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# INFLUENCE OF THYME (THYMUS VULGARIS L.) SUPPLEMENTATION IN FEED ON FATTENING RABBIT'S PERFORMANCE

**Mariya Todorova[1*], Maya Ignatova[1], Krasimir Velikov[2]**

*[1]Institut of animal science, Kostinbrod, Bulgaria*
*[2]Agricultural Institute, Stara Zagora, Bulgaria*
*E-mail: mariq_todorova_1@abv.bg*

**ABSTRACT**

diets on growth performance. 30 rabbits from New Zeeland breed, on 55 days of age (±2) were randomly allocated to three experimental groups for 47 days (until reach 2100g of body weight). The experimental design consisted of three dietary treatments: 1) control group received standard compound feed - unsupplemented; 2) the first experimental group (M3) received diet supplemented with 3% thyme leaves powder instead of alfalfa hay; 3) the second experimental group (M5) received diet supplemented with 5% thyme leaves powder instead of alfalfa hay. Individual rabbits' body weights were recorded weekly. Feed intake and feed conversion rate were determined weekly per group. Carcass characteristics were determinate at the end of the trail. The results of this study have shown that thyme inclusion at level up to 3 or 5% did not adversely affect rabbit's performance.

**Key words:** Thyme, rabbits, nutrition, performance.

## Introduction

Plants (whole plants, leaves or seeds, mainly used as feedstuffs) and their extracts (considered as additives) are being increasingly used in animal nutrition as appetisers, digestive and physiological stimulants, colorants, and antioxidants, and for the prevention and treatment of certain pathological conditions (Dalle Zotte et al., 2016). Thyme (Thymus vulgaris L.) is a flavourful evergreen herb cultivated in many other parts of the world and has traditionally been used in herbal medicine. Thyme has antimicrobial and antioxidant properties and, mainly due to its active components, enhances appetite and has been reported to promote growth performance (Hippenstiel et al., 2011; Abdel-Wareth et al., 2012; Rašković et al., 2015). Moreover, thyme oil can have a beneficial impact on animal performance, health status, and welfare under hot environmental conditions (Attia et al., 2017). Accordingly, dietary supplementation with 0.5 g/kg thyme oil improved intestinal integrity and total antioxidant status of rabbits (Placha et al., 2013), likely mediated through natural antioxidants that can increase meat quality and shelf-life mainly by inhibiting lipid oxidation. The main components of thyme oil are thymol, carvacrol, p-cymene, g-terpinene, linalool, b-myrcene, terpinen-4-ol (Lee et al., 2005).

The objective of the present study was to estimate the effect of feeding different levels of dietary thyme (Thymus vulgaris L.) on rabbit's performance and carcass criteria.

## Materials and methods

An experiment was conducted at the Experimental Rabbit farm of the Institute of Animal Sciences – Kostinbrod on 30 New Zealand White rabbits (equal number of males and females). The average initial age of the rabbits was 55 days (±2) and the average initial live weight was 1, 1272±189.01 g. The experimental period was 47 days. The experiment continued until the average live weight of the rabbits in the groups reached 2100 g. The animals were randomly allocated to

three groups: one control (K) and two experimental, equal in weight and sex. Each group contained 10 animals (5 males and 5 females). The feed used in the experiment was prepared at the Stara Zagora Agricultural Institute according to a recipe for pelleted compound feed for fattening rabbits 53-3-6 от 02.08.2017 г. (crude protein=14.256%, crude fiber=13.429%, fat=1.826%, ME=1979.62 Kcal/kg). The experimental design consisted of three dietary treatments: 1) control group received standard compound feed – unsupplemented; 2) the first experimental group (M3) received diet supplemented with 3% thyme leaves powder instead of alfalfa hay; 3) the second experimental group (M5) received diet supplemented with 5% thyme leaves powder instead of alfalfa hay. The feeding was restricted for the first two weeks, than animals were fed ad libitum. Rabbits had free access to water by nipple watering drinkers.

Individual rabbits' body weights were recorded weekly, after 18 hours of fasting. Feed intake and feed conversion rate were determined weekly per group. At the end of the trail six rabbits per group were selected and slaughtered for carcass analysis. The procedure involved severing the carotid artery, jugular vein, trachea and oesophagus. The slaughtered rabbits were bled, and then the skin, genitals, urinary bladder, gastrointestinal tract, and the distal part of legs were removed. Eviscerated carcasses, lungs, liver, kidneys, heart, spleen, feed and fur and not edible parts were weighed. Then were calculated dressing percent, edible parts, % of body weight and not edible parts, % of body weight. All experimental procedures were carried out in accordance with the requirements of animal welfare of Bulgarian food safety agency.

The obtained results were statistically processed by ANOVA: Single factor with software product MS Excel 2010. The difference between groups was analysed by t-test of Student.

**Results and discussion**

The results of this study have shown that thyme leaves inclusion in rabbit's diet have no detrimental effect on productive parameters. Data about the body weight are shown in table 1. There was no significant difference between the groups. Although the M5 group had higher body weight compared to the control group through all experimental periods. The increase was with 0.5% for the first week, 2.4% for the second week, 4.6% for the third week, 7.2% for the fourth week, 9.1% for the fifth week, 8.4% for the sixth week and 10.7% at the end of the trial. The lack of statistical significance may be is due to the small number of experimental animals.

**Table 1: Average body weight of study rabbits, g**

| Period | Control group (K) | I experimental group (M3) | II experimental group (M5) |
|---|---|---|---|
| At the beginning of the trial | 1271.80±182.83 | 1268.40±212.21 | 1275.80±172.97 |
| At the end of the first week | 1316.40±208.26 | 1307.80±211.83 | 1323.40±186.64 |
| At the end of the second week | 1437.80±235.14 | 1483.80±235.54 | 1472.20±233.37 |
| At the end of the third week | 1585.11±288.17 | 1620.20±266.58 | 1658.40±258.12 |
| At the end of the fourth week | 1734.33±363.94 | 1748.60±262.78 | 1859.80±281.27 |
| At the end of the fifth week | 1871.75±425.71 | 1844.22±275.53 | 2041.60±285.43 |
| At the end of the sixth week | 2018.75±486.52 | 1974.67±324.21 | 2187.80±284.82 |
| At the end of the trial | 2120.75±585.25 | 2131.33±327.62 | 2347.60±281.09 |

Average daily gain of rabbits was similar between the groups (table 2). Our date are in agreement with the results of Ezzat Ahmed et al. (2020) and Elwardany et al. (2022) who observed positive effect of thyme leaves powder inclusion in diet of rabbits on growth performance.

**Table 2: Average daily gain of rabbits, g**

| Period | Control group (K) | I experimental group (M3) | II experimental group (M5) |
|---|---|---|---|
| At the end of the first week | 10.31±5.63 | 13.53±6.97 | 17.20±8.48 |
| At the end of the second week | 17.34±6.94 | 25.14±8.09 | 21.26±10.60 |
| At the end of the third week | 23.02±8.26 | 26.95±9.58 | 26.60±8.30 |
| At the end of the fourth week | 23.41±7.35 | 25.29±4.25 | 28.77±5.73 |
| At the end of the fifth week | 20.34±9.37 | 22.33±7.40 | 25.97±7.61 |
| At the end of the sixth week | 25.76±4.15 | 23.68±5.68 | 20.89±7.44 |
| At the end of the seventh week | 20.73±6.89 | 22.38±2.82 | 22.83±7.45 |

Average daily feed consumption (table 3) was close in value but group M5 has higher consumption compare with control group and M3 group. Compare to the control group this increase was with 4.4% for the first week, 8.2% for the second week, 22.8% for the third week, 1.5% for the fourth week, 3% for the fifth week, 10.3% for the sixth week and 18.1% for the seventh week. Compared to the M3 group this increase was with 1% for the second week, 14.2% for the third week, 0.5% for the fourth week, 32.7% for the fifth week, 26.5% for the sixth week and 12.8% for the seventh week. For the whole experimental period M5 group had higher consumption compare to control and M3 group with 10% and 12%, respectively.

**Table 3: Average daily feed consumption, g.**

| | For the first week | For the second week | For the third week | For the fourth week | For the fifth week | For the sixth week | For the seventh week | For the whole trial |
|---|---|---|---|---|---|---|---|---|
| Control group (K) | 65.46 | 72.14 | 104.13 | 102.86 | 113.18 | 98.75 | 96.11 | 93.23 |
| I experimental group (M3) | 73.12 | 77.26 | 111.97 | 103.90 | 87.86 | 86.10 | 100.70 | 91.56 |
| II experimental group (M5) | 68.36 | 78.06 | 127.89 | 104.40 | 116.57 | 108.94 | 113.54 | 102.54 |

Feed conversion ratio was improved for the both experimental group (table 4). The most efficient feed conversion ratio was found in the M3 group followed by M5 group. For the whole trial the difference among them was 4.9%. Compare to the control group feed conversion in M3 and M5 was improved by 11.5% and 7.1%, respectively. In contrast with our study Elwardany et al. (2022) reported decreases in average daily feed consumption, but feed conversion was improved. In other researches was observed positive effect of thyme leaves powder or thyme oil inclusion in rabbits' diet on feed intake and feed conversion (Benlemlih et al., 2014; Abdel-Wareth et al., 2018; Ezzat Ahmed et al., 2020;). Furthermore, herbs and their constituent essential oils are often supposed to improve flavour and, indirectly, palatability of feeds, thus increasing voluntary feed intake which, in turn, results in improved body weight gain and feed conversion ratio (Zeng et al., 2015).

The effects of thyme leaves powder supplementation on carcass criteria of New Zealand White rabbits at the end of experimental period are shown in table 5. Data about carcass weight, dressing percent, feet and fur, heart, lung, spleen, edible parts, % of body weight, not edible parts, not edible parts, % of body weight are close in value and no significant differences were found. Significant difference was found for liver weight. The groups received thyme M3 and M5 had lower liver weight compared to the control group by 26.6% and 27.1%, respectively. This effect may be due to improve liver function by thyme leaves addition. Ezzat Ahmed et al. (2020) reported that the rabbits fed on

the diets supplemented with thyme leaves at 4, 8, 12 and 16 g/kg significantly lowered the concentrations of the serum ALT and AST compared to the non-supplemented group.

**Table 4: Feed conversion ratio, g feed/g gain**

| | For the first week | For the second week | For the third week | For the fourth week | For the fifth week | For the sixth week | For the seventh week | For the whole trial |
|---|---|---|---|---|---|---|---|---|
| Control group (K) | 7.14 | 4.65 | 5.34 | 4.84 | 5.60 | 4.37 | 5.28 | 5.32 |
| I experimental group (M3) | 6.75 | 3.53 | 4.75 | 4.29 | 4.36 | 4.12 | 5.16 | 4.71 |
| II experimental group (M5) | 4.65 | 4.06 | 5.31 | 4.14 | 4.95 | 5.84 | 5.60 | 4.94 |

**Table 5: Carcass analysis**

| Parameter | Control group (K) | I experimental group (M3) | II experimental group (M5) |
|---|---|---|---|
| Live body weight, g | 2500.67±240.60 | 2373.33±249.49 | 2410.33±180.72 |
| Carcass weight, g | 1512.67±171.74 | 1433.67±172.41 | 1469.00±125.94 |
| Dressing percent, % | 60.41±1.29 | 60.33±1.77 | 60.90±0.89 |
| Feet and fur, g | 432.33±43.29 | 412.00±53.29 | 417.67±47.57 |
| Feet and fur, % of body weight | 17.30±0.86 | 17.39±1.63 | 17.30±1.13 |
| Liver, g | 85.67±10.31$^{ab}$ | 67.67±3.45$^{a}$ | 69.00±7.67$^{b}$ |
| Heart, g | 8.16±2.21 | 7.67±1.00 | 6.89±1.10 |
| Lung,g | 10.92±1.26 | 10.82±1.86 | 10.34±2.14 |
| Kidneys,g | 12.57±2.41 | 14.12±2.09 | 12.84±1.33 |
| Spleen, g | 1.22±0.36 | 1.39±0.37 | 1.20±0.23 |
| Edible parts, % of body weight | 4.74±0.26 | 4.32±0.44 | 4.20±0.66 |
| Not edible parts, g | 334.67±31.64 | 320.33±31.68 | 305.33±31.79 |
| Not edible parts, % of body weight | 13.47±1.70 | 13.57±1.40 | 12.73±1.61 |

*$^{a-b}$ Means bearing different superscripts within a row differ significantly (P < 0,01).*

In contrast with our study Elwardany et al. (2022) reported that thyme leaves inclusion improve dressing percent and decrease giblets percent in New Zealand White rabbits. Besides Abdel-Wareth et al. (2018) found that the incorporation of olive oil and thyme essential oil improved ($P < 0.001$) weights of warm carcass, chilled carcass, and reference carcass and chilled carcass percentage compared with control group, without any effect on internal organs. Moreover different studies reported that thyme oil inclusion improve meat quality (Lee et al., 2005; Rašković et al., 2015; Abdel-Wareth et al., 2018)

## Conclusion

The results of this study have shown that 3 or 5 % thyme leaves powder inclusion in rabbit's feed (instead of alfalfa hay), had dose depending positive effect on growth performance, average daily feed consumption and feed conversion ratio. Nevertheless no significant differences were observed in carcass parameters, except for liver weight. Further investigations are needed to evaluate the others possible positive effects of thyme in rabbits nutrition.

## References


1. Abdel-Wareth A. A. A., Kehraus S., Hippenstiel F., Südekum K.-H. (2012). *Effects of thyme and oregano on growth performance of broilers from 4 to 42 days of age and on microbial counts in crop, small intestine and caecum of 42-day-old broilers*. Animal Feed Science and Technology 178 198–202.
2. Abdel-Wareth A. A. A., Taha E. M. M., Südekum K-H., Lohakare J. (2018). *Thyme oil inclusion levels in a rabbit ration: Evaluation of productive performance, carcass criteria and meat quality under hot environmental conditions.* Animal Nutrition, https://doi.org/10.1016/j.aninu.2018.02.004.
3. Attia,Y. A., Bakhashwain A. A., Bertu N K.. (2017). *Thyme oil (Thyme vulgaris L.) as a natural growth promoter for broiler chickens reared under hot climate*. Ital J Anim Sci, 16, pp. 275–282.
4. Benlemlih M., Aarab A., Bakkali M., Arakrak A. and Laglaoui A. (2014). *The effect of supplementing diets with dried fennel and thyme on the zootechnical parameters and caecal microflora of growing rabbit*. Journal of Animal and Feed Sciences, 23, 346–350.
5. Dalle Zotte, A., Celia, C., & Szendrő, Z. (2016). *Herbs and spices inclusion as feedstuff or additive in growing rabbit diets and as additive in rabbit meat: A review. Livestock Science, 189*, 82–90. https://doi.org/10.1016/j.livsci.2016.04.024.
6. Elwardany, A.R., El-Banna H. M. A. E, Ibrahim M. R. M. and Mahmoud A. E. M. (2022). *Effect of medicinal and aromatic plants on growth, digestibility and carcassin New Zealand white rabbits*. Pak. J. Biol. Sci. 25:282–288.
7. Ezzat Ahmed A., Alkahtani M. A., Abdel-Wareth A. A. A. (2020). *Thyme leaves as an eco-friendly feed additive improves both the productive and reproductive performance of rabbits under hot climatic conditions*. Vet Med-Czech 65, 553–563.
8. Hippenstiel, F., Abdel-Wareth A. A. A., Kehraus S., Südekum K.-H. (2011). *Effects of selected herbs and essential oils, and their active components on feed intake and performance of broilers-A review.* Arch Geflügelkd, 75, pp. 226–234.
9. Lee S, Umano K, Shibamoto T., Lee K. (2005). *Identification of volatile components in basil (Ocimumbasilicum L.) and thyme leaves (Thymus vulgaris L.) and their antioxidant properties*. Food Chem. Jun;91(1):131–7.
10. Placha, I., Chrastinova L., Laukova A., Cobanova K., Takacova J., Strompfova V. (2013).*Effect of thyme oil on small intestine integrity and antioxidant status, phagocytic activity and gastrointestinal microbiota in rabbits*. Acta Vet Hung, 61, pp. 197–208.
11. Rašković,A., Pavlović N., Kvrgić M., Sudji J., Mitić G., Čapo I. (2015). *Effects of pharmaceutical formulations containing thyme on carbon tetrachloride induced liver injury in rats*. BMC Complement Altern Med, 15, pp. 442–453.
12. Zeng Z, Zhang S, Wang H, Piao X. (2015). *Essential oil and aromatic plants as feed additives in non-ruminant nutrition: a review.* J Anim Sci Biotechnol; 6(7):10.