Effects of a graded supplementation of herbs and essential oils in broiler feed on growth and carcass traits

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Abstract

Three studies were carried out with regard to the influence of herbs and essential oils on growth and carcass traits with male broilers over periods of 35 days (Trials 1 and 2) and 84 days (Trial 3), respectively. Graded supplement of oregano and its essential oils reduced the daily feed intake of broilers compared to control animals and improved feed efficiency. Savoury, *Nigella sativa L.* and cacao husks increased daily feed intake of broilers in Trial 2. Final body weight was significantly higher in all experimental groups of Trial 2. Either 5 g or 10 g of savoury as feed additive improved daily feed intake over the entire feeding period in the long term trial (84 days). At the end of Trial 3, live weight of all animals was identical. In all three trials carcass traits of broilers were not influenced by feed supplemented with herbs or essential oil.

Introduction

Herbs, parts of plants or plant extracts can beneficially affect feed intake, secretion of digestive juices and the immune system of animals. A variety of these phytogenic additives have already been used in broiler nutrition. The effects varied from a marked enhancement in performance and health to none or even a negative result. Three studies with regard to the influence of herbs and essential oils on growth and carcass traits were carried out with male broilers over periods of 35 days (Trials 1 and 2) and 84 days (Trial 3), respectively. The effects of oregano and its essential oil, savoury, *Nigella sativa L.* and cacao husks as feed supplements were investigated.

Material and Methods

Table 1: Composition and chemical ingredients of diets (g/kg)

Composition/ Chemical ingredients	Trial 1 and 2 – Day 1 to 35 Trial 3 – Day 1 to 14	Trial 3 Day 15 to 56	Trial 3 Day 57 - 84
Wheat	200	382	400
Corn	353	237	244
Soya bean	372	303	276
Soya oil	29	33	37
Vitamins/Minerals/Amino acids	46	45	43
Crude Protein	214	195	185
AME_N (MJ/kg	12.8	13.0	13.2
Essential oil, ml/100 g			
Origanum	4.2	-	-
Savoury	3.1	3.1	3.1
Nigella sativa L.	8.0	-	-

All diets were tested in the performance Experiments 1 and 2, which were carried out in cages with male broilers of the LOHMANN MEAT strain from Days 1 to 35 of age. A total of

720/700 (Trial 1/2) day-old male chicks were randomly distributed in dietary treatments with 8/7 chicks per cage and 10 cages per group. A third trial was carried out with male broilers of the ISA 257 strain from Days 1 to 84 of age. A total of 180 chicks were randomly distributed in treatments with six chicks per pen and ten pens per group. Feed and water were provided for ad libitum consumption. Live weight was recorded for each broiler individually whereas feed was weighed back on a cage- or pen-basis weekly. Basal diet (Tab. 1) was formulated to contain either 0, 2 g, 4 g, 10 g, 20 g Origanum leaves, 0.1 g, 0.2 g, 0.5 g, 1.0 g essential oil (Origanum) per kg in Trial 1 and 0 g, 3 g, 4 g, 10 g, 20 g Savoury, 10 g *Nigella sativa L.*, 10 g *Nigella sativa L.* plus 10 g Savoury, 10 g Cacao husks, 10 g Cacao husks plus 5 g *Nigella sativa L.* per kg in Trial 2 and 0 g, 5 g, 10 g Savoury in Trial 3.

Results and Discussion

Summarised results of the experiments are given in Table 2 to 4. Graded supplement of oregano (0/2/4/10/20 g/kg) and its essential oil (0/0.1/0.2/0.5/1 g/kg) reduced daily feed intake of broilers compared to control animals of Trial 1 (Tab. 2). Enrichment with essential oil significantly improved feed efficiency.

Table 2**:** The influence of dried leaves and essential oils from Origanum on feed intake (FI), final body weight (FBW) and feed conversion (FC) of male broilers - Trial 1 (Means, Student-Newman-Keuls Test, $P \leq 0.05$)

Group	FI, g/day/broiler	FBW, kg/broiler	FC, kg/kg
Control	91.2	1.909	1.694 a
2 g Origanum leaves	89.7	1.957	1.638 ab
4 g Origanum leaves	89.5	1.968	1.623 ab
10 g Origanum leaves	89.6	1.986	1.609 ab
20 g Origanum leaves	88.8	1.905	1.653 ab
0.1 g Essential oil	87.1	1.961	1.593 b
0.2 g Essential oil	87.0	1.986	1.567 b
0.5 g Essential oil	88.0	1.999	1.556 b
1.0 g Essential oil	87.9	1.986	1.581 b

a, b - Values in columns with different superscripts differ significantly

Savoury, *Nigella sativa L.* and cacao husks increased daily feed intake of broilers (Tab. 3). In comparison to control animals, live weight at the end of the feeding period was significantly higher in all experimental groups of Trial 2 (10 g Cacao husks, 10 g Cacao husks + 5 g *Nigella sativa L.* and10 g *Nigella sativa L.*).

5 g or 10 g of savoury as feed additive improved daily feed intake over the entire feeding period in the long term Trial 3 (84 days) (Tab. 4). Up to the 35th day of life (Trial 1) 10 g savoury in the feed lead to a significantly improved daily live weight gain compared to control group and the group fed with a supplement of 5 g savoury. At the end of Trial 3 the live weight of all animals was identical.

In all three trials, carcass traits of broilers were not influenced by feed supplementation with herbs or essential oil.

Table 3**:** The influence of Savoury, *Nigella sativa L*. and Cacao husks on feed intake (FI), final body weight (FBW) and feed conversion (FC) of male broilers – Trial 2 (Means, Student-Newman-Keuls Test, P≤0.05)

Group	FI g/day/broiler	FBW kg/broiler	FC kg/kg
Control	89.2	2.092 b	1.521
3 g Savoury	91.5	2.180 ab	1.497
4 g Savoury	93.0	2.177 ab	1.522
10 g Savoury	91.4	2.156 ab	1.514
20 g Savoury	91.1	2.146 ab	1.515
10 g *Nigella sativa L.*	95.1	2.241 a	1.512
10 g *Nigella sativa L.* + 10 g Savoury	92,7	2.189 ab	1.507
10 g Cacao husks	93.3	2.204 a	1.512
10 g Cacao husks + 5 g *Nigella sativa L.*	94.9	2.214 a	1.525

a, b - Values in columns with different superscripts differ significantly

Table 4**:** The influence of dried leaves from Savoury on feed intake (FI), final body weight (FBW) and feed conversion (FC) of male broilers - Trial 3 (Means, Student-Newman-Keuls Test, P>0.05)

Group	FI, g/day/broiler	FBW, kg/broiler	FC, kg/kg
Control	110.2	4.321	2.160
5 g Savoury	111.6	4.262	2.224
10 g Savoury	113.9	4.326	2.233

Conclusions

- Results of first trial demonstrated that the most pronounced effect of essential oils supplementation was improved feed conversion. In addition, the results indicated that the influence of essential oils on growing broilers were stronger than that of herbal leaves.
- Results of second trial demonstrated that the most pronounced effect of *Nigella sativa L.* and cacao husks supplementation was improved final body weight. In addition, the results indicated that the influence of *Nigella sativa L.* and cacao husks on growing broilers were stronger than that of Savoury.
- Results of the third trial demonstrated that 5 g or 10 g of Savoury as feed additive improved daily feed intake over the entire feeding period in the long term trial (84 days). Up to the 35th day of life, 10 g savoury in the feed lead to a significantly improved daily live weight gain compared to control group and the group fed with a supplement of 5 g savoury. At the end of the experiment, the live weight of all broilers was identical.