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## Effect of dietary supplementation of fennel seeds (*Foeniculum vulgare* Mill.) on production performance of Japanese quail (*Coturnix japonica*)

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**Abstract**

A total of 300 day old Japanese quail chicks were used to assess the effect of dietary supplementation of fennel seeds on the production performance of Japanese Quails. Fennel seed powder was supplemented with basal ration at 0, 0.5, 1.0, and 1.5% levels. The groups supplemented with fennel seeds at 1.0 and 1.5% levels had resulted in significantly ( $P \leq 0.01$ ) higher mean body weight of  $213.99 \pm 1.79$ g and  $215.92 \pm 2.26$ g, respectively at sixth week of age than 0.5% supplemented group ( $208.69 \pm 1.94$ g) and control ( $205.15 \pm 2.06$ g). The mean feed conversion ratio did not have significant ( $P \geq 0.05$ ) difference between different levels of fennel seeds supplementation. There was no significant difference in mean per cent livability between the fennel seeds supplemented groups and control. The study concluded that the supplementation of fennel seeds at 1% level in Japanese quail diet is beneficial to obtain better body weight at sixth week of age.

**Keywords:** Japanese quail, fennel seed powder, growth performance

**Introduction**

Quail farming has become an important poultry business in India both for its meat and eggs. Recently, many countries banned the usage of antibiotics as growth promoters because of their side effect on both birds and human health. Many nutritive and non nutritive feed additives are being supplemented as growth promoters in poultry production in order to get higher body weight with economic feed efficiency at age at marketing of various poultry species. Nowadays, phytobiotics are commonly used as an alternative to antibiotics as natural growth promoters in the poultry feed. Fennel seed powder (*Foeniculum vulgare* Mill.) is one of the most widely used spices and it is a common additive in large number of compounded foods. Fennel contains from 4 to 5 volatile oils which are 50 to 60% of anethol, a phenolic ester and 18 to 22% of fenchone, a ketone. Fennel and its preparations are used to cure various disorders, and also act as a carminative, digestive and diuretic agent. The aroma and flavor components of the essential oils for fennel seeds contain anethole, limonene, fenchone, estragole, safrole, alpha-pinene, camphene, beta-pinene, sabinene, beta-myrcene, phellandrene, cis-ocimene, para-cymene, gamma-terpinene, camphor and several other volatile constituents as well as a fixed oil<sup>[1]</sup>. Anethole and its isomers present in fennel oil are responsible for its antimicrobial effects<sup>[2]</sup>. Fennel seeds are rich in total carbohydrates (61.0%) and low in total soluble sugars (7.6%). The seeds are rich in Ca, P and Mg and contain considerable amounts of K, Fe and Zn and traces of Mn. The major fatty acid components of fennel seeds are 18:1 (71.31%) and 18:2 (11.66%). Fennel seeds are high in isoleucine and histidine<sup>[3]</sup>. Many research studies of the effect of fennel seeds on the production performance were conducted on broilers<sup>[4-7]</sup> and are limited in Japanese quail<sup>[8]</sup>. Hence, this study was designed to explore the potential use of fennel seed powder as natural growth promoters on performance of Japanese quails (*Coturnix japonica*).

**Materials and Methods**

This study was conducted at the Poultry Research Station, Tamil Nadu Veterinary and Animal Sciences University, Chennai, India. A total of 120 day old Japanese quail chicks were randomly divided into three treatment groups (T1, T2 and T3) with two replicates of 20 chicks each. Locally available fennel seeds were procured, sun dried and powdered for the use in this

study. The dietary treatments consisted of control - basal diet without fennel seed powder (T1), Basal ration + fennel seed powder @0.5% (T2) and Basal ration + fennel seed powder @1% (T3). All the birds were fed standard quail starter and finisher diets containing ME levels of 2855 and 2600 Kcal/kg and crude protein levels of 25.45 and 23.00% respectively. All the experimental diets were formulated without supplementation of any antibiotics, probiotics, and prebiotics enzymes. Experimental diets and fresh water were provided ad libitum during this experiment. The birds were housed in cage and standard managemental condition was followed throughout the experimental period. Production performance parameters namely live body weight, feed consumption and livability were recorded biweekly from 0 day to 6 weeks of age. Body weights were recorded biweekly by individual weighment of the birds of each replicate and feed consumption also recorded at the time of recording body weight. Feed conversion ratio was calculated from the feed consumption and live body weight gain, and mortality was record daily throughout the experimented period. The recorded data were analyzed statistically [9].

**Table 1:** Effect of supplementation of fennel seeds (*Foeniculum vulgare* Mill.) on production performance of Japanese quail (*Coturnix japonica*).

Parameters	Control (0%)	T1 (0.5%)	T2 (1.0%)	T3 (1.5%)
Hatch weight <sup>NS</sup>	9.04±0.09	9.12±0.08	9.03±0.10	9.13±0.08
2 <sup>nd</sup> week body weight(g) <sup>NS</sup>	53.61±1.38	51.65±1.27	50.09±1.50	52.06±1.11
4 <sup>th</sup> week body weight(g) <sup>NS</sup>	143.86±2.74	140.58±1.99	146.64±2.75	147.28±2.16
6 <sup>th</sup> week body weight (g) **	205.15 <sup>c</sup> ±2.06	208.69 <sup>b</sup> ±1.94	213.99 <sup>a</sup> ±1.79	215.92 <sup>a</sup> ±2.26
Feed conversion ratio <sup>NS</sup>	2.92±0.04	2.89±0.01	2.85±0.03	2.83±0.01
Livability up to 42 days (%) <sup>NS</sup>	95.00	95.00	95.00	96.67

\*\* - Highly Significant ( $p < 0.01$ ), \* - Significant ( $p < 0.05$ ),

Mean values having the same superscript in a row do not differ significantly.

Similarly, adding fennel to the control diet at a level of 100g/ton improved live body weight and live body weight gain in Japanese quail [8]. Al-Sagan *et al.*, [10] stated that the best body weight gain in broilers supplemented with 3.2% of fennel seed powder under normal condition. Abdul - Azeez, [11] stated that the increase in body weight of fennel supplemented broilers might be due to some components of the essential oils in fennel are stimulants and they stimulate secretion of digestive and gastric juices, while reducing inflammation of the stomach and intestines and facilitating proper absorption of nutrients from the food. Anethole and estragole have digestive stimulating and appetizing effects [12]. El-Deek *et al.*, [4] indicated that fennel stimulates the flow of digestive juice in the stomach and intestine and increase the efficiency of broken fats to fatty acids. They also noted that the anethole (active component in fennel seeds) affected pathogen microorganisms in digestive system and increased live body weight and improved feed conversion ratio and summarized that supplementation of broiler diets with different levels of fennel was improved weight gain, feed efficiency and some carcass and blood characteristic. The statistical analyses showed that the feed conversion ratio did not differ significantly ( $P \geq 0.05$ ) between different levels of fennel seeds supplementation and control groups. This is in agreement with the earlier study of Kassu, *et al.*, [13] who reported that there were no differences in feed conversion ratio between fenugreek 1 and 2 g kg groups and control groups ( $P > 0.05$ ) during the starter (1 to 27 days) and finisher phase (28 to 49 days) in broilers and concluded that the chicks fed with fenugreek at all ration did not utilize their diet efficiently as compared with those of the other treatment

## Results and Discussion

The data on effect of dietary supplementation of fennel seeds (*Foeniculum vulgare* Mill.) on production performance of Japanese quail (*Coturnix japonica*) was furnished in Table 1. Statistical analysis revealed that there was no significant difference in initial body weights up to fourth week between control and different levels of fennel seed powder supplemented groups. The experimental quails fed with fennel seed powder supplemented diets exhibited significantly ( $P < 0.01$ ) higher mean live body weight at sixth week in comparison with control group. The groups supplemented with fennel seeds at 1.0 and 1.5% levels had significantly ( $P \leq 0.01$ ) higher mean body weight of 213.99±1.79g and 215.92±2.26g, respectively at sixth week of age than 0.5% supplemented group (208.69±1.94g) and control (205.15±2.06g). This is in agreement with the results of previous studies [5-7] who found that addition of fennel seeds in broiler diet resulted in improved body weight.

groups viz., turmeric at 2 and 1 g kg and black cumin 1 and 2 g kg and control. However, Al-Sagan *et al.*, [9] stated that the best feed conversion ratio was obtained when broilers under normal condition were supplemented with 3.2% of fennel seed powder. There was no significant difference in mean per cent livability between the fennel seeds supplemented groups and control. This is in accordance with the reports of Abou Eglia *et al.*, [14] and Abaza [15] who found lack of effect of different types and levels of spices on mortalities in various broiler trials.

## Conclusion

The results of the present study indicated that the dietary supplementation of fennel seed powder at 1.5% level was beneficial to obtain higher body weight in Japanese quails (*Coturnix japonica*). It can be concluded that the fennel seed powder can be used as a natural phytochemical growth promoter to enhance production performance of Japanese quails (*Coturnix japonica*). However, further research on the potential use of fennel seed in different forms, levels and modes of supplementation for different periods in various poultry species must be explored for its recommendation in the commercial use in poultry production.

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