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Effect of fennel seed powder (Foniculum Vulgare) on antioxidant enzymes and histlogical of small intestin (jujenum) of broiler chickens.

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Abstract

This research was investigate the effects of *Foeniculum Vulgare* (F.V) powder on antioxidant enzyams, , height of the villus to the depth of the villi in the jejunum region of grill chicks. A sum of 144 one-day old chicks (Ross 308)were used in the experiment and randomly distributed into twelve cages (12 birds / cage). It was contained four treatments (T1: regular feed without any addition, T2: regular feed supplemented with 10 gm of F.V powder / kg of ration, T3: regular feed with 15 gm of F.V powder/kg of ration and T4: regular feed with 20 gm of F.V powder/kg of ration. Results showed The effect of F.Vulgare adding on the activity of some liver enzymes in the blood serum of broilers that there are significant differences ($P<0.05$) between the treatments. as it showed a significant increase in the activity enzyme (SOD ,GPX).

The effectiveness of malondihyde acid (MDA) in blood serum was measured, as the results of the table show that there is a significant decrease ($P<0.05$) in the effectiveness of acid (MDA) in blood serum for the addition treatments .And the villus height, villus depth, and the ratio of villus height to villus depth in the jejunum of broilers indicates a highly significant superiority ($P<0.05$) in villus height, villus depth, and the ratio between villus height to villus depth for the jejunum area for the treatments to which fennel was added compared to the treatment .

Keywords

Foeniculum Vulgare seed powder, Broilers,antioxidant , height of the villus to the depth of the villi, jejunum region.

I. INTRODUCTION

Human beings have utilized plants thousands of years, especially herbs, for medical purposes, and some of these plants are thought to have a significant impact on maintaining animal health (Kăcániová *et al*., 2019). Herbal additives have been the subject of numerous research due to their various benefits, minimal expense, simple accessibility, and absence of lingering impacts, and nonappearance of worries in regards to the utilization of anti-infection agents (Saeedi et al., 2017). Plants containing bioactive components have been added to animal and poultry feed, and the results have been useful. These supplements can boost growth and performance, in addition to the culmination of feed effectiveness, supplement absorption, cancer prevention agent status, immunological records, and poultry prosperity (Dhama et al., 2015; Alagawany et al., 2019). One of these aromatic herbs, fennel (Foeniculum vulgaris L.) has a high proportion of stearic and linolenic acids, with 16.81% trans-anethol pulse and 47.20% estragole. (Mehra et al 2021). Medicinal herbs and fennel have been used as health enhancers due to their high content of antioxidants such as phenolic compounds (AL-Zuhairi *et al*. 2017),
The essential oil and extracts from fennel seeds has been additives led to significant improvement in villus height and crypt depth in ileum region.results show that treatment was the superior in improving productive performance of broilers (Gharaghani *et al*., 2015). F. vulgare has phenolic properties (Al-Sagan *et al*., 2020) resulted in greater villus width and villus surface area and the normal intestinal villi (Bindels et al., 2015; Gibson et al., 2017; 19

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Hutkins et al., 2016). The main object of current study is to ascertain how dietary fennel seed powder can affect powder on antioxidant enzymes andhistomorphometry of jejunum in broilers**.**

II. MATERIALS AND METHODS

The trials were directed on 144 one day old broiler , (Ross- 308) raised for 30 days from 5/9/ 2022 to 4/10/2022 in Agriculture College field –Basra. The bird's initial weight was (52 gm). Four treatments were randomly assigned to the birds, with three duplicates in each. (12 bird each) T1 (control, a basal eating routin without added substances), T2 (added 100 gm of fennel to each 10 kg of diet), T3 (added 150 gm of fennel to each 10 kg of diet) and T4 (added 200 gm of fennel to each 10 kg of diet). Feed and water were supplied . From(1-30) days of age, birds were fed the experimental diets (Table1)..

Table 1: Dietary treatments' chemical composition (starter and finisher diet)

Ingredient %	Starter diet	Finisher diet
Yellow Corn	36	40
Soybean meal (44%)	9	6
Wheat	6	7
Chick peas	35	32
Protein Concentration (50%)	10	10
Sunflower oils	2	3
Salt	1	1
Limestone	1	1
Total	100	100
Calculated chemical analysis		
Kcal ME/Kg diet	2998	3086
Crude protein %	22.12	19.52
Calorie: protein ratio	135	158
Calcium %	1.5-1.0	1.5-0.9
Phosphorus available	0.70	0.65
Lysine	1.29	0.92
Manganese (mg/kg)	60	60
Sodium(%)	0.30-0.15	0.30-0.15
Zinc (mg/kg)	40	40
Methionine + cysteine	0.82	0.73

ME: metabolizable energy

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The birds were haphazardly disseminated across 12 enclosures (3 recreate/treatment). All through the trial, consistent lighting provided. The The field's natural temperature was maintained at 35°C, then it was lowered by 3°C until it reached a predictable 20–21°C, with a 60% clamminess level. When the birds were ten days old, they received a Newcastle vaccination. As per suggestions of the Public Exploration Committee (NRC, 1994), all birds utilized for the analysis have been dealt with.

The end the experiment Blood samples were taken from the vein wings (vena cutanea ulnaris) into tubes containing anticoagulant . The samples were centrifuged at 200g for 5 minutes at +4°C; then the serum was removed immediately and stored at –20°C until analyzed. After slaughtering the birds, extracting their internal entrails, and separating their intestines, sections of the intestine were taken from the jejunum, with a length not exceeding 2 cm, for the purpose of conducting a histological study on them, after preserving them in plastic containers containing 10% formalin, to find out the changes that can occur in the villi and crypts as a result. For the treatment of chicks with experimental treatments (this study was conducted in the Al-Bayan laboratories in basra governorate)

III. Results and Discussion:

The results of Table (2) show a significant increase in antioxidant enzymes in the blood serum of the treatments to which Foeniculum vulgare was added compared to the control, and that this increase is a positive indicator of the action of antioxidants in the body of birds. (Liu, et al ., 2013) who noted the antioxidant system forms (SOD ,GPX), as these enzymes work to remove free radicals and to prevent their proliferation. The effectiveness of (MDA) in blood serum was measured, as it was found that there was a significant decrease in the effectiveness of MDA in blood serum for the treatments to which fennel was added compared to the control. And agree with .(Hajem, et al ,.(2008); AL. Bnyean and AL-Mousawi,(2023) . This decrease is due to the increase in antioxidants in the treatments themselves due to the properties of fennel, which contains many active compounds, such as phenolics, which play a major role in stimulating antioxidant enzymes, and therefore the results were consistent with (Breves, et al ,.2013) .

Table (4.6): Effect of different concentrations of Foeniculum Vulgare on Antioxidant enzymes activity in serum(Mean ±SE) of the broiler of the experiment.

Treatment	SOD	GPX	MDA
T1	1.74±0.28^{b}	821.4±6.14^{c}	0.55±0.026^{a}
T2	3.01±0.13^{b}	874.0±12.38^{c}	0.20±0.016^{b}
T3	3.58±0.08^{a}	905.2±10.51^{b}	0.24±0.041^{ab}
T4	4.48±0.18^{a}	938.7±19.68^{a}	0.15±0.008^{c}

T1= control, T2 = 10 g\ kg of the F. vulgare, T3 = 15g\kg) of the F. vulgare , T4 = 20g\ kg)of the F. vulgare . N.S mean no significance between all treatment, * mean significantly (P<0.05).

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It can be observed from Table (3) the effect of adding Foeniculum vulgare fennel on the height of the villus, the depth of the villi and the ratio of the height of the villus to the depth of the villi in the jejunum region. This table showed a significant increase in the length and depth of the villi, as well as the ratio between the length of the villi to the depth of the villi in the fourth treatment compared with control and other treatment .This improvement in the length and depth of the villi may be due to the action of The addition of Foeniculum vulgare, as it is rich in active compounds such as phenolic compounds, which led to the settlement of beneficial microorganisms increased the numbers and dominance of lactobacilli bacteria, and created a microbial balance in favor of beneficial bacteria species (Shawky, et al ,. 2020), in addition to the presence of a group of short-chain fatty acids in Foeniculum vulgare . This improvement in the length of the villus and the depth of the crypt has an important role in increasing the absorption and utilization of nutrients and thus increasing the food conversion factor. These results were in agreement with both(Al-Ani,. 2011) and (Jassim ,.2013) who noted A significant increase in the height of the villus, the depth of the villus, and the ratio between them when adding Foeniculum vulgare.

Table (4.8): Effect of different concentrations of F.Vulgare on height and crypt depth (Mean ±SE) of the broiler of the experiment.

Treatment	Villus height	Crypt depth	Villus/crypt ratio
T1	84.4±5.47^{c}	19.7±0.55^{c}	4.28±0.15^{b}
T2	89.4±0.77^{b}	20.1±0.06^{b}	4.44±0.25^{b}
T3	98.8±0.78^{a}	21.5±1.25^{b}	4.61±0.31^{a}
T4	108.3±6.36^{a}	22.6±1.23^{a}	4.81±0.44^{a}

T1= control, T2 = 10 g\ kg of the F. vulgare, T3 = 15g\kg) of the F. vulgare , T4 = 20g\ kg)of the F.vulgare . N.S mean no significance between all treatment, * mean significantly (P<0.05).

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