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Original Research

Influence of herbal oil extracts on live broiler performance, carcass traits and relative weights of internal organs

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ABSTRACT:

The goal of this trail was to study the influence of the oil extracts of ginger and rosemary through directly via intra-crop gavage on live performance and carcass traits of broiler. One day old 192 unsexed ROSS 308 chicks were separated into six treatments (three replicates per treatment), (except 1st and 2nd treatment with two replicates) and 12 chicks per replicate, as follows; first oness, was the control group without any treatment, the second was a placebo group, the chicks were given normal saline (negative control), the chicks in 3rd and 4th treatments were given rosemary oil extracts, finally 5th and 6th treatments chicks gave ginger oil extract. The dosages of herbal oil extract were given intra-crop gavage twice per week in two interval periods (two days per interval) at the rate of 0.1 mL and 0.2 mL from the 1st to 4th week of age and from the 5th week till the end of the experiment at 6th week. Dosage increased from 0.1 mL to 0.5 mL and from 0.2 to 1 mL per chick with three times in a week (with one day off), in 2nd, 3rd, 4th, 5th and 6th treatments respectively, a medicinal syringe (5 mL capacity) was used and an extra 10 cm medicinal plastic pipe was added to the end of the medicinal syringe to insure the reach of oil extract directly to the chick's crop.

Results of intra-gavage oil extract of ginger root and rosemary leafs revealed that there were non-significant differences between treatment on broiler accumulative live performance, but the significant differences appeared in the herbal extract intra-crop gavage treated group in dressing percentage (with and without giblet), thigh, drum stick yields and in abdominal fat pad, internal organ relative weight at 28 and 49 days of broiler age.

Keywords:

Ginger root, Rosemary, Oil extract, Intra-crop gavage, Broiler performance, Carcass traits.

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INTRODUCTION

Recently a broad spectrum trend was arisen concerning the health status in animal management, and that was due to the use of phyto-compounds as feed additives to enhance animal growth and to decrease disease rate in animal production. However, these circumstances imposed the traditional way, especially stopping some antibiotics due to its side effects and its residuals in animal tissues. Many herbals are used in middle east region as spices and medicinal remedies (Khan *et al*., 2012; Gilani *et al.*, 2018). One of the famous herbal crops was ginger root (*Zingiber officinale*), which have many advantages in broiler performance, Tekeli *et al.* (2011) reported that using ginger in broiler feed had significant effect on live performance represented by weight gain and feed conversion ratio, in concurrent results. Barazesh *et al.* (2013) found significant effects in the performance by adding ginger root to broiler diet at the rate of 1.5%. Other researchers try to use another form of ginger root to improve broiler performance. Fakhim *et al*. (2013) reported that using aqueous extract of ginger root for first 10 days improve feed conversion ratio, also, Rafiee *et al.* (2013) use ginger extract in broiler diets. They found a significant improvement in the final body weight, feed conversion ratio and feed intake. They noticed additional improvement happened in broiler carcass traits; significant increase in drumstick and breast yields in ginger treated group.

Another most well-known herbal crop is rosemary (*Rosmarinus officinalis*) (Mounia *et al.,* 2018), it was one of the seasoning phyto-additives used widely as food additives for human and in animal nutrition as growth promoter due to polyphones contents in this herbal crop which had antimicrobial and antioxidant traits (Torki *et al.*, 2018). Increase in feed intake significantly enhance appetite (Attia, 2018), promote animal growth represented by final body weight and weight gain (Omar *et al.*, 2016), these advantages may be due to major rosemary essential oil ingredients (e.g. camphor 32%; 1,8-cineol 14.41% and alpha-pinene 11.56%) (Tomei *et al.*, 1995; Salzer, 1995).

Many scientific papers referred to non-significant effects of using rosemary leaves as it is, so, they tried to use another form of rosemary leaves like extracts or essential oils (Sudarshan *et al.,* 2010; Omonijo *et al.*, 2018). Cross *et al.* (2007) compared adding 10 g of rosemary leave to kg of basal ration, with 1 g / kg of essential oil of rosemary, they found that using essential oil of rosemary significantly improved feed conversion ratio due to the significant increase in feed consumption and without any significant difference with rosemary leave treatments. Findings of Cross *et al.* (2007) lead us to believe that using essential oil of rosemary would be better than using rosemary leave in improving broiler performance, meanwhile, to magnify the effects of ginger ingredients and enhance activities of these constituents. Ghasemi and Taherpour (2015) stated that dosage of ginger root in broiler diets are responsible to induce significant differences, hence, the quantities of active ingredients were small in ginger root. So, using extracts with high dosage will be sufficient to supply these ingredients at the rate of promoting active effects, thus, our study emphasized on using oil extract of rosemary and ginger to reduce inclusion rate in basal ration to allow spaces to the other basal ingredients and to facilitate using another approach of investigation about other phyto-compound *via* intra-crop gavage to broiler. In brief, our study aimed to investigate the effect of directly using phyto-compound extract (*via* intra-crop gavage), such as, ginger root and rosemary leaf oil extract on the broiler performance, carcass traits and relative internal organ weights.

MATERIALS AND METHODS

This experiment was conducted at Anbar University, College of Agriculture, Department of Animal Production. Herbal crops extracts (rosemary leave and

Table 1. Influence of herbal oil extracts (ginger root and rosemary leaf) intra-gavage on accumulative broiler performance (1-49 days).

Performance traits	T_1	T_2	T_3	T_4	T_5	T_6	Total mean	Prob.	SEM
Body weight (g)	2548.3	2691.5	2672.1	2666.9	2675.0	2558.4	2637.69	0.9600	51.085
Weight gain (g/bird/49 days)	2504.3	2647.5	2628.1	2622.9	2631.0	2514.4	2593.69	0.9600	51.085
Feed consumption (g/ bird/49 days)	4633.5	4356.8	5080.8	4805.8	4724.0	4891.7	4741.36	0.9540	199.88
Feed Conversion Ratio (g feed/g weight gain/49 days)	1.844	1.653	1.904	1.834	1.781	1.944	1.822	0.8161	0.0574
Mortality (%)	5.55	2.77	11.02	2.77	8.33	4.16	5.71	0.7467	1.750
Relative Growth Rate (%)	193.20	193.54	193.39	193.48	193.51	193.23	193.40	0.9722	0.1271
Production Efficiency Factor (%)	274.42	325.63	253.97	288.82	288.91	257.39	282.57	0.5407	11.594

[1]T_1=control without any treatment; T_2=normal saline placebo; T_3 and T_4=chicks were given with oil extract of rosemary leaf; T_5 and T_6= chicks were given oil extract of ginger root.
[2]The dosages of herbal oil extract were given via intra-crop gavage twice per week in two interval periods (two days per interval) at rate of 0.1 mL and 0.2 mL from 1st week to 4th week and from 5th week till end of experiment at 6th week, dosage increase from 0.1 mL to 0.5 mL and from 0.2 to 1 mL per chick three times in a week (with one day off), in 2nd, 3rd, 4th, 5th and 6th treatments respectively

ginger root) were taken from the local herbal market at AL-Anbar province. 192 unsexed ROSS 308 chicks at one day old were separated into six treatments (three replicates per treatment) (except 1st and 2nd treat. with 2 replicates) and 12 chicks per replicate, as follows; first one, was the control group without any treatment, the second was a placebo group, the chicks were given normal saline (negative control). The chicks in 3rd and 4th treatments were given rosemary oil extract, finally 5th and 6th treatment chicks gave ginger oil extract. The dosages of herbal oil extract were given through intra-crop gavage twice per week in two interval periods (two days per interval) at the rate of 0.1 mL and 0.2 mL from 1st week to 4th week and from 5th week till the end of the experiment at 6th week. Dosage increased from 0.1 mL to 0.5 mL and from 0.2 to 1 mL per chick three times in a week (with one day off), in 2nd, 3rd, 4th, 5th and 6th treatments respectively. A medicinal syringe (5 mL capacity) was used and an extra 10 cm medicinal plastic pipe was added to the end of medicinal syringe to ensure the reach of oil extract directly to chick's crop.

Broiler chicks were raised at four tiers (120X80X40 cm L, W and H) belong to four blocks, each tier represent the replicate of treatment (16 tires). Chicks were exposed to a standard environment and requirements of broiler rearing according to ROSS 308 manual (ROSS, 2016). Diets were given according to recommendations of NRC (1994), chicks were given free access (*ad libitum*) to feed and water. Starter diet were given through first 21 days of chicks life, then later period (22-49 days) chicks were given finisher diet. Commercial broiler diets (starter and finisher) were used and calculated according to the requirements of broiler (NRC, 1994), and its constituents illustrated according to the label (EMMESSA feed company; www. http://emessafeed.com) were as follows; starter diet contents, crud protein = 21.5 - 23.5%, ME = 2800 - 3000 kcal/kg, Methionine = 0.46%, Meth. + Cys.=0.82 - 0.84%, Lysine = 1.13 - 1.04%, available phosphor = 0.4% and Ca = 0.87%. Finisher diet ingredients were crud protein = 20 - 21.5%, ME = 2900 - 3100 kcal/kg, Methionine = 0.42%, Meth. + Cys. = 0.7 - 0.8%, Lysine = 1.2%, available phosphor = 0.4% and Ca = 0.87%. Chemical analysis of starter and finisher diets

Table 2. Influence of herbal oil extracts (ginger root and rosemary leaf) intra-gavage on carcass traits at 49 days of broiler age.

Carcass Parameters (%)	T_1	T_2	T_3	T_4	T_5	T_6	Total mean	Prob.	SEM
Dressing without giblet	68.67^{ab}	66.08^{b}	67.32^{ab}	70.19^{ab}	66.97^{ab}	71.51^{a}	68.36	0.05	0.6571
Dressing with giblet	72.87^{ab}	70.87^{b}	72.02^{ab}	74.26^{ab}	71.37^{b}	75.95^{a}	72.79	0.05	0.5765
Back yield	15.44	16.41	15.35	17.78	17.85	16.51	16.48	0.7385	0.5795
Breast yield	25.79	23.46	26.22	25.21	25.26	26.69	25.37	0.6050	0.5301
Thigh yield	10.55^{ab}	10.82^{ab}	10.20^{ab}	10.05^{ab}	9.68^{b}	11.52^{a}	10.45	0.05	0.2193
Drum stick yield	9.21^{abc}	9.36^{abc}	8.41^{bc}	9.51^{ab}	8.02^{c}	9.98^{a}	9.09	0.05	0.1986
Neck yield (%)	4.28	4.14	4.05	4.21	4.11	4.08	4.15	0.9813	0.0924
Wings yield (%)	7.00	6.97	7.10	6.72	7.11	6.51	6.91	0.7714	0.1220
Abdominal Fat pad (%)	1.89^{a}	1.03^{b}	1.53^{b}	1.83^{a}	1.59^{ab}	1.83^{a}	1.62	0.05	0.1004

[1]T_1=control without any treatment; T_2=normal saline; placebo; T_3 and T_4=chicks were intra-crop gavage with oil extract of rosemary leaf; T_5 and T_6= chicks were intra-crop gavage with oil extract of ginger root.
[2]The dosages of herbal oil extract were given via intra-crop gavage twice per week in two interval periods (two days per interval) at rate of 0.1 mL and 0.2 mL from 1st week to 4th week and from 5th week till end of experiment at 6th week, dosage increase from 0.1 mL to 0.5 mL and from 0.2 to 1 mL per chick three times in a week (with one day off), in 2nd, 3rd, 4th, 5th and 6th treatments respectively.

samples were analyzed using MPA apparatus (Multiple Purpose Analysis), ASTM D92 fully automatic, model no. TPO-3000, China. The chemical analysis of starter in MPA apparatus was 21.72% crude protein, 3.68% ether extract, 2.17% crude fiber, 7.77% moisture and 6.86% ash. The chemical analysis of finisher diet according to MPA apparatus was 19.63% crude protein, 3.46% ether extract, 2.10% crude fiber, 7.30% moisture and 6.48% ash.

Live performance of broilers were calculated weekly for body weight, weight gain, feed consumption, feed conversion ratio, production efficiency factor according to ROSS 308 manual (ROSS, 2016) and Relative Growth Rate (RGR) calculated according to Gondwe and Wollny (2005). At 49 days of broiler age, thirty six birds that had weights nearest to the mean weight of the treatment were selected (2 birds per replicate, 6 birds per treatment), weighed and killed by cervical dislocation. The carcass were scalded, de-feathered, and eviscerated, then, carcass traits were evaluated which include dressing percentage with and without giblets (gizzard, heart and liver), then, carcasses were cut off to primary broiler carcass yields then, the relative weight of carcass yields according to live body weight were calculated (ROSS, 2016).

At 28 and 49 days of broiler age, the relative weight of internal organs (after cleaning from digesta) were assessed according to Padihari *et al*. (2014) and Torres *et al*. (2015), firstly the gizzard, pro-ventriculus, heart, liver, pancreas, spleen, bursa of fabricius and gall bladder were cut off individually and weighed. Secondly, the whole gastrointestinal tract were obtained *via* cutting the gastrointestinal tract from the end of crop to the beginning of ileo-caecal junction. Then the small intestine were cleaned from the digesta and dried with desiccant papers. Thirdly, the gastrointestinal tract were separated into three segments. First segment was the duodenum segments which was determined from gizzard to pancreo-biliary ducts, the rest of gastrointestinal tract was jejunum and ileum segments. The jejunum segment were obtained from pancreo-biliary ducts to Meckel's diverticulum. The ileum was the last segment (from Meckel's diverticulum to ileo-caecal junction). Finally, the relative weight of three segments to the

Table 3. Influence of herbal oil extracts (ginger root and rosemary leaf) intra-gavage on internal relative organ weights at 28 days of broiler age

S. No	Relative internal organs	T_1	T_2	T_3	T_4	T_5	T_6	Total mean	Prob.	SEM
1	Heart (%)	0.630	0.726	0.702	0.610	0.767	0.631	0.675	0.5936	0.0272
2	Gizzard (%)	1.96	1.99	1.74	1.56	2.20	1.66	1.84	0.7345	0.1159
3	Proventriculs (%)	0.902	0.410	0.548	0.511	0.651	0.421	0.578	0.2557	0.0672
4	Pancreas (%)	0.251	0.267	0.286	0.318	0.327	0.313	0.290	0.5896	0.0135
5	Spleen (%)	0.109	0.095	0.103	0.072	0.099	0.051	0.090	0.4451	0.0083
6	Liver (%)	2.30	2.64	2.57	2.46	2.87	2.30	2.51	0.6869	0.0986
7	Bursa (%)	0.216^{ab}	0.231^{ab}	0.140^{b}	0.178^{ab}	0.324^{a}	0.159^{ab}	0.20	0.0500	0.0217
8	Gall blader (%)	0.164	0.182	0.149	0.180	0.200	0.156	0.171	0.9581	0.0147
9	Dod.(g/100 g of live wt)	0.93	0.90	0.89	1.08	1.14	0.79	0.95	0.7553	0.0614
10	Dod. (g/100 cm)	28.58	30.74	33.42	33.28	39.62	33.83	32.81	0.6155	1.5930
11	Ileum .(g/100 g of live wt)	1.28	1.22	1.18	1.26	1.61	1.00	1.25	0.7601	0.0903
12	Ileum (g/100 cm)	17.78	21.60	21.78	19.00	21.60	18.54	19.66	0.8969	1.0529
13	Jejunum (g/100 g of live wt)	1.67	1.53	1.28	1.36	1.56	1.27	1.45	0.4751	0.0674
14	Jejunum (g/100 cm)	27.49	26.85	24.80	22.58	26.68	27.54	25.85	0.7345	1.0148

[1]T_1=control without any treatment; T_2=normal saline, placebo; T_3 and T_4=chicks were intra-crop gavage with oil extract of rosemary leaf; T_5 and T_6= chicks were intra-crop gavage with oil extract of ginger root.
[2]The dosages of herbal oil extract were given via intra-crop gavage twice per week in two interval periods (two days per interval) at rate of 0.1 mL and 0.2 mL from 1st week to 4th week and from 5th week till end of experiment at 6th week, dosage increase from 0.1 mL to 0.5 mL and from 0.2 to 1 mL per chick three times in a week (with one day off), in 2nd, 3rd, 4th, 5th and 6th treatments respectively

length (g/100 cm) and to the weight (g/kg live weight) were measured (Padihari *et al*., 2014; Torres *et al*., 2015).

All data were transformed to arcsine (except data with un percentage), then were analyzed in own-way analysis by using General Linear Model (GLM) procedure of statistical package SAS version 9.1 (SAS Institute, 2004). The probability value less than 0.05 and 0.01 were considered to be significant between treatment means. The results were expressed as mean/pooled SEM.

RESULTS AND DISCUSSIONS

Impact of intra-gavage of herbal oil extract on accumulative (1-49 days) performance were illustrated in (Table 1). As obvious from the probability column in Table 1, there were no significant differences between treatments (T_1, T_2, T_3, T_4, T_5 and T_6) in final body weights (2548.3, 2691.5, 2672.1, 2666.9, 2675 and 2558.4 g respectively), accumulative weight gain (2504.3, 2647.5, 2628.1, 2622.9, 2631 and 2514.4 g respectively), feed consumption (4633.5, 4365.8, 5080.8, 4805.8, 4724 and 4891.7 g feed / bird/ 49 days respectively), feed conversion ratio (1.844, 1.653, 1.904, 1.834, 7.781 and 1.944 g feed/g weight gain/ bird/49 days respectively), mortality percentage (5.55, 2.77, 11.02, 2.77, 8.33 and 4.16% respectively), relative growth rate (193.20, 193.54, 193.39, 193.48, 193.51 and 193.23 % respectively) and production efficiency factor (274.42, 325.63, 253.97, 288.82, 288.91 and 257.39 % respectively). These finding were in line with the previous work of Saleh *et al.* (2014) who found non-significant difference of adding essential oils of ginger on the basal diets on live broiler performance, Habibi

Table 4. Influence of herbal oil extracts (ginger root and rosemary leaf) intra-gavage on internal relative organ weights at 49 days of broiler age

Relative internal organs	T_1	T_2	T_3	T_4	T_5	T_6	Total mean	Prob.	SEM
Heart (%)	0.498	0.561	0.541	0.540	0.478	0.601	0.536	0.6431	0.0193
Gizzard (%)	1.22^{ab}	1.11^{ab}	1.25^{ab}	1.09^{ab}	0.99^{b}	1.35^{a}	1.17	0.0500	0.0385
Proventriculs(%)	0.326	0.342	0.427	0.486	0.411	0.380	0.397	0.2221	0.0215
Pancreas (%)	0.218	0.180	0.182	0.210	0.204	0.206	0.200	0.7697	0.0089
Spleen (%)	0.106	0.142	0.135	0.112	0.112	0.087	0.118	0.8348	0.0117
Liver (%)	2.48	3.11	2.90	2.43	2.91	2.47	2.72	0.6559	0.1455
Bursa (%)	0.149	0.131	0.132	0.141	0.106	0.149	0.135	0.6301	0.0068
Gall bladder (%)	0.078	0.081	0.129	0.121	0.095	0.140	0.107	0.3224	0.0095
Dod.(g/100 g of live wt)	0.450^{ab}	0.401^{ab}	0.490^{a}	0.401^{ab}	0.371^{b}	0.415^{ab}	0.425	0.0939	0.0129
Dod. (g/100 cm)	34.98	29.72	34.31	36.86	27.33	31.88	32.88	0.3022	1.2797
Ileum .(g/100 g of live wt)	0.874^{ab}	0.886^{ab}	0.789^{b}	0.926^{ab}	0.830^{b}	1.029^{a}	0.884	0.0875	0.0234
Ileum (g/100 cm)	27.94^{ab}	25.67^{b}	25.18^{b}	31.78^{ab}	25.70^{b}	33.82^{a}	28.17	0.0299	0.9451
Jejunum (g/100 g of live wt)	0.854	0.833	0.771	0.875	0.866	0.835	0.838	0.8849	0.0261
Jejunum (g/100 cm)	24.26	25.08	20.94	25.91	24.35	25.03	24.18	0.4356	0.7526

[1]T_1=control without any treatment; T_2=normal saline, placebo; T_3 and T_4=chicks were intra-crop gavage with oil extract of rosemary leaf; T_5 and T_6= chicks were intra-crop gavage with oil extract of ginger root.
[2]The dosages of herbal oil extract were given via intra-crop gavage twice per week in two interval periods (two days per interval) at rate of 0.1 mL and 0.2 mL from 1st week to 4th week and from 5th week till end of experiment at 6th week, dosage increase from 0.1 mL to 0.5 mL and from 0.2 to 1 mL per chick three times in a week (with one day off), in 2nd, 3rd, 4th, 5th and 6th treatments respectively

et al. (2014) obtained the same non-significant results of current experiment on live performance of broiler when they use ginger as powder and as oil extract. The same trend of non-significant results were obtained in rosemary oil extract through intra-crop gavage to broiler on accumulative broiler performance (Table 1). These results were in accordance with the previous work of Norouzi *et al.* (2015), who added rosemary to broiler diets at different levels. The results of their work showed non-significant effects on broiler performance. Recently, Yildirim *et al.* (2018) use another form of rosemary in broiler diets (rosemary extract) and they found non-significant effects on live performance.

Results of carcass traits of broiler affected by intra-gavage of herbal oil extracts were showed in Table 2. Herbal oil extracts showed significant increase dressing percentage without giblets; 68.67, 66.08, 67.32, 70.19, 66.97 and 71.51% for control (T_1), normal saline (T_2), intra-crop gavage with oil extract of rosemary leave at the rate of 0.1 mL (T_3) and 0.2 mL (T_4), intra-crop gavage with oil extract of ginger root at the rate of 0.1 mL (T_5) and 0.2 mL (T_6) respectively, dressing percentage with giblets (72.87, 70.87, 72.02, 74.26, 71.37 and 75.95% respectively), also, yields of thigh (10.55, 10.82, 10.20, 10.5, 9.68 and 11.52 % respectively), drum stick (9.21, 9.36, 8.41, 9.51, 8.02, and 9.98% respectively), and abdominal fat pad (1.89, 1.03, 1.53, 1.83, 1.59 and 1.83% respectively). These results were in line with the findings of Oleforuh-Okoleh *et al.* (2014) when they noticed a significant increase of ginger treated broiler in dressing percentage and abdominal fat pad. These results were also obtained from Qorbanpour *et al.* (2018), who found that using ginger in broiler diets at the rate of 0.20% would significantly increase abdominal fat pad and gizzard without any significant effect on the rest of carcass parameters.

Significant results of carcass traits were obtained with rosemary oil extracts treated group (3rd and

4th treatments) as showed in Table 2. The results were also confirmed from the previous scientific papers dealing with rosemary. Ghazalah and Ali (2008) found a significant improvement in carcass broiler quality, involved color, taste, aroma, texture and overall acceptability, in contrast result. Loetscher *et al.* (2013) found non-significant effect of rosemary on carcass traits of broiler. Rostami *et al.* (2017) confirmed that the addition of rosemary in broiler diets had non-significant effects on carcass traits.

Results of relative internal organ weights were tabulated in Table 3 and 4, intra-crop gavage of oil extract from herbal crops revealed that significant differences between six treatments (T_1, T_2, T_3, T_4, T_5 and T_6) were occurred in Bursa of Fabricius at 28 day (0.216, 0.231, 0.140, 0.178, 0.324 and 0.159% respectively) and in gizzard at 49 day of broiler age (1.22, 1.11, 1.25, 1.09 0.99 and 1.35% respectively).

There were non-significant differences between the six treatments (T_1, T_2, T_3, T_4, T_5 and T_6) at 28 days of age on pancreas relative weight (0.251, 0.267, 0.286, 0.318, 0.327 and 0.313% respectively). also, the same was occurred in spleen (0.109, 0.095, 0.103, 0.072, 0.099 and 0.051% respectively), heart (0.630, 0.720, 0.702, 0.610, 0.767 and 0.631% respectively) and liver (2.30, 2.64, 2.57, 2.46, 2.87, and 2.30% respectively) relative weights of internal organs as illustrated in Table 3.

The non-significant differences between six treatments of some relative weight of internal organs were continued on 49 days of broiler age (Table 4). The non-significant differences between treatments (T_1, T_2, T_3, T_4, T_5 and T_6) were occurred in heart (0.498, 0.561, 0.541, 0.540, 0.478 and 0.601% respectively), proventriculs (0.326, 0.342, 0.427, 0.486, 0.411 and 0.380% respectively), pancreas (0.218, 0.180, 0.182, 0.210, 0.204 and 0.206% respectively), spleen (0.106, 0.142, 0.135, 0.112, 0.112 and 0.087% respectivley), liver (2.48, 3.11, 2.90, 2.43, 2.91, and 2.47% respectively), Bursa (0.149, 0.131, 0.132, 0.141, 0.106 and 0.149% respectively), and gall bladder (0.078, 0.081, 0.129, 0.121, 0.095 and 0.140% respectively) as tabulated in Table 4.

The results on non-significant were in line with Loetscher *et al.* (2013) who found non-significant differences between the treatments of rosemary leaves on the internal organ weights (pancreas, spleen, heart and liver), whereas, Alimohammedi-Saraei *et al.* (2018) found that supplementing broiler diets with 0.5 and 1% of rosemary extract significantly increased internal organ relative weight (pancreas, heart and proventriculus), Elmakki *et al.* (2013) found significant increase in liver weight of ginger treated bird, whereas, Habibi *et al.* (2014) did not find any significant effect of adding ginger root or its essential oil on relative weight of liver, pancreas, heart, gizzard, spleen, Bursa of Fabricius and small intestine. The results of current experiment were in agreement with most of the previous works dealing with using herbal extracts (ginger root and rosemary leave). A new investigation by using the intra-crop gavage approach as alternative method to study the direct effect of these herbal extract instead of traditional methods (e.g. feed additive and water), was used as, the traditional methods did not insure the direct reaching of these herbal extract to intestine without environment interactions. In spite of direct contact with foregut of broiler (crop and upper gastrao-intestinal tract), the results were non-significant, and this may be due to several reasons, we brief this as follows; first, using the current method (intra-crop gavage), only used in challenge studies to establish infected bird with specific pathogens (e.g. *Salmonella, Compalobacter*), so, the doses of these microorganisms were known, whereas, the doses of oil extract were unknown and need more preliminary experiment to standardize effective doses of these extract. In the current study the doses calculate according to daily feed consumption, and that was not enough to standardize the optimum and effective dose of these

extracts, so, this approach needed more experiments to determine a precise dose of these extracts. Secondly, many researchers have already reported that active ingredients of herbals were in its oil content (Salzer, 1995), Sasidharan and Nirmalamenon (2010) reported many antioxidant materials found in ginger oil (e.g. zingiberene, β-sesquiphellandrene, sabinene, ar-curcumene and β-bisabolene), so, they hypothesized that using these oil extract would be sufficient to establish minimum effective dose of these herbals instead of using full herbal crops to allow more space to another feed additives (e.g. vitamins, antibiotics, probiotics). Our study reflect our belief that herbal crops will work as a whole or entire plant and not as partitioning parts, so, using a part of herbal plant will not be effective as the whole part of herbal crop. Finally, Habibi *et al.* (2014) thought that using ginger root as powder form was better than its oil extract, because, herbal crops would be impaired in some active compounds during processing, especially the ingredients that are responsible for pungent taste (e.g. gingerols and shogaols) which enhance feed intake. Cross *et al.* (2007) confirmed this opinion when they use rosemary, thyme and oregano in broiler diets. In future, herbal crops should be used in another approach than using herbal extract in broiler production. Whole plant should be explored for wide knowledge about the specific doses of active ingredient to establish optimum effect of herbal crops on live performance of broiler.

CONCLUSION

The results showed non-significant differences between treatments except the significant differences in intra-crop gavage herbal extract treated group in Bursa of Fabricius at 28 days of age and gizzard at 49 days of broiler age.

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REFERENCES

Alimohammedi-Saraei MH, Chamani M, Seidavi AR, Sadeghi AA and Amin-Afshar M. 2018. Effect of green tea and rosemary extract on performance, organ weights and blood parameters of broiler. *Journal of Livestock Science*, 9: 32-42.

Attia FA. 2018. Effects of dietary rosemary leaves and black seed on broiler performance. *Egyptian Poultry Science Journal*, 38(2): 465-481.

Barazesh B, Pour MB, Salari S and Abadi TM. 2013. The effect of ginger powder on performance, carcass characteristics and blood parameters of broilers. *International Journal of Advanced Biological and Biomedical Research*, 1(12): 1645-1651.

Cross DE, McDevitt RM, Hillman K and Acamovic T. 2007. The effect of herbs and their associated essential oils on performance, dietary digestibility and gut microflora in chickens from 7 to 28 days of age. *British Poultry Science*, 48(4): 496–506.

Elmakki AM, AbdelAtti Kh A, Dousa BM, Elagib HAA, Malik HEE and Elamin Kh M. 2013. Effect of dietary ground ginger (*Zingiber officinale*) root additive on broiler performance. *Global Journal of Animal Scientific Research,* 1(1): 76-83.

Fakhim R, Ebrahimnezhad Y, Seyedabadi HR and Vahdatpour T. 2013. Effect of different concentration of aqueous extract of ginger (*Zingiber officinale*) on performance and carcass characteristics of male broiler chickens in wheat-soybean meal based diets. *Journal of Bioscience and Biotechnology,* 2(2): 95-99.

Ghasemi HA and Taherpour K. 2015. Comparison of broiler performance, blood biochemistry, hematology and immune response when feed diets were supplemented with ginger essential oils or mannan-oligosaccharide. *Iranian Journal of Veterinary Medicine*, 9(3): 195-205

Ghazalah AA and Ali AM. 2008. Rosemary leaves as a dietary supplementation for growth in broiler chickens. *International Journal of Poultry Sci*ence, 7(3): 234-239.

Gilani SMH, Zehra S, Ul-Hassan F, Galani S and Ashraf A. 2018. Effect of natural growth promoters on immunity and biochemical and haematological parameters of broiler chickens. *Tropical Journal of Pharmaceutical Research*, 17(4): 627-633.

Gondwe TN and Wollny CBA. 2005. Evaluation of the growth potential of local chickens in Malawi. *International Journal of Poultry Science,* 4(2):64-70.

Habibi R, Sadeghi G and Karimi A. 2014. Effect of different concentration of ginger root powder and its essential oil on growth performance, serum metabolites and antioxidant status in broiler chicks under heat stress. *British Poultry Science*, 55(2): 228-237.

Khan RU, Naz S, Nikousefat Z, Tufarelli V, Javadani M, Qureshi MS and Laudadio V. 2012. Potential applications of ginger (*Zingiber officinale*) in poultry diets. *World's Poultry Science Journal*, 68(2): 245-252.

Loetscher Y, Kreuzer M and Messikommer RE. 2013. Oxidative stability of the meat of broiler supplemented with rosemary leaves, rosehip fruits, chokeberry pomace, and entire nettle and effect on performance and meat quality. *Poultry Sci*ence, 92(12): 2938-2948.

Mounia M, Nadir A and Omar B. 2018. Effects of phytogenic products on gut morpho-histology of broiler chickens. *International Journal of Veterinary Science and Research*, 4(1): 009-0011.

[NRC] National Research Council. 1994. Nutrient requirement of poultry. 9th revisited National academy press, Washington DC, USA, 176 p.

Norouzi B, Qotbi AA, Seidavi A, Schiavone A and Marin ALM. 2015. Effect of different dietary levels of rosemary (*Rosemarinus officinalis*) and yarrow (*Achillea millefolium*) on the growth performance, carcass traits and ileal microbiota of broiler. *Italian Journal of Animal Science*, 14(3): 3930-3937.

Qorbanpour M, Fahim T, Javandel F, Nosrati M, Paz E, Seidavi A, Ragni M, Laudadio V and Tufarelli V. 2018. Effect of dietary ginger (*Zingiber officinale Roscoe*) and multi-strain probiotic on growth and carcass tratis, blood biochemistry, immune responses and intestinal microflora in broiler chickens. *Animals (Basel)*, 8(7): 117-127.

Oleforuh-Okoleh VU, Chukwu GC and Adeolu AI. 2014. Effect of ground ginger and garlic on the growth performance, carcass quality and economics of production of broiler chickens. *Global Journal of Bio-Science and Biotechnology*, 3(3): 225-229.

Omar AJ, Hejazi A and Badran R. 2016. Performance of broilers supplemented with natural herb extract. *Open Journal of Animal Science*, 5(1): 68-74.

Omonijo FA, Liju Ni, Gong J, Wang Q, Lahaye L, and Yang C. 2018. Essential oils as alternatives to antibiotics in swine production. *Animal Nutrition*, 4(2): 126 -136.

Padihari VP, Tiwari PS, Sahu T, Kumar GM and Kumar NS. 2014. Effects of mannan oligosaccharide and *Saccharomyces cerevisiae* on gut morphology of broiler chickens. *Journal of World's Poultry Research*, 4(3): 56-59.

Rafiee A, Rahimian Y, Zamani F and Asgarian F. 2013. Effect of use ginger (*Zingiber officinale*) and

thyms (*Thymus vulgaris*) extract on performance and some hematological parameters on broiler chicks. *Scientia Agriculturae*, 4(1): 20-25.

ROSS 2016. Manual guide of broiler (ROSS 308). Aviagen company booklet. www.aviagen.com.

Rostami H, Seidavi A, Dadashbeik M, Asadpour Y, Simoes J, Laudadio V, Milis C and Tufarelli V. 2017. Oxidative stability of chilled broiler breast meat as affected by dietary supplementation with rosemary (*Rosmarinus officinalis* L.) powder and vitamin E. *Food Science and Nutrition,* 5(4): 909-910.

Saleh N, Allam T, Abd El-latif A and Ghazy E. 2014. The effects of dietary supplementation of different levels of thyme (*Thymus vulgaris*) on ginger (*Zingiber officinale*) essential oils on performance, hematological, biochemical and immunological parameters of broiler chickens. *Global Veterinaria*, 12(6): 736-744.

Salzer UJ. 1995. Analytical evaluation of seasoning extracts (oleoresins) and essential oils from seasonings. *Flavours*, 11: 206-210.

SAS Institute. 2004. The SAS System for Windows, Release 9.51. SAS Institute Inc., Cary, NC.

Sudarshan S, Fairoze N, Ruban SW, Badhe SR and Raghunath BV. 2010. Effect of aqueous extract and essential oils of ginger and garlic as decontaminat in chicken meat. *Research Journal of Poultry Science*, 3 (3): 58-91.

Sasidharan I and Nirmalamenon A. 2010. Comparative chemical composition and antimicrobial activity fresh and dry ginger oils (*Zingiber officinale Roscoe*). *International Journal of Current Pharmaceutical Res*earch, 2(4): 40-43.

Tekeli A, Kutlu HR and Celik L. 2011. Effects of *Zingiber officinale* and propolis extracts on the performance, carcass and some blood parameters of broiler chicks. *Current Research in Poultry Science*, 1(1): 12–23.

Tomei PE, Cioni PL, Flamini G and Stefani A. 1995. Evaluation of the chemical composition of the essential oils of some Lamiaceae from Serrania de Ronda (Andalucia,Spain). *Journal of Essential Oil Research,* 7(3): 279-282.

Torki M, Sedgh-Gooy S and Mohammadi H. 2018. Effects of adding essential oils of rosemary, dill and chicory extract to diets on performance, egg quality and some blood parameters of laying hens subjected to heat stress. *Journal of Applied Animal Research*, 46(1): 1118 -1126.

Torres RL, Cantu AP, Leija RE, EScareno JJH, Durazo HF, Valdes VMR, Estefano de FAS and Rubio FJP. 2015. Effect of adding different levels of probiotic to broiler's diets on gastrointestinal tract development and production performance. *African Journal of Microbiology Research*, 9(12): 892-897.

Yildirim BA, Tunc MA, Gul M, Yidirim F and Yildiz A. 2018. The effect of Rosemary (*Rosmarinus officianalis* L.) extract supplemented into broiler diets, on performance and blood parameters. *GSC Biological and Pharmaceutical Sciences*, 2(3): 001-009.