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The Effect Medicinal Plants on Performance, Carcass Parameters and Meat Quality in Broiler Chickens

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Highlights:

- Alp Atay

Keywords:

- Broiler chickens
- Carcass
- Meat quality
- Medicinal and aromatic

ABSTRACT:

This study was conducted to investigate the effects of adding dietary Garlic, Ginger, Turmeric and their powders mixture in broiler chicken's diet on performance, carcass characteristic and meat quality. A total of 400 (200 male and 200 female) day-old Ross-308 broiler chicks were distributed into 5 dietary treatments; (T1) 0% powder, (T2) 0.5% Garlic powder, (T3) 0.5% Ginger powder , (T4) 0.5% Turmeric powder and (T5) 0.5% mixture of these powders with 4 replicates and each replicates included 10 man and 10 female having similar body weight. The results of this study showed that adding of this medicinal and aromatic plants powder in broiler chicken's diet caused significant effect on broiler chickens performance at the 7, 14 and 21 days of age ($P<0.05$) and also have a beneficial effect on mortality. On the other hand, it was observed that the adding of 0.5% medicinal and aromatic plants in broiler chicken's diet had no a significant effect on hot carcass, cold carcass, breast, thigh, wings and visceral organs weight ($P>0.05$), but have a significant effect on carcass yield ($P<0.05$). Also, adding of this medicinal and aromatic plants powder had a significant effect on meat breast colour values ($P<0.05$). İt may be concluded that adding of these medical and aromatic plants powder in broiler chicken's diet have beneficial effects on performance, carcass characteristic and meat quality.

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INTRODUCTION

The way for people to live a healthy life is through a healthy diet. Nutrition includes physical satisfaction as well as balanced consumption of nutrients necessary for life. As the rapid increase in the world population constantly increases the need for animal products. Poultry meat and egg have valuable nutrients including proteins for human nutrition and a source of income for the community in many development and undevelopment countries therefore; poultry production has a very important role in the economic development of society (Abd El-Hakim et al., 2009). So, poultry production industry focused to optimize growth performance of broiler chicken through better growth rate and improved feed intake and body weight especially after COVID-19 crisis (Al-Khalaifah et al., 2022; Sugiharto et al., 2020). In poultry industry, antibiotics used for many years to stimulate growth and development of broiler and this amount is approximately five times the amount of antibiotics used for disease treatment (Nir and Şenköylü, 2000). Antibiotics are chemical composition and produced by microorganisms such as fungi and bacteria and protect their environment from the effects of harmful microorganisms. Antibiotics have economic benefits by increasing yields, but have been shown to cause adverse effects when used. The most important of these negativities is in animal ration. The used antibiotics leave residues on animal products and cause resistance of microorganisms to antibiotics and this resistance can be transferred from one microorganism to another and from one antibiotic to another and thus used in the treatment of diseases cross-resistance to antibiotics (Braykov et al., 2016; Özkan et al., 2007). Therefore, the modern trend is to replace chemical antibiotic growth promoters with some natural growth promoters such as medicinal and aromatic plants powder, medicinal and aromatic plant extracts, probiotics and enzymes (Bednarczyk et al., 2016; Al-Massad et al., 2018; Mondal et al., 2015). Phytogenic growth promoters have a beneficial effect on gut health for optimum function. On other hand, these components are ideal for animal and human due to the natural, residue free, eco-friendly and above all having no side effects also, these components have antimicrobial, antiparasitic, insecticidal, antifungal, antiviral and antitoxic effects which according to these features improves feed consumption, digestibility, growth performance and reduce sisease and increased profitability (Yitbarek, 2015). Medicinal and aromatic plants have been used in cooking and treatment for many years. Some of these components are garlic, ginger and turmeric and most of the rhizome of these plants are used. Garlic can be used as a growth stimulant due presence of oreganosulfur compounds such as Allicin, Allicin Ajoene, Diallylsulfide, Dithin and S-Allylcysterine (Teshika et al., 2019). Ginger contains some compounds such as Gingerol and Gingerdione which have antioxidant activity also, according to reports, ginger can play an antibacterial properties and immonomodylatary role in labratory animals (Al-Nasser et al., 2020; Dieumou et al., 2009). Turmeric contains active ingredients such as curcumin, desmethoxycurumin, bisdemethoxycurcumin and tetrahydrocurcuminodis (Borazjanizadeh et al., 2011) which according to these features traditionally used to treat various diseases, liver obstruction, fresh wounds and diabetes (Demir et al., 2003). Recent studies on the use of these plants in the broiler's diet indicate their different effects. İt was reported that adding of 3, 6, 9 g/kg-1 medicinal and aromatic plant (rosemary) in layer hens diet at 63-52 weeks of age does not have significant effect on feed intake, feed conversion ratio, body weight but total cholesterol, IgM and Ig A amounts were affected by the experimental diets (Alagawany et al., 2015). İn the another study showed that, adding of 1%, 2% and 3% Allium sativum in broiler chicken's diet have not any effect on broiler performance and hematological parameters but it can change total cholesterol, liver cholesterol, trigliserid, abdominal fat and LDL amounts (Adebiyi, 2017).

In the study which was conducted in Japanes quail it was demonstrated that, adding of 1ml/l chamomile, mint and oregano extract in drinking water of quail have not effect on production, feed intake, feed conversion ratio but reduced egg cholesterol, reduced bacteria population and increased villi height (Behnamifar et al, 2018). This present study was conducted to evaluate the effects different feed additives su az garlic, ginger, turmeric and there powders mixture on performance, carcass characteristics and visceral organs weight in broiler chickens.

MATERIALS AND METHODS

Ethical Statement

All practices used in this study were approved by Animal Experiment Ethic Committee of Cukurova University (Date: 13.09.2021, Number: E57730304-604.01.01.12336). All steps of this study were conducted in Broiler Unit of Experimental Farm of the Department of Animal Science, Faculty of Agriculture, University of Cukurova, Adana, Türkiye.

Trial groups and nutrition

Total of 400 day old broiler chicks (200 male and 200 female) were used in this study.

Table 1. Ingredient and Nutrient Compositions of Broiler Diets

Ingredients (%)	Starter (0-10 days)	Grower (11-21 days)	Finisher (22- days)
Yellow Corn	43.18	46.65	50.72
Soybean Meal	15.60	7.69	0.00
Full Fat Soybean	14.18	16.69	26.22
Wheat Short (15% CP)	13.04	13.04	11.18
Maize Gluten Meal (60% CP)	5.00	3.00	0.00
Poultry Offal Meal (52% CP)	-	4.00	4.00
Meat- Bone Meal (33% CP)	4.00	5.28	4.48
Soybean Oil	2	2.00	2.00
DCP (18% CP)	0.60	0.00	0.00
Sodium Bicarbonate	0.11	0.08	0.00
Salt	0.17	0.13	0.22
Biyo-Lysine (60% CP)	0.77	0.61	0.37
Limestone	0.68	0.28	0.27
DL- Methionine	0.37	0.25	0.24
Vitamin Premix*	0.20	0.20	0.20
Mineral Premiz**	0.10	0.10	0.10
Total	**100.00**	**100.00**	**100.00**
Dry matter	88.00	88.00	88.00
Crude Protein	24.00	22.00	21.00
Ether extract	7.00	8.66	10.13
Crude fibre	3.20	3.17	3.37
Crude ash	6.03	5.80	5.48
Lysine	1.43	1.26	1.09
Methionine	0.70	0.56	0.50
Methionine + Cystine	1.07	0.84	0.86
Calcium	1.00	1.00	0.90
Available Phosphor	0.45	0.45	0.40
Sodium	0.16	0.16	0.16
Metabolizable Energy (kcal/kg)	3050	3150	3250

*:Each 2 kg of vitamin premix contains 15.500.000 IU Vitamin A, 5.000.000 IU Vitamin D_3, 100.000 mg vitamin E, 3.000 mg Vitamin K_3, 3.000 mg Vitamin B_1, 8.000 mg Vitamin B_2, 60.000 mg Niacin, 15.000 mg Ca-D-Pantotenate, 5.000 mg Vitamin B_6, 20 mg Vitamin B_{12}, 2.000 mg Folic Acid, 200 mg D-Biotin and100.000 mg Vitamin C, **:Each kg of trace mineral premix contains 80.000 mg Manganese, 60.000 mg Iron, 60.000 mg Zinc, 5.000 mg Copper, 200 mg Cobalt, 1000 mg Iodine, 200 mg selenium (sodium selenite), 500.000 choline chloride.

For this purpose, a total of 400 broiler chicks (Ross-308) were purchased from the producer and sexed by wing feathers according to the recommendation of Ross Management (Ross, 2014) and then

weighted by an electronic scale with sensitive of 0.01g in laboratory and 5 experimental groups were formed (T1: Control (without any adding), T2: Control+ %0.5 Garlic powder, T3: Control + %0.5 Ginger powder, T4: Control + %0.5 Turmeric powder, T5: Control + %0.5 mix of these powder with equal amount) with 4 replicates. All diets were used in this study based on corn and soybean and ingredient and nutritional composition of the diets used in study are given in Table 1.

Animal housing

After weighting and sexing of all birds, birds carefully transferred to the experimental unit and accommodated in 20 pens in completely randomized design so that each pens with a density of 20 birds/2m2 (10 male and 10 female). Each pen (replication) was equipped with a tube feeder and an automatic water- bowl on litter; wood shaving litter 4-5 cm height. Throughout the study (35 days) chicks reared under 23:1 light: dark photoperiod and environmental temperature was controlled by heating and tunnel ventilation system starting from 33°C in the fırst week and gradually decreased by 3°C per week until the fourth week then it fluctuated between 22-24°C.

Growth performance and carcass parameters of broiler chickens

During this study, the production parameters such as body weight, feed intake, feed efficiency and mortality were recorded on days 7, 14, 21, 28 and 35 on subgroup (replicate) bases. At the end of the study (35 days of age), all chicks were weighted individually and 12 birds (6 male+ 6 female) from each subgroup were selected according to average body weight of subgroup and transferred to Cukurova University's slaughter house with numbers of their feet in order to determine carcass yield, hot carcass weight, heart, gizzard, liver, spleen, pancreas and bursa fabrious weights. After measuring of these parameters, the carcasses of the birds was kept 4°C for 24 hours for determine the cold carcass, abdominal fat, breast, thigh and wings weights.

Meat physical analyses

In order to determine the meat color sample with the same dimensions were collected from right half of the chest, thigh and skin samples were collected from the right side of chest. Then color measurement (L*= Lightness; a*= redness and b*= yellowness) of breast and thigh were carried out using HunterLab, ColorFlex EZ device.

Statistical analyses

All data obtained in the study were analyzed using GLM procedure of SAS; the Statistical Analysis System [20] and Duncan's New Multiple Range Test in SAS were used to identify signification differences among treatments mean.

RESULTS AND DISCUSSION

The results obtained in the study are presented according to the statistical analyses, given in the relevant tables and discussed the frame of present literature. Results related to feed intake, body weight gain and feed conversion ratio were given in Table 2, Table 3 and Table 4 respectively. The data obtained from this experiment demonstrated that, the adding of garlic, ginger and turmeric powders in broiler chicken's diet have significant effects on feed intake at 14 and 21 days of age and feed conversion ratio at 7, 14 and 21 days of age ($P<0.05$). Also, feeding of broiler chicken with diets containing different feed additives have a significant effect on body weight gain at 7 and 14 days of age ($P<0.05$). Data obtained from this study demonstrated that feeding of chicks with this diets did have no significant effects on feed intake, Body weight and feed conversion ratio after the 21 days of

age (P>0.05). On the other hand, the results obtained from this study indicated that using of 0.5% of garlic, ginger and turmeric and there mix powders in broiler chickens' diet have a beneficiaal effects on mortality rate, so that the lowest mortality rate belonged to groups which received 0.5% turmeric (0%) and higher amount was related to control group (5%).

Table 2: The Effect of Experimental Diets on Feed İntake (g/chicks)

Day	Groups					SED	P=
	T1	T2	T3	T4	T5		
7	159.03	158.65	158.95	157.73	155.18	1.023	0.739
14	719.48^{b}	746.73^{a}	703.53^{b}	702.18^{b}	704.53^{b}	3.233	0.002
21	1554^{ab}	1564^{a}	1511.50^{b}	1529^{ab}	1529^{ab}	6.644	0.142
28	2711	2724	2646	2688	2655	15.91	0.482
35	3590	3635	3545	3587	3557	21.71	0.725

T1: Control (without any adding), T2: Control+ %0.5 Garlic powder, T3: Control + %0.5 Ginger powder, T4: Control + %0.5 Turmeric powder, T5: Control + %0.5 mix

Table 3: The effect of Experimental Diets on Body Weight Gain (g/chicks)

Day	Groups					SED	P=
	T1	T2	T3	T4	T5		
0	41.60	41.63	41.61	41.61	41.62	0.072	0.468
7	155.85^{a}	152.68^{ab}	149.10^{b}	150.75^{ab}	153.33^{ab}	0.773	0.117
14	565.93	559.23	545.15	547.55	553.45	3.467	0.350
21	1149	1109	1129	1122	1132	25.16	0.302
28	1853	1859	1841	1891	1893	56.77	0.608
35	2355	2388	2320	2355	2354	17.74	0.806

T1: Control (without any adding), T2: Control+ %0.5 Garlic powder, T3: Control + %0.5 Ginger powder, T4: Control + %0.5 Turmeric powder, T5: Control + %0.5 mix

Table 4: The effect of Experimental Diets on Feed Conversion Ratio and Mortality Rate

Day	Groups					SED	P=
	T1	T2	T3	T4	T5		
7	1.02^{b}	1.04^{ab}	1.07^{a}	1.05^{ab}	1.01^{b}	0.005	0.038
14	1.27^{b}	1.34^{a}	1.29^{b}	1.28^{b}	1.27^{b}	0.062	0.001
21	1.35^{ab}	1.41^{a}	1.34^{b}	1.37^{ab}	1.35^{ab}	0.039	0.127
28	1.43	1.45	1.44	1.45	1.44	0.009	0.972
35	1.53	1.52	1.53	1.53	1.51	0.006	0.914
Mortality rate (%)	5	2.5	2.5	0	2.5	0.764	0.405

T1: Control (without any adding), T2: Control+ %0.5 Garlic powder, T3: Control + %0.5 Ginger powder, T4: Control + %0.5 Turmeric powder, T5: Control + %0.5 mix

Carcass and visceral organs weight

The effects of experimental diets rations on carcass parameters are shown in Table 5. The results obtained from carcass analyses showed that there were no differences obtained for slaughter weight (P>0.05). Also, it can be seen that inclusion of 5% garlic, ginger, turmeric and there powder mix in ration caused a change in on broiler chickens carcass yield, so that lowest carcass yield was related to the control group when compared to other experimental groups (P<0.05). According to the statistical analysis for hot carcass weight, there was no statistical difference between the experimental groups (P>0.05). But according to the findings, it was observed that the highest hot carcass weights were related to the group which fed with rations containing garlic, turmeric and powders mix. In the statistical analysis for the cold carcass weights between experimental groups, no significant difference was found (P>0.05) but the highest cold carcass weight was found in the group fed garlic, turmeric, mixture, ginger and control group respectively. Using of 0.5% feed additives in broiler chicken's diet have a significant effect on thigh weight (in male chickens) and wings weights (in female chickens) (P<0.05), but does not have any significant effect on breast weights (P>0.05).

Table 5: The effect of Experimental Diets on Carcass Parameters of Broiler Chickens

Parameters	Gender	Groups					SED	P=
		T1	T2	T3	T4	T5		
Slaughter weight (g/chicks)	Male	2501	2598	2478	2634	2516	22.653	0.191
	Female	2418^{a}	2221^{ab}	2178^{b}	2206^{ab}	2206^{ab}	30.358	0.134
	Average	2460	2409	2328	2421	2361	1023	0.726
Carcass yield (%)	Male	77.86^{ab}	77.24^{ab}	76.99^{b}	77.66^{ab}	79.20^{a}	0.280	0.165
	Female	72.46	78.55	77.46	78.20	78.64	0.965	0.261
	Average	75.09^{b}	77.84^{ab}	77.22^{ab}	77.90^{ab}	78.96^{a}	0.495	0.205
Hot carcass weight (g/chicks)	Male	1948	2007	1909	2046	1993	23.719	0.433
	Female	1739	1744	1687	1725	1737	21.820	0.920
	Average	1844	1875	1798	1885	1865	834.3	0.844
Cold carcass (g/chicks)	Male	1811	1958	1861	1986	1934	24.800	0.204
	Female	1765	1686	1635	1668	1659	21.578	0.410
	Average	1788	1822	1748	1827	1796	2582	0.876
Breast	Male	598	628	615	615	625	11.837	0.938
	Female	568	570	532	573	535	10.306	0.559
	Average	583	599	575	594	580	9.144	0.913
Thigh	Male	569^{ab}	580^{a}	503^{b}	565^{ab}	583^{a}	10.235	0.137
	Female	508	483	492	458	478	14.829	0.873
	Average	538	531	497	512	530	10.989	0.756
Winks	Male	145^{b}	155^{b}	138^{b}	173^{a}	148^{b}	2.599	0.007
	Female	155^{a}	128^{b}	136^{b}	137^{b}	130^{b}	2.699	0.043
	Average	150	141	137	155	139	3.566	0.090

T1: Control (without any adding), T2: Control+ %0.5 Garlic powder, T3: Control + %0.5 Ginger powder, T4: Control + %0.5 Turmeric powder, T5: Control + %0.5 mix

Table 6: The effect of Experimental Diets on Visceral Organs of Broiler Chickens

Parameters	Gender	Groups					SED	P=
		T1	T2	T3	T4	T5		
Abdominal fat (g/chicks)	Male	85.73	29.80	29.70	36.95	28	12.125	0.527
	Female	26.55	27.30	25.18	30.73	31.30	1.708	0.742
	Average	56.14	28.55	27.44	33.84	29.65	1930	0.550
Heart (g/chicks)	Male	10.50^{b}	12.67^{a}	11.58^{ab}	12.52^{a}	11.71^{ab}	0.116	0.043
	Female	11.42	10.10	10.22	9.95	9.33	0.212	0.390
	Average	10.96	11.38	10.90	11.23	10.52	0.302	0.910
Gizzard (g/chicks)	Male	36.03	40.22	37.31	40.36	30.85	0.979	0.310
	Female	33.28	32.32	33.49	31.50	30.21	1.228	0.969
	Average	34.65	36.27	35.40	35.93	30.53	1.169	0.546
Liver (g/chicks)	Male	57.49	48.97	58.89	58.29	57.57	2.171	0.829
	Female	59.77	48.65	48.14	49.88	48.94	1.431	0.422
	Average	58.63	48.81	53.51	54.08	53.25	1.772	0.559
Spleen (g/chicks)	Male	2.06	2.72	2.55	2.93	2.39	0.131	0.665
	Female	2.99^{a}	2.21^{ab}	1.81^{b}	2.15^{ab}	1.55^{b}	0.089	0.092
	Average	2.52	2.46	2.18	2.54	1.97	0.135	0.613
Pancreas (g/chicks)	Male	8.05	6.46	6.94	8.06	5.41	0.322	0.408
	Female	7.04	5.71	6.26	6.47	6.64	0.154	0.484
	Average	7.54	6.09	6.60	7.26	6.02	0.250	0.254
Bursa fabricius (g/chicks)	Male	3.60	3.78	3.23	3.58	3.53	0.164	0.875
	Female	2.63^{b}	3.23^{ab}	3.38^{ab}	3.95^{a}	4.03^{a}	0.180	0.141
	Average	3.11	3.50	3.30	3.76	3.78	0.122	0.369

T1: Control (without any adding), T2: Control+ %0.5 Garlic powder, T3: Control + %0.5 Ginger powder, T4: Control + %0.5 Turmeric powder, T5: Control + %0.5 mix

Data related to broiler chickens visceral organs weight are given in Table 6. According to Table 6, it can be seen that abdominal fat amounts improved between experimental groups whose diets having 0.5% ginger, garlic and turmeric powders than the control group. According to this table, it can be seen that feeding of diets which were containing 0.5% garlic, ginger, turmeric and these powders mix does not affect heart and gizzard weights (P>0.05). Also, Included of 5% ginger, garlic, turmeric and mixture powder in broiler chicken's diet does not have significant effect on liver and spleen weights but, higher liver and spleen were related to control and turmeric groups respectively (P>0.05). As known, bursa fabricius is one of the organs of the immune system and adding of 0.5% garlic,

ginger, turmeric and mix of these powders in broiler chicken's diet numerically increased this organ weight.

Meat physical analyses

Results related meat physical parameters were given in Table 7. The results obtained from this study revealed that the adding of 0.5% Garlic, Ginger and Turmeric powders in broiler chicken's diet have significant effects on breast color (P<0.05). According to Table 7, it can be seen that breast (a* and b*) colors affected by experimental diet but breast l* color was not affected by experimental diet. The highest value of redness (a*) of breast was observed in treatment with the addition of 0.5% Turmeric with significant differences compared to other experimental dietary treatments. Also it can be seen that feeding of diets which was containing 0.5% Garric, Ginger, Turmerik and there powders mixture does not have any significant effect on thigh color (P>0.05). Data obtained from this study indicated that values of lightness, redness and yellowness of thigh were higher in groups which feed diets containing 0.5% Ginger, mixture and control groups respectively.

Table 7: The effect of Experimental Diets on Meat Physical Parameters

		Gruplar						
Parameters	**Gender**	**T1**	**T2**	**T3**	**T4**	**T5**	**SED**	**P=**
Breast l*	**Male**	45.20	47.47	45.66	47.23	47.19	2089	0.738
	Female	47.07	48.48	48.02	47.01	48.04	5496	0.884
	Average	46.13	47.98	46.84	47.12	47.62	1318	0.675
Breast a*	**Male**	4.36^{a}	3.47^{ab}	2.99^{b}	4.13^{ab}	4.35^{a}	0.179	0.110
	Female	2.89	2.89	3.49	4.82	4.12	2994	0.239
	Average	3.62^{ab}	3.18^{b}	3.24^{b}	4.47^{a}	4.24^{ab}	1756	0.088
Breast b*	**Male**	13.69^{ab}	14.61^{ab}	12.55^{b}	15.19^{a}	14.73^{ab}	3393	0.160
	Female	13.09	14.65	13.69	15.04	15.03	3055	0.219
	Average	13.39^{bc}	14.63^{ab}	13.12^{c}	15.11^{a}	17.88^{a}	2173	0.016
Thigh l*	**Male**	47.99	52.98	47.81	51.69	48.57	3035	0.343
	Female	51.87	51.86	53.25	51.57	45.32	3939	0.330
	Average	49.93	52.42	50.53	51.63	46.94	2472	0.237
Thigh a*	**Male**	4.63	4.71	5.83	5.24	5.72	4812	0.896
	Female	6.11	4.41	4.27	5.58	5.71	5206	0.704
	Average	5.37	4.56	5.05	5.55	5.72	1072	0.833
Thigh b*	**Male**	13.95	14.30	13.09	13.20	13.70	1859	0.960
	Female	16.99^{a}	14.41^{ab}	16.08^{ab}	13.24^{b}	16.69^{ab}	4027	0.073
	Average	15.47	14.35	14.58	13.22	14.19	1167	0.443

T1: Control (without any adding), T2: Control+ %0.5 Garlic powder, T3: Control + %0.5 Ginger powder, T4: Control + %0.5 Turmeric powder, T5: Control + %0.5 mix

In this study broiler chickens feed intake was affected by dietary garlic, Ginger, Turmeric and these powders mixture at the 14 and 21 days of age. Our study results are agreement whit previous studies. For example; it was demonstrated that, included 0, 5, 10 and 15 g/kg higher powder in broiler chicken's diet and reported that, the experimental diets have a significant effect on feed intake but does not have any significant effect on body weight and feed conversion ratio (Al-Khalaifah et al., 2022). Effects of thyme and turmeric powders on broiler chicken performance were investigated by some researcher. These researcher added 5 g/kg turmeric, 5 g/kg thyme and mix of these powders (25+25 g/kg) in broiler chickens diet and reported that body weight and feed conversion ratio were not affected by the experimental diet (Fallah and Mirzaei, 2016). Also, it was demonstrated that feeding of diets which were containing 100, 200 and 300 mg/kg of thyme and 100, 200 and 300 mg/kg garlic oil does not have any effects on feed intake and body weights of broiler chickens (Saleh et al., 2014). On the other hands, according to some researches inclusion of 1% garlic, ginger and these powders mix in Cobb-400 broiler chickens ration have a significant effect on feed intake, body weight and feed conversion ratio (Karangiya et al., 2016). İn the other study on broiler chickens it was showed that,

supplementing broiler feed diets with 12, 240, and 360 ppm of ginger increased the broiler body weight gain (Tekeli et al., 2011). Also, it was informed that inclusion of 0, 0.25, 0.50, 0.75 and 1% turmeric powder in broiler chickens diet have significant effect on body weight and Feed conversion ratio but does not have any effect on mortality rate (Ekine et al., 2020). In the other study, researcher included 2% ginger powder in broiler chicken's diet and the showed that ginger powder increased body weight of broiler chickens and our study result is in contrast with these researcher results (Moorthy et al., 2009). Also, Yesuf et al., 2023, demonestrated adding of some medicinal planst such as black cumin, fenugreek and turmerik in Cobb 500 broiler chickens diet have a significant effect on feed convertion ratio, body weight gain, and final body weights ($P<0.05$). Another researcher reported that, fed of broiler chickens with diets which were supplemented with different levels of cumin meal and çopra or cocount mel significantly improwed body weigh and feed conversion ratio (Zaazaa et al., 2023) ($P<0.05$). Our study results are inconsistent with some study results and it seems that, this difference is due to the level of medical and aromatic plants used in feed or their particle size.

Effects of medicinal and aromatic plant on broiler chickens carcass characteristics were investigated by some researchers and our results are agreement whit these researcher results. For example; included of 0.25, 0.50 and 0.75 g/kg garlic powder and phenyl acetic acid in Cobb broiler chicken's diet and researcher demonstrated that, amounts of slaughter and heart weights were not affected by the feed additives but liver weight affected by the experimental rations (Ismail et al., 2021). In the another study which was conducted by Mustafa et al. (2021), it was demonstrated that, the weights of heart, spleen, gizzard and bursa fabricus of broiler chickens were not affected by diets which were containing 50, 75 g/ton curcumin, and 1.65, 2.5kg/ton turmeric powder. Ashour et al. (2020), added 300 g red pepper, 300g thyme, 300g rosemary, 150g anise, 150 g min, 300g black cumin and 300g garlic powder in broiler chickens diet for 35 days and reported that these feed additives does not have significant effect on liver and heart weights. Adding of different levels (%0, 0.5, 1 and 1.5) of turmeric in broiler chicken's ration did not affect liver weight but improved carcass yield and abdominal fat (Mondal et al., 2015). Also, it was reported that supplementation of broiler chickens' diet with 0.05, 1, and 2 % fermented medicinal plant combination does not have any significant effect on gizzard, heart, splen, bursa and liver wights (Bostami et al., 2017). On the other hand our results are in contrast with some researches. It was showed that feeding of diets which were containing 1% garlic powder and 0.9g/kg-1 probiotic by broiler chickens have significant effect on carcass yield, heart, gizzard, spleen, abdominal fat and liver weights (Rastad, 2020). Al-Massad et al. (2018), demonstrated that inclusion of 2.5, 5, 7.5 kg/ton garlic powder in 400 broiler chicken's diet have a significant effect on heart, liver, gizzard and abdominal fat amounts.

Physical and organoleptic have been essential for broiler meat quality and acceptance (Mir et al., 2017). The results of this study showed that meat color in broiler chickens can be affected by the experimental diet. The results of this study are consistent with the results of some researcher. So Theshla et al. (2019) reported that the color of breast meat (l*, a*, b*) of broiler chickens was affected by diets which were containing blak paper, Hot red paper and mixture of these powder. It was suggested that herbal plants may delay myoglobin oxidation and preventing muscle protein denaturation in broiler meats and finally change the amount of a* and b* colour amounts in this way (Rastad, 2020). Also, it was reported that, herbal plants can increases hemoglobin in broiler tissue and support of this, it was suggested levels of 200, 400, 600 and 800 mg/kg turmeric extract improved broilers digestion and metabolism and due to this hemoglobin production was increased in broiler tissue and ultimately produced redder meat in broilers (Sugiharto, 2011). According to these

researchers supplementation of chicken's diet whit herbal may enhance pigment deposition in broiler meats especially yellow pigment and it causes the change colour of meat (Sugiharto, 2020).

CONCLUSION

In could be concluded that use of 0.5% Garlic, Ginger, Turmeric and these powders mixture in broiler chicken's diet improve feed intake (at 14 and 21 days), body weight gain (at 7 days) and feed conversion ratio (at 7, 14 nad 21 days). İt would also be concluded that adding of these feed additives in the broiler chicken's diet have a significant effect on carcass yield, thigh, wings, heart, spleen and bursa fabricius. Also, supplementated of these plants in broiler chicken's diet have a significant effect on breast a, breast b and thigh b colours. According to the results obtined from this study, it can be said that the use of these medicinal plants in the diet of broiler chickens can have positive effects on performance, carcass parameters and meat colors.

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