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EFFECT OF DIFFERENT LEVELS OF CARDAMOM OIL IN DIET ON SOME PRODUCTIVE TRAITS OF LAYER HENS

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Abstract

This experiment was conducted in the laying hens field, the Agricultural Research and Experiments Station, College of Agriculture, Al-Muthanna University, from 6/12/2019 to 28/2/2020 (12 weeks). A total of 84 ISA Brown hens, 21 weeks age, distributed to four treatments, spread at four pens (3 x 3 m), the pen was divided into three equal sections, each section contains 7 laying hens (21 laying hens per treatment), the treatments were as follows T_1 (control treatment): the diet was given without additives, T_2: added 5 ml cardamom oil per 100 kg of diet, T_3: added 10 ml cardamom oil per 100 kg of diet and T_4: add 15 ml cardamom oil per 100 kg of diet. The results show that indicate that all treatments of cardamom oil to the laying hens diet, it was significantly improved (Pd"0.05) on the weekly egg production ratio, egg weight and feed conversion compared to the control treatment, the addition level of 10 ml / 100 kg of diet gave the best results, as a significantly compared to all treatments for adding cardamom oil (5 and 15 ml for every 100 kg of diet).

Key words : cardamom oil, productive traits, layer hen.

Introduction

Poultry farming occupies a distinguished place in animal production, one of the nutritional sources rich in protein and essential security acids, fast economic return and short economic cycle (Johnson, 2019). The production was accompanied by many problems as well as diseases, because of bacterial and viral pathogens, resulting in random use of medicines and antibiotics (Kabir, 2009). As a result, there has been a trend in recent years among researchers and scientists to use medicinal plants instead of chemically manufactured drugs (Dhama *et al.,* 2015). Attention has been paid to medicinal plants recently, as they contain active compounds of medicinal importance, it has no side effects, many medicinal plants improving the productive characteristics of poultry, the medicinal plants were eucalyptus leaves (Al Salman and Al-Gharawi, 2019), melissa leaves (Al-Ramahi *et al.,* 2019) and parsley leaves (Al-Musawi *et al.,* 2019). One of these medicinal plants is the cardamom scientific name *Elettaria cardamomum*, belongs to the Zingiberaceae family, used after being dried, consists of an external seed carrier containing inside it are small brown seeds, characterized by its fragrant aroma and sweet and sour taste, two types of black cardamom and green cardamom are more used (Vijayan *et al.,* 2018). Cardamom oil is three esters of fatty acids and cholesterol (triple killsurides) and less dense than water, used in therapies for containing substances such as phenols and dehydrates (Zhang *et al.,* 2018). Cardamom oil was used in broiler diets as a stimulant instead of antibiotic (Hamed, 2018). The importance of cardamom oil This study aimed to know the effect of adding different levels of cardamom oil to diet on some productive traits of laying hens (Isa Brown).

Materials and Methods

Design the experiment

This experiment was conducted in the laying hens field, the Agricultural Research and Experiments Station, College of Agriculture, Al-Muthanna University, from 6/12/2019 to 28/2/2020 (12 weeks). A total of 84 ISA Brown hens, 21 weeks age, distributed to four treatments, spread at four pens (3 × 3 m), the pen was divided into three equal sections, each section contains 7 laying hens (21

laying hens per treatment), the treatments were as follows T_1 (control treatment): the diet was given without additives, T_2: added 5 ml cardamom oil per 100 kg of diet, T_3: added 10 ml cardamom oil per 100 kg of diet and T_4: add 15 ml cardamom oil per 100 kg of diet.

Studied traits

Egg Production Percent

Eggs were collected at two o'clock throughout the experiment, the egg production ratio for each hen was calculated on the basis of the number of chickens present at the end of each period for each treatment (Hen Day Production), for three times, the following formula (North, 1984):

$$\text{Egg production percent} = \frac{\text{Egg production}}{\text{hen number}} \times 100$$

Egg Weight

Eggs were weighed weekly and collectively for each of the treatments repeat, by a balance Type Muttler 2000 was sensitive to the nearest gram, the average egg weight was extracted during each trial period.

Feed Conversion Coefficient

The feed conversion factor was calculated by the following formula (North, 1984):

$$\text{Feed Conversion Coefficient} = \frac{\text{Feed Consumption}}{\text{Egg mass}}$$

$$\text{Egg mass} = \frac{\text{Egg production percent}}{100} \times \text{Egg weight mean}$$

Statistical analysis

Completely Randomized Design (CRD) was used to study the effect of different treatments on the studied traits, comparison of the mean differences between the means of the Duncan (1955) multiples test under a significant level of 0.05 and 0.01, SAS (2001) was used in statistical analysis.

Results and discussions

Egg Production Percent

Table 1 shows the effect of different levels of cardamom oil in laying hens on the daily egg production percentage (H.D%), at the 22nd week of the age of birds there was no significant difference between all treatments. At week 28 of bird age, T_3 was significantly superior ($P \leq 0.05$) compare with T_4 treatment significantly superior ($P \leq 0.05$) compare with the control treatment. No significant differences were observed between T_2 and T_3, and T_2 and at the same mentioned ages. At the last week of trial (32 weeks), the T_2 and T_3 were significantly increased ($P \leq 0.05$) at the expense of the significantly superior T_4 treatment ($P \leq 0.05$) compared to the control treatment, no significant differences were observed between T_2 and T_3 at the same age. In the cumulative egg production ratio during the trial period, it is noted that the treatment T_3 significantly outperformed ($P \leq 0.05$) at the expense of the T_4 treatment, which significantly outperformed ($P \leq 0.05$) at the expense of the control treatment, no significant differences were observed between T_2 and T_3, and T_2 and T_4. The cumulative egg production rate during the trial period was 71.99, 75.04, 75.88 and 74.34% for T_1, T_2, T_3 and T_4 coefficients respectively.

The results indicate that all treatments for adding cardamom oil to the laying hens diet have significantly improved the weekly egg production rate compared to the control treatment, the addition level of 1 ml / kg of diet gave the best results, in a significant way, compared to all treatments for adding cardamom oil (0.5 and 1.5 ml for each kg of diet), the reason for the improvement of egg production in the addition of cardamom seed oil may be due to the essential oils, which may be involved in the synthesis of proclandines, contributes to the regulation of the release of many hormones from the pituitary gland, including the ovulation hormone (LH), an important role in the ovulation process, as well as the follicle-stimulating hormone (FSH). Or may contribute to the synthesis of steroid hormones (estrogen, progesterone and androgen) by increasing the activity of some enzymes that have a role in the pathogenesis of sexual steroids, cause a change in the activity of cloning factors controlling the genetic expression of these enzymes and then increase their activity in the cell, thus improving the biosynthesis activity of sexual steroids in the ovary (Ding *et al.,* 2017).

Egg Weight

Table 2 shows the effect of different levels of cardamom seed oil on laying hens on a weekly egg weight (g), there were no significant differences in the average egg weight during the 22nd week of the birds life, at 28 and 32 weeks of age the treatment T_3 significantly increased ($P \leq 0.05$) compared to the control treatment, at the same age, no significant differences were observed between all treatments for adding cardamom seed oil and between T_1, T_2 and T_4, likewise, the same result in the cumulative egg weight, the average egg weight during the trial period was 55.96, 57.28, 57.99 and 56.93 g for T_1, T_2, T_3 and T_4 treatments, respectively.

All the addition of cardamom oil resulted in a

Table 1: The effect of different levels of cardamom oil in laying hens on weekly egg production H.D% (mean ± standard error).

Treatments	Age (weeks)			Total
	22	28	32	
T_1	0.83±45.97	0.68±82.45c	0.64±84.91c	0.26±71.99c
T_2	0.37±46.12	0.42±86.17ab	0.26±89.69a	0.34±75.04ab
T_3	0.94±46.31	0.51±87.45a	0.27±90.22a	0.39±75.88a
T_4	0.86±45.84	0.34±85.53b	0.23±87.93b	0.14±74.34b
Sig.	N.S	0.05	0.05	0.05

T_1 (control treatment): the diet was given without additives, T_2: added 5 ml cardamom oil per 100 kg of diet, T_3: added 10 ml cardamom oil per 100 kg of diet and T_4: add 15 ml cardamom oil per 100 kg of diet. N.S no significant differences.*The different letters within the same column indicate significant differences between the totals at the probability level of 0.05.

Table 2: The effect of different levels of cardamom oil in laying hens on weekly egg weight (g) (mean ± standard error).

Treatments	Age (weeks)			Total
	22	28	32	
T_1	0.58±47.38	0.60±59.23b	0.63±60.90b	0.55±55.96b
T_2	0.82±47.55	0.42±61.09ab	0.40±62.14ab	0.45±57.28ab
T_3	0.90±47.65	0.86±62.14a	0.57±63.24a	0.71±57.99a
T_4	0.59±47.43	0.36±60.61ab	0.42±61.68ab	0.21±56.93ab
Sig.	N.S	0.05	0.05	0.05

T_1 (control treatment): the diet was given without additives, T_2: added 5 ml cardamom oil per 100 kg of diet, T_3: added 10 ml cardamom oil per 100 kg of diet and T_4: add 15 ml cardamom oil per 100 kg of diet. N.S no significant differences.*The different letters within the same column indicate significant differences between the totals at the probability level of 0.05.

Table 3: The effect of different levels of cardamom oil in laying hens on weekly feed conversion(g diet/ g egg mass)(mean ± standard error).

Treatments	Age (weeks)			Total
	22	28	32	
T_1	0.16±5.28	0.04±2.35b	0.03±2.22c	0.04±2.80b
T_2	0.09±5.24	0.01±2.18a	0.01±2.06ab	0.02±2.61a
T_3	0.19±5.22	0.04±2.11a	0.01±2.01a	0.04±2.55a
T_4	0.15±5.29	0.01±2.21a	0.01±2.12b	0.01±2.66a
Sig.	N.S	0.05	0.05	0.05

T_1 (control treatment): the diet was given without additives, T_2: added 5 ml cardamom oil per 100 kg of diet, T_3: added 10 ml cardamom oil per 100 kg of diet and T_4: add 15 ml cardamom oil per 100 kg of diet. N.S no significant differences.*The different letters within the same column indicate significant differences between the totals at the probability level of 0.05.

significant increase in the average egg weight produced compared to the control treatment, T_3 gave the best egg weight compared to other treatments, the reason for improving egg weight may be significant for essential oils in cardamom oil, containing flavonoids that inhibit the formation of aflatoxins, improving the digestibility factor of the food eaten by the bird which improves the egg weight (Ozek, 2012), there was a positive correlation between estrogen concentration in the blood plasma and between concentrations of neutral fats, fat proteins, free fatty acids and protein in the blood plasma, it also showed the concentration of estrogen in bird blood plasma, egg production ratio, and egg weight produced (Novero *et al.,* 1991).

Feed Conversion Coefficient

Table 3 indicates the effect of different levels of cardamom oil added to the laying hens diet on the average feed conversion factor (feed g / egg egg), there were no significant differences between all treatments in the week 22 weeks of the birds 'life, as for the 28th week of birds, a significant improvement was observed ($P \leq 0.05$) in the feed conversion factor in all treatments for adding cardamom oil compared to the control treatment, at the same age, the treatments of adding cardamom oil were not significantly different. At week 32 of the age of the laying hens, T_3 improved significantly ($P \leq 0.05$) compared to the T_4, which showed a significant improvement ($P \leq 0.05$) compared to the control treatment, T_2 and T_3 on the one hand, and T_2 and T_4 on the other, were not significantly different.The coefficient of feed conversion for the treatments was 2.80, 2.61, 2.55 and 2.66 g feed / g egg.

The addition of cardamom oil at the rate of 1 ml per kg of feed has significantly improved the conversion factor, it is mainly the result of a significant increase in both the percentage of egg production and the average weight of eggs produced. Langhout *et al*., (1999) indicated that vegetable oils extracted from aromatic seeds have an effective effect in improving the level of apparent digestibility of the ileal and alimentary canal in general, increasing the efficacy of Pancreatic lipase and amylase, which improved the ability to digest starch and fats, reflected in improving the conversion factor of food by increasing the ratio of egg production and weight, extracted oils, including cardamom oil, have an adverse effect and inhibitory pathogenic microorganisms, which increases the beneficial microorganisms at the expense of harmful bacteria, stimulates increased secretion of digestive enzymes that increase the efficiency of food intake, as oils have a positive effect on digestive enzymes, increased absorption and thus improved feed conversion factor (Zeng *et al*., 2015).

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