

The effect of *Satureja hortensis* on performance of broiler chickens and NDHI titers

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In order to study the effects of *Satureja hortensis* (*S.h*) (a plant from family Lamiaceae) on performance and NDHI titers of broiler chickens, 144 day old Ross male broiler chickens, were randomly divided into 4 groups of 36 (consisting 3 replicates) and placed in 12 separate pens. The groups 1, 2, 3 and 4 received 0, 0.15, 0.3 and 0.45 % *S.h* in their feed respectively from 3 until 42 days of age. Performance indexes were recorded on a weekly basis. At 42 days of age, serum, liver and kidney samples were taken for NDHI test and histopathological studies. The results analyzed by One Way ANOVA, Tukey and Ch-2 tests. The birds of the 3rd group (0.3% *S.h*), had higher body weight and lower FCR, but the differences were not significant ($p>0.05$). All treatment groups had higher HI titers than the control, and the titers of the 3rd group were significantly higher than the control ($p<0.05$). Adding of *S.h* to the diet had no effect on histological structure of the liver and kidney samples.

Key words: *Satureja hortensis*, performance, broiler, NDHI titer.

Introduction

Parallel to the use of medicinal herbs in the treatment of human diseases, plants or plant originated compound has been extensively used in veterinary field especially as growth promoter or feed supplement in broiler industry. One of the most important medicinal herb families is the *lamanacae*, whose related drugs have been used at times in different purposes. *Satureja hortensis* is one of the known plants, related to this family. Several pharmaceutical effects has been proved for *Satureja hortensis* related compounds and its different fractions in vitro and in vivo.

For this reason, a study was designed to investigate the beneficial effects of this herb on Newcastle disease (ND) antibody titer and performance of broiler chickens.

Materials and methods

In this study, 144 male Ross 308 broiler chickens were randomly divided into four groups of 36 with three replicates of 12. The feed rations was formulated and prepared according to the standard of NRC. Groups 2, 3 and 4 received a balanced ration with % 0.15, %0.3 and %0.45 *Satureja hortensis* as a supplement respectively. Group 1 as the control, received a balanced diet but no *Satureja hortensis* was added to their feed up to the end of the experiment (42 days of age). The chicks of groups 2, 3 and 4 had free access to the medicated feed from 3 to 42 days of age. All chicks were vaccinated against ND, Infectious bronchitis (IB) and Infectious bursal disease (IBD) according to the regional standard vaccination program. All other management

procedures were the same for all groups. The following parameters were recorded on a weekly basis: feed intake, mean body weight and feed conversion ratio (FCR) and mortality rate.

Recording of the weight of breast, thigh and abdominal fat: In the mean time, the chickens at 42 days of age were scarified and the weight of their breast and thigh muscle as well as abdominal fat were measured carefully.

Measuring NDHI antibody titers at 42 days of age: 4 chicks from each pen were randomly selected and blood samples were collected for NDHI test.

Histopathological studies: liver and kidneys of the sacrificed birds of all groups sent to laboratory for histopathological studies. Other special conditions such as clinical signs and diarrhea index (by visiting birds 3 times a day to assess the probable incidence of diarrhea) were investigated through the experiment. Statistical analysis: All data were analyzed by one way ANOVA and in case of significant difference by Turkey's test.

Results

1- Effect of *Satureja hortensis* on Body Weight: At the end of the 3rd week, mean body weight of the control group was significantly higher than group 4 ($P < 0.05$) but no significant difference was observed among the body weight of the medicated groups and control. In the 4th, 5th and the 6th week, the body weight of the %0.3 group was higher than other groups but no significant difference was observed among groups.

Table 1- Effect of *Satureja hortensis* on Body Weight

Mean Body Weight (gr) ± SD						
	1 st week	2 nd week	3 rd week	4 th week	5 th week	6 th week
0/kg/ton	121.6±3.12	331±20.30	541.4 ± 81.20 ^a	933.9 ± 169.6	1409.2 ± 263.6	1996.7 ± 438.4
1.5/kg/ton	118.6±2.25	314.6±13.41	503.7 ± 53.65 ^{ab}	924 ± 93.3	1328.2 ± 149.1	1954.5 ± 257.8
3/kg/ton	128.3±2.26	331±14.47	525.6 ± 67.86 ^{ab}	965.1 ± 121.2	1417.7 ± 178.7	2034.8 ± 356
4.5kg/ton	123±5.10	317.3±25.19	491.5 ± 56.57 ^b	884.84 ± 135.13	1360 ± 179.6	1933 ± 372.80

* In each column , different letters indicates of significant differences ($P < 0.05$)

Table 2 - Effect of *Satureja hortensis* on Feed Conversion Ratio (FCR)

Feed Conversion Ratio ± SD							
	1 st week	2 nd week	3 rd week	4 th week	5 th week	6 th week	Total FCR
0/kg/ton	1.4 ± .1	1.5 ± .15	1.8 ± .1 ^a	2.2 ± .1	2.4 ± .42	1.8 ± .25	1.97 ± .17
1.5/kg/ton	1.5 ± .03	1.6 ± .07	2. ± .12 ^a	2. ± .06	2.6 ± .25	1.5 ± .15	1.92 ± .1
3/kg/ton	1.5 ± .02	1.5 ± .05	1.9 ± .06 ^a	1.9 ± .25	2.6 ± .42	1.6 ± .40	1.91 ± .1
4.5kg/ton	1.4 ± .07	1.8 ± .08	2.3 ± .15 ^b	2.3 ± .58	2.7 ± .44	1.8 ± .15	2.1 ± .08

2- Effect of *Satureja hortensis* on Feed intake (FI): In the 2nd week, the FI of the %0.45 group was higher than %0.3 ($P < 0.05$), and the FI of the %0.15 and %0.3 groups were lower than control. Except the 1st and 4th week, the FI of the %0.45 group was higher, but the differences were just significant in the 2nd week.

3 - Effect of *Satureja hortensis* on NDHI titers: At 42 days of age the highest and lowest NDHI titers were belonging to the %0.3 and %0.45 group respectively and the difference was significant between these groups. Other medicated groups also had higher (although not significant) NDHI titers than control.

4 - Effect of *Satureja hortensis* on the relative weight of breast, thigh muscles and abdominal fat: The highest percentage of breast muscle was related to %0.45 group and relative breast weight of %0.3 group was higher than control but no significant difference was observed.

The %0.45 group had the highest relative thigh weight and relative thigh weight of %0.15 group was higher than control, but the difference was not significant.

The highest and lowest amount of abdominal fat was related to %0.45 and %0.15 groups respectively but no significant difference was observed among experimental groups.

DISCUSSION

At the end of the experiment the highest body weight and lowest FCR was related to %0.3 group (tables 1 and 2). Although because of wide range of data variance, the differences were not considered significant, but it could be postulated that because of antioxidant, antifungal and antiseptic activities of *Satureja hortensis* it may protect the chickens ration from oxidation and save the value of vitamins and proteins of the diet. *Satureja hortensis* can prevent the feed from deleterious effects of mycotoxins. On the other hand antiseptic activity of this herb may reduce the numbers of harmful intestine bacteria and improve the feed absorption from the GI tract. *Satureja hortensis* has some amount of vitamin A and unknown beneficial factors that may improve the health of the chicks as well as protecting the birds, confronted to unfavorable condition, which all results to better body weight and FCR.

Testing serum samples collected at 42 days of age revealed higher NDHI titers in the treatment groups, with highest level related to %0.3 group. After vaccination, to obtain an optimal level of immunity, many factors are involved such as the health of the bird. High levels of vitamins especially vitamin A and vitamin E in this herb plays a positive role in the antibody production, increasing serum antibody levels and phagocytic activity of immune cells of the medicated chicks. (3, 5, 6)

Considering that the relative weight of the carcass, breast and thigh muscles are mainly affected by genetic factors (and not by nutritional manipulation of the diet) inclusion of the feed with *Satureja hortensis* can not significantly alter these relative weights. Since there was not a significant difference between the abdominal fat levels of the treatment and control groups it could be postulated that adding of *Satureja hortensis* to the feed has not a detrimental effect on the abdominal fat metabolism.

Satureja hortensis makes the chicks diet more palatable, which can lead to an increased feed intake and body weight. This factor may also lead to higher antibody titers which is needed to be proved by more research.

Several pharmaceutical effects have been reported invitro and invivo associated with *Satureja hortensis* that antimicrobial activity (1) antifungal (6), antioxidant (2) and analgesic, anti inflammatory and anti spasmodic effects are some examples in this regard. This plant has also palatable and expectorant effects (4).

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