition to glycosides and flavanoids Experimental studies have shown its anti dyspeptic antispasmodic anti ulcerogenic, anti bacterial, anti tumor, anti proliferative, antioxidant ant hyperglycemic, anti hyperlipidaemic and diuretic activities[4]. The dried ripe fruits of the plant are

used in folk medicine especially in the treatment of digestive disorders[4]. Studies on *Carum carvi L* against the pathogenesis of gastric lesions became important with the discovery of its antioxidant activity. Some reports found about inhibit superoxide radicals, lipid peroxides and hydroxyl radicals. In addition terpenes including carvones and limonene are known to induce the detoxifying enzyme glutathione S-transferase in some mice target tissues [4-5]. Flavonoides, including quercetin and kaempferol has been known to possess antioxidant and antiulcer activities [5-6]. many reports indicated antimicrobial effect of cumin essential oils. It seems inclusion the broilers diets with *Caraway* induce and increase in the relative weight of the crop [5- 6]. Many researchers proved an increase in BW and decrease in FCR, when using cumin in diets as mentioned above it has become clear that there is a quite bite of benefits of caraway as a medical and nutritional resource to be used for poultry. This study was for understanding that this medical plant can improve the performance of broiler chicks.

MATERIALS AND METHODS

For determine the effect of use *Caraway* on performance of broiler chickens a total 240 one day broilers chicks (Ross 308) were divided into 4 groups of 15 birds each and assigned to 4 treatment diets. The experiment was carried out in 42 days. Each treatments group was fed on a starter diets. *Caraway* seeds purchased from local market and grounded separately to a fine powder and then mixed with the basal diet (Table 2). Feed and fresh water were provide *ad libitum* during this experiment. Caraway sample was analyzed in the lab for determine amount of Moisture, Crude protein, Calcium, Phosphorus and its Crude fiber with AOAC method (Table 1) [7].

Treatments were Control (contain control group, basal diet with no added caraway), T₁ (basal diet with 1% added caraway), T₂ (basal diet with 1.5% added caraway), T₃ (basal diet with 2% added caraway) that they were balanced according to their requirement as shown in NRC for poultry [8]. In the trial duration average body weight, body weight gain, feed conversation rations for each treatments were recorded. At the end of experimental

Table 1: Chemical composition of *Caraway* that used in this experiment

Compounds	DM (%)	CP (%)	EE (%)	CF (%)	Ca (%)	P (%)	Fat (%)	Ash (%)
<i>Carum carvi L</i> (<i>Caraway</i>)	62	17.6	15.6	8	1.14	0.62	18	7

Table 2: Composition of the basal diets in different periods of this experiment

Ingredients %	0-14 (days old)	15-29 (days old)	29-42 (days old)
Corn grain	51.64	56.61	60.37
Soybean meal	37.74	32.30	27.81
Wheat grain	5	5	5
Oil	1.40	2.03	2.84
Dical.phosphate	1.56	1.47	1.39
Oyster shells	1.17	1.13	1.08
Methionine D-L	0.30	0.29	0.27
L-lysine	0.13	0.13	0.30
Nacl	0.26	0.24	0.14
Vit+Min Premix*	0.6	0.6	0.6
Sodium bicarbonate	0.1	0.1	0.1
Coccidiostat	0.1	0.1	0.1
Calculated nutrient content			
ME(Kcal/Kgr)	2.850	2.950	3.050
CP (%)	22	20	18.5
Ca (%)	0.90	0.85	0.80
Available Phosphorus (%)	0.45	0.42	0.40
Lysine (%)	1.35	1.20	1.16
Na (%)	0.16	0.15	0.15
Methionine+Cystine (%)	0.97	0.87	0.85

Supplied Per Kilogram Of Feed: 7,500 IU of vitamin A, 2000IU vitamin D3, 30 Mg vitamin E, 1.5 µg vitamin B12, 2Mg B6, 5 Mg Vitamin K, 5 Mg vitamin B2, 1 Mg vitamin B1, 40 Mg nicotinic acid, 160µg vitamin Biotine, 12 Mg Calcium pantothenate, 1MgFolic acide 20 Mg Fe, 71 Mg Mn, 100µg Se, 37Mg Zn, 6 Mg Cu, 1.14 Mg I, 400 µg Cu.

plan 2 birds from each groups (totally 32 birds) were slaughtered and to compare body parts were separated and weighed. Blood samples from each bird were collected for determine their triglyceride with Ellefson and Graway 1967 analysis methods [9]. Some blood samples were collected and antibody titers against New Castle Vaccine Were measured by Haemagglutination inhibition test (HI).finally samples from small intestine tissue for determination intestinal morphology were collected. Then data were collected and analyzed by using the General, Linear model procedure of SAS (2001) and different means Duncans multiple ranges test was used to detect the differences at level ($p < 0.05$). [10-11]. The statically model of this experiment was: $Y_{ij} = \mu + T_i + e_{ij}$ (Y_{ij} = average effect, μ = total average, T_i = Effect of treatments, e_{ij} = Effect of errors).

RESULT AND DISCUSSION

Data for feed intake, broiler weight and FCR are in (Table 3). This data showed no significant difference about Feed intake in trial groups. Chicks were fed with T_2 diet was higher BW among others groups. This improvement may be attributing to the biological function of *Caraway* that is essential for growth [1-4-12]. for describes depression on body weight in T_4 group some Scientific evidence demonstrated that many of herbal plants do have medicinal properties that alleviate symptom and may prevent diseases and also high use of them may cause poisoning due to its strong bitter test and reduce feed intake in T_1, T_2, T_3 groups. Improvement on BW in T_1, T_2 lead to lower FCR in these groups and in T_1 was lower than others groups ($p < 0.05$). In spite of the low consumption compared with others. The fact that is helping some herbal plant cause provides some compounds that enhance digestion and absorption of some nutrients in these diets. Other researchers proved that there is an increase in BW, FCR with decreasing hematological values of some important blood parameters using 2% of cumin in broiler diets [1-2].

Table 3: The effect of added (*Caraway*) to the diets on broilers performance

Treatments	FI(Kg)	BW(Kg)	FCR
Control	4.95 ^{a*}	2.64 ^b	1.87 ^a
T_1	4.93 ^a	2.87 ^a	1.71 ^b
T_2	4.91 ^a	2.85 ^a	1.72 ^b
T_3	4.86 ^a	2.64 ^b	1.84 ^{ab}
MSE	.0081	.014	.0076

*Means within row with no common on letter are significantly different ($p < 0.05$).

Data from this study showed intestine percentage was significantly decrease were broilers fed with T_1, T_2, T_3 and the lowest decrease was for T_1 ($p < 0.05$). There were no significant differences in percentage for liver. In some experiments, the administration of cumin and coriander it showed significant decrease in bilirubin level [12]. Although the use of *Caraway* was reduced abdominal fat but statistically significant effects in terms were not observed. Drumstick percentage was increase were broilers fed with T_1, T_2, T_3 ($p < 0.05$). Breast meat percentage was higher than others for T_3 but there were no significant effects about breast meat percentage between treatments. Data from table 4 showed percentage of gizzard was higher in the control groups and it was at the lowest in T_2 groups ($p < 0.05$). Weight percent Bursal.F was higher in control group and the spleen was too. *Caraway* has many unsaturated fatty acids such as myristic acid, palmitic acid, palmitoleic acid, stearic acid, oleic acid, linoleic acid (omega-6), linolenic acid (omega-3) and arachidonic acid that to be effective on saturated fat metabolism in the body [13,14].

Data from this study that showed the triglyceride, calcium and phosphorus changed with use experimental diets (Table 5). Amount of triglyceride was lower when chicks used T_3 diets. in this case increasing of use *Caraway* in the broilers diet cause to significant decrease blood triglyceride content of broilers chicks ($p < 0.05$). blood calcium increased when chicks used T_1, T_2, T_3 respectively and amount of Phosphorus was lowest when chicks used T_2 diet ($p < 0.05$).

Table 4: The effect of added (*Caraway*) to the diets on percentage some part of chicks' body

Treatments	Intestine (%)	Liver (%)	Abdominal Fat (%)	Drumstick (%)	Breast Meat (%)	Gizzard (%)	Bursal.F (%)	Spleen (%)
Control	5.94 ^{a*}	1.80 ^a	1.54 ^a	21.24 ^b	25.21 ^a	3.33 ^a	0.20 ^a	0.124 ^a
T_1	4.19 ^b	1.89 ^a	1.21 ^a	23.6 ^a	25.13 ^a	3.21 ^a	0.18 ^a	0.093 ^b
T_2	4.84 ^b	1.79 ^a	1.18 ^a	23.14 ^a	26.16 ^a	2.99 ^b	0.17 ^a	0.077 ^b
T_3	5.18 ^b	1.80 ^a	1.14 ^a	23.05 ^a	25.90 ^a	3.19 ^a	0.17 ^a	0.111 ^a
MSE	0.194	0.009	0.054	0.451	1.67	0.014	0.194	0.008

*Means within row with no common on letter are significantly different ($p < 0.05$).

Table 5: The effect of added (*Caraway*) to the diets on some blood parameters

Treatments	Triglyceride(Mg/dl)	Ca(Mg/dl)	P(Mg/dl)
Control	95.33 ^{a*}	10.15 ^a	7.42 ^a
T ₁	80.68 ^b	10.15 ^b	6.54 ^c
T ₂	59.00 ^c	10.27 ^a	7.00 ^b
T ₃	45.66 ^d	10.30 ^a	7.27 ^a
MSE	52.16	0.0045	0.015

*Means within row with no common on letter are significantly different (p<0.05).

Table 6: The effect of added (*Caraway*) to the diets on Bed Moisture and HI test

Treatments	Bed Moisture (%)	HI (log ²)
Control	18.76 ^{a*}	4.55 ^d
T ₁	18.81 ^a	4.69 ^c
T ₂	19.01 ^a	4.78 ^b
T ₃	19.13 ^a	4.91 ^a
MSE	3.69	0.0016

*Means within row with no common on letter are significantly different (p<0.05).

Table 7: The effect of added (*Caraway*) to the diets on Small Intestinal Morphology

Treatments	Mucosa,			Total (micron)
	Sub Mucosa	Musclaris	Serosa	
Control	112.7 ^c	12.17 ^d	7.2 ^c	132 ^c
T ₁	113.2 ^c	12.5 ^c	7.4 ^c	133 ^c
T ₂	146.2 ^a	14.02 ^a	8.1 ^a	168 ^a
T ₃	139.1 ^b	12.9 ^b	8 ^b	160 ^b
MSE	12.85	.037	.017	13.50

*Means within row with no common on letter are significantly different (p<0.05).

The decrease in the level of cholesterol and triglyceride on T₁,T₂,T₃ in comparison with control group is expected to be due to the active compound that found in *Cumin* and *Caraway* with acts as inhibitors to the active enzyme hepatic 3-hydroxyl-3-methylglutaryl coenzyme A that synthesized the cholesterol [5]. In addition this reduction in blood cholesterol could be contributed in some cases to the reduction in some hormones secreted by the cortex of adrenal glands, which in turn causes the reduction in the secretion of fatty acids from adipose tissues or the reduction of fat oxidation that lead to the reduction of level of fatty acids including cholesterol and triglyceride [12].

Data from (Table 6) showed bed moisture was increasing none significantly when increasing addition of *Caraway* on broilers diets. This is may be due to the amount of protein in *Caraway* that it needs more water is

excreted from the body [12-13]. Antibody titers against New Castle Vaccine were measured and data from this test showed that antibody titers were significantly higher when broilers fed with higher content of *Caraway* (p<0.05). Furthermore some studies that showed *Caraway* has diuretic activity and use of it can lead to withdrawal of more water from the body. *Cumin* is a one popular spice that regularly used as a flavoring agent and an alternative antimicrobial agent that is safe for human applications [14-15-16].studies on *Caraway* against the pathogenesis of gastric lesions became important with the discovery of its antioxidant activity, In one of the earlier reports, it is found to inhibit superoxide radicals, lipid peroxides and hydroxyl radicals [4].Carvone, the main constituent of *Carum carvi L* has many applications as fragrance and flavor,antimicrobial agent, along with its relevancy in the medical field [17-18].The appropriate amount of cuminaldehyde can explain the antibacterial effects for *Carum carvi L*. *Caraway* is richness in polyunsaturated fatty acids, which help to produce prostaglandin E1. Prostaglandin E1 has so many functions such as in relation to the immune system. In addition (α pinene) and (sabinene) in *Caraway* has antibacterial effects [19-20].

As result was relevant (Table 7) small intestine mucosa and sub mucosa diameters were significantly increased when we applied T₁,T₂,T₃ diets for them (p<0.05). Musclaris and serosa parts diameter were higher in T₂ than others. Data from this study showed use of *Caraway* in broilers diets cause increase total diameter of small intestine parts (p<0.05).

CONCLUSION

We could be explained by the facts that *Caraway* can benefit acts on performance and quality of meat for broilers chicks. This improvement may be due to the biological functions of *Caraway* to improve growth or that may be due to its role as stimulant, carminative, enhanced digestibility, anti-microbial properties and the prevention of gastric toxicity. Further tests are needed to explore and more detail explanation.

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