Original Contribution

EFFECT OF DIETARY HERBAL ESSENTIAL OILS ON THE PERFORMANCE AND MEAT QUALITY OF FEMALE TURKEYS BROILERS

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ABSTRACT

During the last years, the addition of essential oils to livestock rations became increasingly popular. Numerous studies have proved the antibacterial properties of herbal essential oils (EO) along with antioxidant, anticarcinogenic and digestive properties. They are also used as growth promoters of livestock. With this regard, the purpose of the present study was to investigate the effect from addition of 0.01% essential oils (EO) from *Matricaria chamomilla*; *Rosmarinus officinalis*; *Lavandula angustifolia*; *Origanum vulgare*; *Thymus vulgaris*; *Hypericum perforatum* to the feed of turkey broilers on live body weight, feed consumption, slaughter traits, fatty acid content and meat quality. Female turkey broilers, were divided into 7 groups of 15 birds in each after being weighed and labelled (each group comprised 3 subgroups of 5 birds). Groups were one control (C) and six experimental (T1, T2, T3, T4, T5, T6). The control (C) group of turkeys received feed according to the requirements of their age without herbal essential oils. The experimental groups received the same diet supplemented as followed: group T1- 0.01% EO from *Matricaria chamomilla*; T2- 0.01% EO from *Rosmarinus officinalis*; T3- 0.01% EO from *Lavandula angustifolia*; T4-0.01% EO from *Origanum vulgare*; T5- 0.01% EO from *Thymus vulgaris*; T6- 0.01% EO from *Hypericum perforatum*). The addition of 0.01% EO of abovementioned herbs influences breast and thigh meat pH measured at 24th post mortem hour (pH₂₄) (P<0.05). The highest value L* in breast meat was demonstrated in birds supplemented with EO from *Lavandula angustifolia* (T3) and lowest L* in group T5 at (P<0.05). The highest value L* in thigh meat was measured in birds from group T2 (EO from *Rosmarinus officinalis*) and the lowest- in group T5 (EO from *Thymus vulgaris*). The redness (a*) and yellowness (b*) of breast meat did not differ significantly among the groups (P>0.05), yet a* and b* values showed considerable differences in thigh meat (P<0.05). The dietary EO also had an effect on thigh meat L*, a* and b* - parameters of meat colour. Cooking loss % of breast meat was the highest in the control group- 35.12% and the lowest in group T5 (*Thymus vulgaris* EO) - 23.69% and group T6 (*Hypericum perforatum* EO) - 24.78% (P<0.001). The addition of herbal EO to the ration of turkey broilers did not influence the content of saturated and unsaturated fatty acids (linoleic acid, α -linolenic acid, arachidonic acid, eicosapentaenoic acid and docosahexaenoic acid) of breast and thigh meat of birds from experimental groups.

Key words: Turkeys, performance, essential oil from herbs, quality meat, fatty acids

INTRODUCTION

Herbs are a new class of growth promoters which recently has gained popularity in the fodder industry. The variety of herbs, spices

and their products and essential oils is substantial. Numerous studies have proved that Herbal essential oils (EO) have antibacterial, antioxidant, anti-inflammatory, anticarcinogenic, health promoting and digestive properties (1-5). They are also used as growth promoters in livestock nutrition (6-9). Essential oils (EO) improve the digestibility through optimisation of intestinal microbiota, stimulation of secretion of digestive enzymes

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and improvement of growth performance in domestic poultry (7, 10). Malayoglu et al. (11) and Roofchae et al. (12) reported that dietary supplementation with oregano exhibited a growth-promoting effect. Marcinčák et al. (13) found out that broiler chickens supplemented with oregano essential oil showed higher body weight (2563 ± 140 g) than non-supplemented birds (2462 ± 195 g). Agus et al. (14) demonstrated that the addition of a mixture of nine plants EO in the drinking water (1 ml/1 l) influenced the slaughter yield, cooking loss, tenderness and water holding capacity of broiler meat. No differences in live weight and feed conversion were noticed. Botsologlu et al. (15) and Hernandez et al. (16) also showed that the addition of plant extracts to broiler chickens' diet did not influence feed conversion ratio. Kırkpınar et al. (17) supported these findings with lack of significant differences in live weight and feed conversion ratio of experimental birds supplemented with oregano and garlic oil and control birds. Lee et al. (18) and Ocak et al. (19) added a mixture of herbal EO to the ration of broiler chickens and established a substantial improvement of feed conversion ratio. When the broilers were fed a diet supplemented with EO from peppermint and thyme at 24 and 48 mg/kg feed, feed conversion was better and mortality rate – lower than those in controls. Méndez et al. (20) reported that the addition of 0.4 mg/kg *Mexican oregano* EO resulted in a positive effect on body weight and feed intake of chickens. *Mexican oregano* EO could be used as a dietary supplement in broilers' rations. In available literature, investigations on the influence of dietary herbal essential oils on productive performance and meat quality in turkeys are scarce.

The purpose of the present study was to investigate the effect from addition of 0.01% essential oils from herbs (*Matricaria chamomilla*; *Rosmarinus officinalis*; *Lavandula angustifolia*; *Origanum vulgare*; *Thymus vulgaris*; *Hypericum perforatum*) to the feed of turkey broilers on live body weight, feed consumption, slaughter traits, meat chemical and fatty acid content and meat quality.

MATERIALS AND METHODS

Experimental design

The experiment was carried out in the experimental base of the Agricultural Institute, Stara Zagora from May to September 2019. A

day-old female turkey broilers were divided in 7 groups after being weighed and labelled. Birds were reared in separate boxes, on the floor, on wooden shavings from day 1 to day 126 of age. The first week of life, circles for maintaining the temperature and corrugated card box to limit pecking of shavings were used. Birds had ad libitum access to feed and water and continuous lighting was provided. Groups were one control (C) and six experimental (T1, T2, T3, T4, T5, T6). The control (C) group of turkeys received feed according to the requirements of their age without herbal essential oils. The experimental groups received the same diet supplemented as followed: group T1- 0.01% EO from *Matricaria chamomilla*; T2- 0.01% EO from *Rosmarinus officinalis*; T3- 0.01% EO from *Lavandula angustifolia*; T4- 0.01% EO from *Origanum vulgare*; T5- 0.01% EO from *Thymus vulgaris*; T6- 0.01% EO from *Hypericum perforatum*. At 56 days of age from these groups of broiler turkeys were selected 15 turkeys from each group with average live weight (each group was divided into 3 subgroups of 5 turkeys) in boxes.

The basal diet was formulated for starter (Starter 1 from 1 to 21 day-old turkey- Crude protein-28% and Metabolic energy- 2800 kcal/kg; Starter 2- from 22 to 42 day-old turkey- Crude protein- 26% and Metabolic energy- 2900 kcal/kg; Starter 3- from 43 to 55 day-old turkey- Crude protein- 24% and Metabolic energy- 3000 kcal/kg), grower (Grower 1 from 56 to 84 day-old turkey - Crude protein- 22% and Metabolic energy- 3100 kcal/kg; Grower 2- from 85 to 100 day-old turkey - Crude protein- 19% and Metabolic energy- 3250 kcal/kg) and finisher (Finisher from 101 to 126 day-old turkey- Crude protein- 17% and Metabolic energy- 3350 kcal/kg) growth periods. All diets were in mashed form. Body weight (BW) and feed intake (FI) were recorded by treatment group, and FCR (feed conversion ratio) per group were then calculated for the total experimental period.

Slaughter procedures and carcass evaluation

At the end of the experiment, 35 turkeys (5 birds per group) representing the average body weight of each group were selected and after 12-h fasting time were slaughtered at the own experimental slaughterhouse. After evisceration the hot carcasses were weighed to evaluate dressing yield expressed as a percentage of pre-slaughter body weight.

Thereafter, the carcasses were cut into parts. The carcass parameters measured were - whole breast, whole legs, back, wings, neck, heart, gizzard, liver. Abdominal fat was removed and weighed individually. The breast (*m. Pectoralis superficialis* and *m. Pectoralis profundus*) and thigh (*m. Femorotibialis*) muscles were deboned for the determination the fatty acid profile, stored in hermetically sealed bags and kept at -20°C until analysis.

Analysis of Quality of Meat

Meat proximate analysis comprised moisture, protein and fat in breast muscles (*m. Pectoralis superficialis* and *m. Pectoralis profundus*) and thigh muscles (*m. Femorotibialis*). Meat moisture content was determined by drying in an oven at 105° C. Moisture content was analysed according to (21). Meat protein content was determined as per (22). To this end, a UDK 149 Automatic Kjeldahl Distillation Unit (VELP Scientifica, Italy) was used. Fat content was determined by Soxhlet extraction as per (23). The pH (pH₂₄) was determined by pH-meter „Testo 205“ into the breast and thigh muscles 24 hours after slaughter. The muscle colour was evaluated in the CIE L*, a*, b* colour space, where L* is lightness, a*- redness and b*- yellowness of meat. Colour coordinates were determined with a colorimeter Minolta CR-400 (Konica Minolta, Osaka, Japan), with illuminate D65 and observation angle 2°.

Water holding capacity of meat (WHC %) was determined by pressing it using the classical method of Grau and Hamm described by Zahariev and Pinkas, (24) with modifications by Petrov, (25).

Cooking loss (%) was determined by cooking the meat sample at 150° C for 20 minutes in a forced air convection oven. Cooking loss was calculated as the difference in weight of samples before and after cooking. The fatty acid content of breast and thigh samples was determined of gas chromatography after extraction and transformation of fatty acids in methyl esters. Fatty acids were expressed as a percentage of the sum of identified fatty acids.

Statistical Analysis

Statistical analyses were conducted with STATISTICA program, ver. 10 (StatSoft, Inc., 2011). One-way analysis of variance (ANOVA) tests were performed to compare means of all data. Dependent on the variance homogeneity (evaluated by Levene's test), identification of significant differences ($P < 0.05$) was carried out making use of the LSD post-hoc test, while for nonparametric analysis was used the Kruskal-Wallis test.

RESULTS AND DISCUSSION

Table 1 presents body weights at 126 days of age, average daily gain, average feed consumption and feed conversion ratio from 56 to 126 day of age of turkey broilers.

Table 1. Effects of dietary treatments on broilers' performance

Treatment	Parameters			
	BW	ADG	AFC	FCR
C	9873.33	0.097	0.312	3.333
T1	9673.33	0.099	0.320	3.310
T2	9793.33	0.097	0.326	3.366
T3	9850.00	0.101	0.323	3.244
T4	9338.46	0.095	0.320	3.267
T5	9966.67	0.109	0.328	3.027
T6	10081.82	0.116	0.327	2.811
SEM	62.51	0.003	0.002	0.076
P-value	0.064	0.256	0.995	0.558

Note: The means within the same column with at least one common letter, do not have significant difference ($P > 0.05$). SEM: standard error of the means; BW(kg): body weight at 126 day of age; ADG- Average Daily Gain (kg), AFC- Average Feed Consumption (kg /day) and FCR - feed conversion ratio (kg/ kg) for 56- 126 day of age

The addition of 0.01% herbal EO to the feed of turkey broilers had no significant effect on final body weight at 126 days of age. The highest weight was that of birds from group

T6, supplemented with EO from *H. perforatum*- 10081.82 kg and the lowest- in group T4 (supplemented with EO from *Thymus vulgaris*- 9338.46 kg), but the differences were

statistically unproven ($P>0.05$) (**Table 1**). The average daily gain and the feed conversion ratio from 56 to 126 days of age were not influenced by feed supplemented with herbal EO ($P>0.05$). This finding disagrees with data of Al- Kassie, (26) reporting that chickens fed diets supplemented with 200 ppm thyme EO showed considerably higher weight gain. Fotea et al. (27) also reported higher final body weight by 13% in chickens supplemented with thyme essential oil compared to control birds. Yet, the research results of Sevim et al. (28) found no effect from feed supplementation with rosemary EO on final body weight and feed intake of chukar partridges ($P>0.05$). Other studies also confirmed the lack of significant influence of dietary plant extracts on average daily gain and feed conversion ratio (7, 15-16).

The effect of herbal EO added to the feed of turkey broilers on slaughter traits are shown in **Table 2**. The addition of 0.01% EO to the feed had no effect on slaughter yield and breast yield in the present study ($P> 0.05$). A number

of studies have reported the effects of dietary phytogetic compounds- extracts of rosemary and salvia (29), rosemary (30) and rosemary and oregano EO (31-32) on slaughter traits of poultry. They however did not demonstrate significant beneficial effect of phytoadditives on carcass yield and carcass cut-up parts yields (33-34). These findings are contrary to those of Agus et al. (14), who confirmed increased slaughter yield by 10.87% in broiler chickens supplemented with a mixture of EO in drinking water in comparison to control broilers. Other studies in line with these findings are those of Roofchae et al. (12) and Alçiçek et al. (35). Our study, however, demonstrated considerably differences in thigh and breast percentage from body weight ($P<0.05$) in studied groups of turkey poult. The highest thigh percentage was found in group T6 (EO from *H.perforatum*), and the lowest - in control group (28.72%). Back percentage was the highest in control group- 21.97%, followed by T1- 20.36% while the lowest back percentage was that of group T6- 18.70% ($P<0.05$).

Table 2. Carcass characteristics of turkeys at 126 days of age, %

Parameters	Treatment							SEM	P-value
	C	T1	T2	T3	T4	T5	T6		
CY, %	77.83	76.53	76.30	75.60	75.44	76.77	75.78	0.24	0.087
Breast*, %	37.02	36.56	38.31	38.48	37.89	37.87	36.79	0.32	0.638
Thigh, %	28.72 ^c	31.18 ^{ab}	31.04 ^b	30.64 ^{bc}	30.74 ^b	31.00 ^b	33.12 ^a	0.34	0.016
Wings, %	11.34	11.90	11.11	11.36	11.60	11.22	11.38	0.11	0.523
Back, %	21.97 ^a	20.36 ^{ab}	19.50 ^b	19.43 ^b	19.68 ^b	19.95 ^b	18.70 ^b	0.28	0.028
Gizzard, %	1.34	1.19	1.11	1.15	1.33	1.15	1.23	0.12	0.088
Liver, %	1.18	1.17	1.08	1.12	1.03	0.99	1.01	0.03	0.337
Heart, %	0.36	0.35	0.40	0.35	0.39	0.36	0.35	0.01	0.791
Abdom.fat, %	1.17	1.51	1.47	1.40	1.57	1.67	1.67	0.08	0.412

Note: a,b,c,d,e- different superscripts within a row indicate statistically significant differences at $P<0.05$ in non-parametric Kruskal-Wallis test (% wings, % gizzards and % abdominal fat); % of viscera and abdominal fat was calculated with respect to body weight, and carcass cuts -vs grill weight; *breast with bone; CY - Carcass yield

Table 3 presents moisture, protein and fat contents (%) in breast and thigh meat of birds from control and experimental groups. There were no consistent differences ($P>0.05$) in breast meat moisture, protein and fat percentages among the groups. Thigh meat protein and fat contents were neither statistically significantly different. Moisture of thigh meat varied from 70.50% in turkey broilers whose feed was supplemented with thyme EO to 73.08% in the group that received oregano EO ($P>0.05$). Karakok et al. (36) have performed a comparative study on the moisture, protein and fat contents of various meats and reported that moisture content of

turkey meat was 73.12%, that of proteins- 24.38%, and of fats- 1.19%. Elimali et al. (37) observed no between-group and between-sex significant differences ($P>0.05$) of meat dry matter, crude protein in Japanese quails whose drinking water was supplemented with 1 ml or 1.5 ml plant extracts per 5 l water. However, Herkel et al. (38) reported that the addition of a mixture of phytogetic essential oils from oregano, anise and citrus fruits as well as of prebiotics (fructooligosaccharides) at a dose of 1 kg/100 kg compound feed resulted to increased dry matter and fat in the liver, and crude protein and ash content of muscles of turkeys.

Table 3. Chemical analysis of breast and thigh meat

Treatment	Parameters		
	Moisture	Protein	Fat
Breast			
C	73.51	23.96	1.18
T1	74.14	23.29	1.56
T2	72.48	23.51	1.23
T3	73.56	23.11	1.52
T4	73.36	23.87	1.93
T5	73.20	22.85	1.06
T6	73.07	23.00	1.89
SEM	0.18	0.16	0.17
P-value	0.284	0.205	0.781
Thigh			
C	71.92	19.63	6.16
T1	71.26	19.39	6.52
T2	72.94	19.31	4.73
T3	71.17	19.31	6.26
T4	73.08	19.91	5.22
T5	70.50	19.60	7.35
T6	71.34	19.60	7.65
SEM	0.27	0.17	0.31
P-value	0.057	0.977	0.098

The values of pH₂₄, meat colour coordinates (L*, a*, b*), WHC% and cooking loss percentages of breast and thigh turkey meat are presented in **Table 4**. The breast and thigh meat pH measured 24 h post mortem differed significantly between control and experimental groups (P<0.001). The highest breast meat

pH₂₄ was found out in group T1- 5.73 (*Matricaria chamomilla* EO) and group T3- 5.71 (*Lavandula angustifolia* EO) whereas the lowest was that of group T4 (*Origanum vulgare* EO) and T6 (*Hypericum perforatum* EO).

Table 4. Meat quality

Treatment	Parameters					
	pH ₂₄	L*	a*	b*	WHC%	Cooking loss%
Breast						
C	5.67 ^{ac}	54.65 ^{ab}	4.90	3.79	18.54	35.12 ^a
T1	5.73 ^a	53.36 ^b	5.62	3.27	17.15	28.50 ^b
T2	5.61 ^{bc}	53.12 ^b	4.04	2.94	19.15	30.31 ^b
T3	5.71 ^a	56.67 ^a	4.38	4.67	19.05	27.33 ^{bc}
T4	5.63 ^{bc}	53.87 ^{ab}	7.22	4.74	17.51	27.88 ^{bc}
T5	5.67 ^{ab}	52.43 ^b	4.23	4.48	21.73	23.69 ^d
T6	5.63 ^{bc}	53.04 ^b	4.08	3.75	18.65	24.78 ^{cd}
SEM	0.01	0.33	0.25	0.22	0.54	0.62
P-value	0.000	0.047	0.052	0.176	0.387	0.000
Thigh						
C	5.92 ^{ab}	49.64 ^a	13.13 ^{ab}	4.85 ^{ab}	17.12	31.30
T1	5.97 ^a	49.70 ^a	12.59 ^{abc}	4.90 ^{ab}	20.49	32.36
T2	5.88 ^{ab}	49.80 ^a	13.71 ^{ab}	7.16 ^a	17.95	37.50
T3	5.77 ^b	47.85 ^b	10.93 ^{bc}	4.04 ^b	22.13	32.91
T4	5.84 ^{ab}	48.59 ^{ab}	11.97 ^{abc}	4.52 ^{ab}	19.53	36.80
T5	5.97 ^{ab}	46.08 ^c	14.11 ^a	5.34 ^{ab}	20.33	35.71
T6	5.75 ^b	47.73 ^{bc}	10.72 ^c	4.73 ^{ab}	18.92	33.44
SEM	0.02	0.24	0.29	0.25	0.58	0.62
P-value	0.002	0.000	0.013	0.048	0.021	0.091

a-d - different superscripts within a column indicate statistically significant differences at P<0.0; Non parametric Kruskal- Wallis test for pH₂₄, L*, a*, b*

For thigh meat, the highest pH₂₄ of 5.97 was observed again in T1 group (EO from *Matricaria chamomilla*) and the lowest- in group T6 (EO from *Hypericum perforatum*)- 5.75. Lightness (L*) values of breast meat differed statistically significantly ($P<0.05$). Values in all groups were higher than 50, which is associated with PSE (39). The highest value L* in breast meat were demonstrated in birds supplemented with EO from *Lavandula angustifolia* - 56.67 and lowest L* in group T5- 52.43($P<0.05$). The highest value L* in thigh meat was measured in birds from group T2 (EO from *Rosmarinus officinalis*)- 49.80 and the lowest- in group T5 (EO from *Thymus vulgaris*)- 46.08. Küçükyılmaz et al. (40) observed increased lightness of meat in broilers supplemented with 24 mg/kg and 48 mg/kg feed lavender EO (*Lavandula stoechas*): 58.49 and 58.38 respectively, compared to 56.29 in control group. The redness (a*) and yellowness (b*) of breast meat did not differ significantly among the groups ($P>0.05$), yet a* and b* values showed considerable

differences in thigh meat ($P<0.05$). Water-holding capacity (WHC%) is one of the most important quality attributes of meat, in particular with regard to its processing suitability. Water-holding capacity (WHC) has been correlated with muscle pH, indicating that lower cooking losses are associated with higher muscle pH and better protein functionality (39). In this study, there were no relevant differences with respect to WHC% in the breast and thigh meat of studied groups of birds. Breast meat cooking loss% was the highest in control turkey broilers- 35.12% and the lowest in groups supplemented with *Thymus vulgare* EO- 23.69% and *Hypericum perforatum* EO- 24.78% ($P<0.001$). For this parameter, between-group differences in thigh meat were not considerable.

Table 5 presents the content of saturated fatty acids, linoleic acid, α -linolenic acid, Arachidonic acid, eicosapentaenoic acid and docosahexaenoic acid in breast and thigh meat of studied groups of turkey broilers.

Table 5. Effects of dietary herbs supplement essential oil on fatty acid composition (%) of thigh and breast meat in turkeys at 126 day of age

Treatment	Fatty acids					
	SFA	EPA20:5(n-3)	DHA22:6(n-3)	ALA18:3(n-3)	ARA20:4(n-6)	LA18:2(n-6)
Breast						
C	0.68	<0.001	<0.001	0.003	0.002	0.16
T1	0.73	<0.001	<0.001	0.004	0.002	0.20
T2	0.63	<0.001	<0.001	0.001	0.001	0.10
T3	0.73	<0.001	<0.001	0.004	0.001	0.13
T4	0.86	<0.001	<0.001	0.007	0.001	0.23
T5	0.55	<0.001	<0.001	0.002	0.001	0.08
T6	0.81	<0.001	<0.001	0.005	0.003	0.31
SEM	0.06	-	-	0.000	0.000	0.03
P-value	0.925	-	-	0.338	0.735	0.514
Thigh						
C	3.07	0.005	<0.001	0.007	0.006	0.83
T1	2.83	0.004	<0.001	0.013	0.008	1.01
T2	1.93	0.002	<0.001	0.016	0.007	0.82
T3	2.78	0.002	<0.001	0.030	0.004	0.89
T4	2.35	0.004	<0.001	0.009	0.006	0.75
T5	3.05	0.005	<0.001	0.017	0.006	1.13
T6	3.46	0.005	<0.001	0.023	0.006	1.11
SEM	0.14	0.000	-	0.003	0.001	0.05
P-value	0.058	0.409	-	0.264	0.751	0.269

*- SFA- saturated fatty acids; EPA- Eicosapentaenoic acid; DHA- Docosahexaenoic acid; ALA- α -linolenic acid; ARA - Arachidonic acid; LA- Linoleic acid

The increase in polyunsaturated fatty acids in meat influences not only lipid oxidation, but also meat colour, flavour and oxidative stability (31). The analysis of saturated fatty acid content of breast and thigh meat of turkeys did not differ considerably in the present study. The content of EPA20:5(n-3)-

eicosapentaenoic acid in breast meat was <0.001 in all studied groups, in line with data reported by Ribarski and Oblakova (41) for lack of (n-3)- eicosapentaenoic acid in female wild turkeys and content of 1.73% in the breast meat of female turkey poults. The differences with regard to the other studied unsaturated

fatty acids in breast and thigh meat of all groups were not significant. The addition of herbal EO to turkey feed had no effect on the content of unsaturated fatty acids, linoleic acid, α -linolenic acid, arachidonic acid, eicosapentaenoic acid and docosahexaenoic acid in thigh meat of studied groups. In a study of Smet et al. (42) with broiler chickens and of Elmalı et al. (37) with quails, whose diets were supplemented with various plant extracts, no substantial effect on meat fatty acid content was demonstrated, which is in line with results from the present study. İpçak and Alçiçek, (43), have investigated the effect of main ingredients carvacrol in thyme essential oil (*Origanum vulgare*), cinnamaldehyde from cinnamon essential oil (*Cinnamomum zeylanicum*) and oleoresin from capsicum in *Capsicum annuum* added at 150 mg/kg feed on fatty acid content of breast and thigh meat of broiler chickens. They found out increased content of C20:5n-3 eicosapentaenoic acid and C20:1 eicosanoid acid of breast meat in birds supplemented with a mixture of the three additives in comparison to the other groups.

CONCLUSION

The addition of 0.01% EO from *Matricaria chamomilla*; *Rosmarinus officinalis*; *Lavandula angustifolia*; *Origanum vulgare*; *Thymus vulgaris*; or *Hypericum perforatum* to turkey broiler feed influenced significantly ($P < 0.05$) thigh and breast meat pH measured on post mortem hour 24. The tested essential oils supplements resulted in statistically significant differences in breast and thigh meat lightness (L^*) ($P < 0.05$). The highest value L^* in breast meat were demonstrated in birds supplemented with EO from *Lavandula angustifolia* (T3) - 56.67 and lowest L^* in group T5- 52.43 ($P < 0.05$). The highest value L^* in thigh meat was measured in birds from group T2 (EO from *Rosmarinus officinalis*)- 49.80 and the lowest- in group T5 (EO from *Thymus vulgaris*) - 46.08. The redness (a^*) and yellowness (b^*) of breast meat did not differ significantly among the groups ($P > 0.05$), yet a^* and b^* values showed considerable differences in thigh meat ($P < 0.05$). Cooking loss % of breast meat was the highest in control birds - 35.12% and the lowest - in group T5 (EO from *Thymus vulgaris*) - 23.69% and group T6 (EO from *Hypericum perforatum*)- 24.78% ($P < 0.001$). The essential oil supplements did not alter significantly the content of saturated and unsaturated fatty acids, linoleic acid, α -linolenic acid,

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arachidonic acid, eicosapentaenoic acid and docosahexaenoic acid in breast and thigh meat of studied groups of turkeys.

ACKNOWLEDGEMENTS

The present study is a part of the project "Opportunities for obtaining functional foods from poultry"- №КП-06- Г 26/3 from 04.12.2018 funded by the Bulgarian National Science Fund in the competition for Financial Support for a basic research project.

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