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RESEARCH ARTICLE

Influence of feed form and probiotic levels on growth performance, carcass traits, some blood parameters and nutrients digestibility of broiler chicks

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Abstract

The present study aimed to evaluate the effect of feed form (pelleted versus mash diets) and probiotic levels on growth performance, carcass traits, some blood parameters and nutrients digestibility of Ross broiler chicks during 42 days experimental period. One hundred and twenty, one day old Ross broiler chicks were randomly distributed into eighth treatments. Each treatment consisted of three replicates of 5 birds each. Both mash and pellet diet groups were subdivided into four treatment groups each. Each fed form supplemented with 0, 1, 1.5 and 2 g probiotic /kg diet, respectively. The obtained data showed that at 3 and 6 weeks of age, broilers fed a pellet diet had considerably higher body weight, weight gain, feed intake, and feed conversion ratio than those fed a mash diet. The ultimate BW and BWG, FI, and FCR of the birds fed the 1g or 1.5g probiotic/kg diets were considerably greater than those fed the 2g probiotic diet and the control diet. The addition of probiotics to the food or feed form of broilers at doses of 1, 1.5, and 2 g/kg had no effect on the carcass and blood parameters. When fed a mash meal instead of a pellet diet, the dry matter and protein digestibility values improved. It can be concluded that fed pellet-diet with the supplementation of 1 and 1.5 g probiotic/kg diet improved productive performance but had no consistent effect on overall carcass traits and blood parameters of broilers chicks.

Keywords: Broiler; Feed form; probiotic; production.

1. Introduction

Since the discovery of antibiotics in the 1920s, they have played a substantial role in the advancement and prosperity of the poultry industry. Antibiotics have been supplemented in animal feed at sub-therapeutic doses to improve growth and feed conversion efficiency and to prevent infections for more than 60 years (Castanon, 2007). The widespread use of antibiotics, however, led to an issue with antibiotic residue in poultry meat and increased the prevalence and duration of antibiotic-resistant faecal bacteria (Turnidge, 2004). The presence of feed residues in poultry meat products and the emergence of bacterial resistance to the antibiotics used in both human medicine and poultry agriculture have both been noted by numerous researchers. As a result, the European Union has prohibited the sale in and use of antibiotics on animals used for food production since January 2006 and has intensified its quest for substitutes for use in the poultry industry (Janardhana *et al.*, 2009). Gibson and Roberfroid (1995), stated that the use of compounds having probiotic effects is a possible mean to improve intestinal health and animal performance in the

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absence of antibiotic growth promoters. Chiang and Hsieh, (1995), reported that probiotics include viable microbial and their fermentation products which are beneficial in decreasing the undesirable microflora population in the gastrointestinal tract of chicks, and building-up resistance against diseases by stimulating the immune system, also they are defined as "live microbial feed supplements which beneficially affect the host animal by improving its intestinal microbial balance. Feeding cost indicates the principal cost of chicken production. The physical shape of feed (mash, pellets and crumbles) is a critical aspect in broiler meat production. Mash is a type of complete feed that has been finely crushed and combined so that the ingredients are difficult for birds to separate out and each mouthful offers a well-balanced meal. The mash diet results in more economic growth, fewer death loss, and greater growth unification. However, ungrounded feed retains its nutritional value better than ground feed and is more palatable. Feeding by applying pelleted diets system is really a modification of the mash system. It consists of mechanically pressing the mash into hard dry pellets. It is generally accepted that, , feeding on pellets improves broiler growth rate with an increased feed intake as compared to mash diets (Jahan *et al.*, 2006; Nir *et al.*, 1994b). The relatively improved growth performance due to feeding on pelleted diets may be achieved through the increased digestibility, decreased ingredients segregation, reduced energy during prehension and improved palatability (Behnke, 1998). Similar results were also achieved by Fairfield (2003), who stated that feed pelleting offers unique benefits such as boosting feed bulk density, enhancing feed flow ability, and providing potential to lower feed formula costs through the use of alternative feed ingredients. The current study aimed to assess the effects of feed form (pellets versus mash diets) and various probiotic doses on growth performance, carcass features, nutrient digestion, and a few blood markers in broiler chicks during a 42-day trial.

2. Materials and methods

The experiment was carried out at the Experimental Poultry Farm, Department of Animal and Poultry Production, Faculty of Agriculture, South Valley University. Qena, Egypt. to assess the effects of feed form (pelleted versus mash diets) and probiotic levels on the growth performance and carcass traits and some blood biochemistry of Ross broiler chicks during 42 days experimental period.

2.1. Housing and experimental design

One hundred twenty, one day old Ross broiler chicks were randomly distributed into eighth treatments. Each treatment consisted of three replicates of 5 birds each. A factorial design (2×4) was used in which there were two feed forms (mash and pellet). Both mash and pellet diet groups were subdivided into four treatment groups each. Birds in the G1, which served as the control, were fed a commercial broiler diet, while the G 2 to 4 received 1, 1.5 and 2 g probiotic /kg diet, respectively. Chicks were brooded in two-tiers wire floor battery placed in windowless house and raised in battery cages with the dimensions (length: 97 cm; width: 50 cm; height: 45 cm) in a closed broiler house under adequate commercial managerial and hygienic conditions.

All chicks were full access to feed and water all the time during the experimental period. The inside temperature was about 33 ºC during the first week and gradually reduced by about 2 ºC every week to reach around 25 ºC at the fourth week, which lasted up to the end of the experiment at 6 weeks of age. The relative humidity ranged between 55 -60% during the experiment. The temperature values and the relative humidity percentages were recorded all over the day and experiment by using a thermo-hygrograph. The temperature humidity indices-(THI) values were calculated all over the experimental period. The experimental birds were fed on a starter followed by grower diets from 1 to 21 and 22 to 42 days of age Table (1) the diet formulated according to (NRC 1994), respectively. Feed and water were available all the time.

Table 1. Composition and analysis of experimental broiler diets

Ingredients (%)	Starter diet	Grower diet
Maize, ground	27.59	30.00
Sorghum, ground	27.59	30.00
Soybean meal (44% CP)	28.50	25.00
Corn gluten meal (60% CP)	9.50	6.00
Vit & Min. Premix*	0.30	0.3
Sunflower oil	3.00	5.52
Dicalcium phosphate	2.00	1.8
Limestone	1.00	1.00
Salt	0.38	0.38
DL-methionine	0.04	---
L- lysine HCl	0.10	---
Total	100	100
Nutrient Analysis		
ME (kcal/ kg diet)	3000	3187
Crude protein (%)	23.67	20.46
Calcium (%)	1.00	1.00
Available phosphorus (%)	0.50	0.50
Lysine (%)	1.16	1.16
Methionine (%)	0.52	0.52

1Premix provides by kg: Vit A, 5500 IU; Vit E, 11 IU; Vit D3, 1100 IU; riboflavin, 4.4 mg; Ca pantothenate, 12 mg; nicotinic acid, 44 mg; choline chloride, 191 mg; vitamin B12, 12.1 ug; vitamin B6, 2.2mg; thiamine (as thiamine mononitrate), 2.2 mg; folic acid, 0.55 mg and d- biotin, 0.11 mg. Trace mineral (mg /kg diet): Mn, 60; Zn, 50; Fe, 30; Cu, 5 and Se, 0.3.

2.2. Live body weight and daily body weight gain

Birds per each replicate were weekly weighed on individual basis. The body weight gains BWG was calculated as the difference between final and the initial BW.

The daily average BWG during the experimental periods was calculated by applying the following formula:

$$\text{Average daily gain} = \frac{\text{Final BW} - \text{Initial BW}}{\text{Length of period / day}} / \text{No. of chicks}$$

Where: BW= Body weight.

2.3. Feed consumption and feed conversion ratio

The daily average feed consumption (FC) per each replicate was weekly calculated as the difference between the offered and remained amounts of feed. The average of FC / bird was adjusted by taking in consideration the number of dead birds. The mean feed conversion ratio (FCR) was weekly calculated by dividing total feed consumed by the total body weight gain of birds per each replicate.

The average of feed consumption for each replicate (per chick/day) at certain period was calculated using the following formula:

$$\text{DAFC} = \frac{\text{Weight of supplied feed} - \text{Weight of residual feed}}{\text{No. of survived chicks}} / \text{No. of chicks}$$

Feed conversion ratio (g, feed: g, gain) was calculated for each replicate within each period as follows:

$$\text{Feed conversion} = \frac{\text{Total feed consumption for each replicate}}{\text{Total body weight gain of survived chicks}}$$

2.4. Mortality rate

Number of dead birds was daily recorded and the mortality rate was calculated for each replicate and treatment. The studied growth performance parameters were: feed consumption (FC), body weight gains (BWG), and feed conversion ratio (FCR) for the periods 1-14, 15-28, 29 – 42 and 1-42 days of age.

2.5. Carcass traits and blood parameters

At the end of the experimental period at forty two days of age, twenty four fasted hens for eight hours per each group (three round the average weight / every replicate), were taken and slaughtered. When complete hemorrhage, they were scalded and mechanically plucked. The edible organs (heart, liver and empty gizzard) were gently removed, weighed and calculated as percentages of pre-slaughter weight. The dressing proportion was calculated, by dividing carcass and giblets weights by the pre-slaughter weight of birds. Also, the weights and lengths of intestines, ceca and rectum were recorded. Additionally, the intestines' weights and lengths, as well as the Ceca, were noted. Blood samples were collected from the chicks into collecting tube and allowed to clot at 5ºC overnight, and then centrifuged at 3000 rpm for 15 minutes. After collecting blood serum, it was kept at -20°C until analysis. Blood serum constituents: Obtained blood sera were subjected to determine: Total serum protein concentrations, albumen percentage, globulin percentage serum glucose, total cholesterol, low-density lipoprotein cholesterol (LDL-cholesterol) and triglyceride were analyzed using commercial kits, and the thyroid hormones tri-iodo-thyronine (T3) and thyroxine (T4) were analyzed using ELISA kits.

2.6. Digestibility trial

On day 42 a digestibility trial was carried out with the chicks. Weighed quantities of the diets were supplied and excreta were collected over 72 h in plastic sheeting placed under the wire mesh floor of the cage using the total collection method. Excreta samples were oven dried (70 °C for 20 h), weighed, ground and stored in airtight Kilner jars. Feed and fecal samples were analyzed for moisture by oven drying (930.15), protein by Kjeldahl (984.13), and ether extract by Soxhlet fat analysis (954.02).

2.7. Statistical analysis

Data were statistically analyzed by ANOVA using the General Linear Model (GLM) Procedure of SAS software (SAS institute, version 9.1, 2005).Duncan's multiple range test (Duncan, 1955) was used to detect the differences among means of different groups.

3. Results

3.1. Growth performance

The data of body weight (BW), body weight gain (BWG), feed intake (FI) and feed conversion ratio (FCR) as affected by feed form and probiotic level are presented in Table 2. Our data indicated that the broilers fed pellets form of feed had significantly ($p<0.01$) increased body weight and body weight gain compared to broilers fed mash form of feed during the period from 1 up to 42 days of age. Additionally, feed intake was significantly ($p<0.01$) higher in broilers fed a pellets form of diet than mash diet group during the period from 0-21d of age. However, there was non-significant changed in feed conversion ratio of broilers fed tow form of diet (mash or pellets). Dietary including of probiotic at 1, 1.5 and 2 g/kg did not affected FI, BW, BWG and FCR during different experimental periods compared to control group. BW and BWG were significantly higher in broilers fed probiotic at 1g/kg than group fed diet added with probiotic at 2 g/kg.

3.2. Carcass traits

The findings of the effects of feed form and probiotic levels on relative weights of internal organs of broilers are shown in table (3). The relative weight of carcass was significantly ($p<0.01$) increased in broilers fed a pellets form of diet compared with broilers fed a mash form of diet. Additionally, relative weight of gizzard significantly ($p<0.01$) reduced in broilers fed a pellets form of diet compared with broilers fed a mash form of diet. Addition of different levels of probiotic (1, 1.5 and 2 g/kg) to broilers diet did not affected relative weight of carcass or internal organs of broilers when compared to control group.

3.3. Blood parameters

The data of blood biochemistry as affected by feed form and probiotic levels on blood parameters of broilers are present in table (4). Supplementation of probiotic at 1, 1.5 and 2 g/kg to broilers diet or feed form did not affected on serum concentration of total protein, albumen, globulin, glucose, Triglyceride, total cholesterol, HDL and LDL cholesterol, T3 and T4 compared to control group.

3.4. Nutrient digestibility

Impact of feed form and probiotic levels on nutrient digestibility of broilers are present in table (5). There were a significant improvement in dry matter and protein digestibility of broilers fed mash form of feed compared to group fed pellets form of diet. Dietary including of probiotic at 1, 1.5 and 2 g/kg significantly decreased protein digestibility of broilers compared to control group. However, dry matter and ether extract digestibility were not affected by probiotic supplementation.

4. Discussion

Our data indicated that the broilers fed pellets form of feed had significantly ($p<0.01$) increased body weight and body weight gain compared to broilers fed mash form of feed during the period from 1 up to 42 days of age. This result was agreed with those of Serrano *et al.* (2013), stated that broilers fed pellet diet had significantly ($p<0.05$) higher ADG compared to broilers fed mash or crumble diets and both crumble and pellet groups had significantly higher ADG than mash group. Also, Jafarnejad *et al.* (2010) indicated that there were a significant effect of feed form and the interaction between feed form and dietary protein and energy on broilers BWG. Feed intake was significantly ($p<0.01$) higher in broilers fed a pellets form of diet than mash diet group during the period from 0-21d of age. However, there were non-significant changed in feed conversion ratio of broilers fed tow form of diet (mash or pellets). These obtained results are similar with those of Hamdy *et al.* (2014) who stated that non-significant ($p<0.05$) effect of feeding pellet or mash diet on broilers feed intake whereas feeding pellet diet significantly ($p<0.05$) improved feed conversion ratio. Our result disagree with results of Serrano *et al.* (2013) who indicated that from 1-25 d broilers were reared in battery and supplemented with pellets diet had significantly ($p<0.05$) higher ADFI and significantly had better F:G ratio compared to broilers fed crumble diet and both were better than mash group.

Dietary including of probiotic at 1, 1.5 and 2 g/kg did not affected FI, BW, BWG and FCR during different experimental periods compared to control group. BW and BWG were significantly higher in broilers fed probiotic at 1g/kg than group fed diet added with probiotic at 2 g/kg. These obtained results are similar with those of Anjum *et al.* (2005) who stated that supplementation of probiotic at 100 and 110 g/ton to broilers starter diet significantly ($p<0.05$) increased body weight gain compared to control group. Also, Chen and Yu (2020) found that supplementation of probiotic (*Bacillus licheniformis*) at level of 1g/kg had significantly ($P <0.05$) higher BW and BWG compared to 3g/kg of (B. licheniformis and Enramycin groups). Our data disagree with those of Song *et al.* (2014) who indicated that supplementation of probiotica at level 1.5g/kg during heat stress significantly ($P<0.05$) decreased average daily gain. Also, Bai *et al.* (2018) summarized that, there were non-significant effects on body weight of broilers fed diet supplemented with probiotic at levels of 0.2g, 0.3g, 0.4g and 0.5g/kg of feed.

The relative weight of carcass was significantly ($p<0.01$) increased in broilers fed a pellets form

Table 2. Effect of feed form and probiotic levels on growth performance of broilers.

Items		Feed form		Probability	Additives				Probability	Interaction	
		M	P		Control	Pro1	Pro2	Pro3		SM	Probability
B.W	BW21	966.29^{b}±10.10	1035.17^{a}±8.32	<.0001	998.33^{ab}±7.99	1023.58^{a}±18.61	1008.33^{a}±21.39	972.67^{b}±23.67	0.0222	9.62	0.1486
	BW42	2407.92^{b}±9.71	2506.92^{a}±13.31	<.0001	2463.67^{ab}±21.76	2492.83^{a}±32.11	2443.17^{b}±19.62	2430.00^{b}±28.56	0.0251	13.09	0.2751
B.W.G	BWG0-21	924.29^{b}±12.21	993.17^{a}±8.32	<.0001	956.33^{ab}±11.37	981.58^{a}±20.52	966.33^{ab}±20.97	930.67^{b}±25.40	0.0844	10.19	0.3156
	BWG21-42	1441.63±13.19	1471.75±14.01	0.1397	1465.33±21.15	1469.25±27.08	1434.83±16.32	1457.33±14.88	0.6059	9.92	0.3211
	BWG0-42	2365.92^{b}±12.70	2464.92^{a}±14.54	<.0001	2421.67^{ab}±24.99	2450.83^{a}±34.76	2401.17^{ab}±22.33	2388.00^{b}±28.63	0.1143	13.99	0.5092
F.I	FI 0-21	1321.96^{b}±14.16	1396.17^{a}±12.71	0.0004	1370.67±16.82	1355.58±36.59	1353.33±18.46	1356.67±26.37	0.8785	12.10	0.0254
	FI 21-42	2771.83±76.41	2857.92±57.03	0.4386	2832.00±107.69	2867.13±121.82	2827.17±111.79	2733.20±24.02	0.8394	47.48	0.9777
	FI 0 -42	4093.79±99.93	4254.08±76.05	0.2836	4202.67±136.57	4222.72±176.33	4180.50±144.08	4089.87±44.22	0.9186	63.64	0.9880
FCR	FCR 1	1.430±0.025	1.406±0.027	0.5298	1.433±0.047	1.377±0.033	1.404±0.045	1.458±0.014	0.4797	0.018	0.4465
	FCR 2	1.924±0.027	1.944±0.026	0.6025	1.931±0.047	1.956±0.021	1.972±0.038	1.877±0.032	0.3440	0.018	0.3440
	FCR T	1.729±0.019	1.726±0.018	0.9061	1.735±0.039	1.721±0.011	1.740±0.033	1.714±0.017	0.9229	0.013	0.9854

Means with different superscript letters within rows are significantly different (P<0.05).). M. mash diet. P pellet diet. Pro11g/kg of feed probiotic additive. Pro2 1.5g/kg of feed probiotic additive. Pro3 2g/kg of feed probiotic additive. BW body weight. B.W.G body weight gain. FI feed intake. FCR feed conversion ratio.

Table 3. Effect of feed form and probiotic levels on carcass traits of broilers.

Items	Feed form		Probability	Additives				Probability	Interaction	
	M	P		Control	Pro1	Pro2	Pro3		SM	Probability
Carcass W	2220.417^{b}±33.49275	2275^{a}±31.07298	0.0183	2320^{a}±38.57892	2308.333^{a}±52.4193	2205^{b}±31.17157	2157.5^{b}±28.2769	<.0001	23.054	<.0001
Dressin %	82.47994±0.24867	82.5984±0.227906	0.6654	82.7323^{a}±0.1565	82.58501^{a}±0.40379	81.75935^{b}±0.2437	83.08001^{a}±0.26174	0.0204	0.16541	0.1748
Liver%	2.297352±0.06198	2.235764±0.07453	0.4917	2.148422^{b}±0.0625	2.285572^{ab}±0.1143	2.435102^{a}±0.1038	2.197136^{ab}±0.0697	0.1446	0.047832	0.2299
Gizzard%	1.404945^{a}±0.06696	1.208595^{b}±0.04171	0.0050	1.181658^{b}±0.0604	1.30627^{ab}±0.05282	1.357371^{ab}±0.042	1.381782^{a}±0.14882	0.1307	0.043671	0.0125
Heart%	0.540227±0.02117	0.554687±0.01303	0.6082	0.57241±0.02991	0.522695±0.02160	0.552343±0.0295	0.542378±0.01654	0.6489	0.012251	0.9915
Pinc%	0.203001±0.01022	0.193979±0.01315	0.6375	0.189137±0.0154	0.190993±0.01813	0.20479±0.01579	0.20904±0.019007	0.8401	0.008196	0.9274
Spleen %	0.152624±0.01194	0.142905±0.00606	0.4621	0.13946±0.00759	0.152198±0.01770	0.152374±0.0125	0.147025±0.01605	0.8802	0.006625	0.1113
intens L	171.4167±4.24346	177.5 ±3.82476	0.1931	166.5±2.986079	174.6667±9.45046	180.6667±4.0552	176±3.932768	0.2003	2.86469	0.0136
ceca L	17.33333^{b}±0.48199	19.16667^{a}±0.44096	0.0168	17.83333±0.6541	17.66667±0.95452	18.83333±0.8724	18.6667±0.49441	0.5515	0.372273	0.6437

Means with different superscript letters within rows are significantly different (P<0.05).M. mash diet P. pellet diet Pro1,1g/kg of feed probiotic additive. Pro2,1.5g/kg of feed probiotic additive .Pro3,2g/kg of feed probiotic additive.

Table 4. Effect of feed form and probiotic levels on serum biochemistry of broilers.

Items	Feed form		Probability	additives				Probability	Interaction	
	M	P		Control	Pro1	Pro2	Pro3		SM	Probability
%total protein	5.707±0.096	5.972±0.088	0.0774	5.883±0.126	5.862±0.214	5.869±0.131	5.745±0.082	0.8910	0.069	0.5681
%albumen	4.246±0.067	4.382±0.112	0.3244	4.377±0.167	4.256±0.084	4.246±0.124	4.377±0.158	0.8263	0.065	0.2756
%globuli	1.461±0.086	1.591±0.148	0.4592	1.506±0.126±	1.606±0.172	1.623±0.188	1.368±0.210	0.7111	0.085	0.2521
T3	1.521±0.095	1.283±0.152	0.2084	1.560±0.171	1.058±0.151	1.503±0.124	1.485±0.231	0.2252	0.091	0.9131
T4	12.201±11.073	12.108±10.809	0.9953	1.208±0.096	22.963±21.608	23.318±22.136	1.128±0.065	0.5811	7.567	0.2982
Glucose	117.669±2.531	117.774±1.427	0.9718	115.612±2.116	118.038±4.298	115.823±2.645	121.414±1.686	0.4910	1.421	0.4194
Triglyicride	193.451±3.323	190.512±2.875	0.4618	199.328±5.570	187.238±2.072	194.291±4.959	187.070±2.365	0.1136	2.171	0.2147
Cholesterol	178.947±3.868	186.383±1.625	0.0672	181.788±4.074	175.439±5.460	187.469±3.874	185.965±3.114	0.1515	2.193	0.2185
HDL	133.237±3.042	138.083±1.500	0.1705	130.720±4.966	138.605±3.453	136.515±2.701	136.800±2.102	0.4070	1.734	0.4002
LDL	10.221±2.638	10.949±2.399	0.8485	11.202±2.821	5.789±3.249	13.599±4.794	11.751±2.788	0.5110	1.7452396	0.6914

Means with different superscript letters within rows are significantly different (P<0.05)
M. mash diet P. pellet diet Pro1,1g/kg of feed probiotic additivePro2,1.5g/kg of feed probiotic additive .Pro3,2g/kg of feed probiotic additive.
HDL ,High density lipoprotein. LDL, low density lipoproteinT3tri-iodo-thyronine.).(T4 thyroxine).

Table 5. Effect of feed form and probiotic levels on nutrient digestibility of broilers.

Items	Feed form		Probability	hamdy_ahmed@agr.svu.edu.eg Addetives				Probability	Interaction	
	M	P		Control	Pro1	Pro2	Pro3		SM	Probability
DM	83.650^{a}±2.29	77.425^{b}±1.71	0.0339	84.534±3.88	79.954±3.87	77.409±2.60	80.253±1.31	0.3372	1.54	0.1899
EE	81.723±2.13	77.425±1.71	0.1437	80.330±3.01	79.196±3.80	78.564±3.30	80.208±1.28	0.9639	1.41	0.2375
CP	81.139^{a}±2.10	71.418^{b}±3.19	0.0063	84.684^{a}±4.04	75.276^{b}±3.72	71.820^{b}±5.01	73.334^{b}±2.78	0.0401	2.12	0.1098

Means with different superscript letters within rows are significantly different (P<0.05)
DM. dry mater EE. Ether extract .M. mash diet P. pellet diet Pro1,1g/kg of feed probiotic additive.
Pro2,1.5g/kg of feed probiotic additive.Pro3,2g/kg of feed probiotic additive.

of diet compared with broilers fed a mash form of diet. Additionally, relative weight of gizzard significantly (p<0.01) reduced in broilers fed a pellets form of diet compared with broilers fed a mash form of diet. Our results are agree with those of Corzo *et al.* (2011) who summarized that broilers supplemented with 64%pellets diet had significantly (P<0.05) higher carcass weight and breast and abdominal fat weights compared to mash diet group. Similarly, Nabi *et al.* (2017) indicated that broilers fed crumble diet significantly increased Carcass weight, dressing percentage, liver and gizzard weights compared to mash diet, while no significant effect of feed form on heart weight and intestine length. Addition of different levels of probiotic (1, 1.5 and 2 g/kg) to broilers diet did not affected relative weight of carcass or internal organs of broilers when compared to control group. These result was similar with those of Hamdy *et al.* (2014), investigated that there were non-significant effect of probiotic supplementation at levels 1g,1.5gand 2g/kg of feed on dressing percentages and weights of gizzard, heart, giblets, liver, and spleen and length of intestines and ceca compared to control group. Furthermore, Rehman *et al.* (2020), indicated that supplementation of probiotic at levels 0, 1g and 2g/kg of feed or prebiotic at level 0,1gand 1.5g/kg of feed or their interactions show non-significant effect on carcass characteristic (breast, thigh, heart, liver, and gizzard weights) but there were a significant (P < 0.05). Supplementation of probiotic at 1, 1.5 and 2 g/kg to broilers diet or feed form did not affected on serum concentration of total protein, albumen, globulin, glucose, Triglyceride, total cholesterol, HDL and LDL cholesterol, T3 and T4 compared to control group. These obtained results are similar with those of Alkhalf *et al.* (2010), who summarized that supplementation of probiotic at levels 1g, 1.6 and 0.8 g/kg of feed result in non-significant effect on serum parameters (Hemoglobin, PCV, Total protein, Albumin and Total lipids) but significantly (P < 0.05) decrease Cholesterol.

5. Conclusion

It can be concluded that fed pellet-diet with the supplementation of 1 and 1.5 g probiotic/kg diet improved productive performance but had no consistent effect on overall carcass traits and blood parameters of broilers chicks.

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6. References

Alkhalf, A., Alhaj, M., Al-Homidan, I. (2010). 'Influence of probiotic supplementation on blood parameters and growth performance in broiler chickens', *Saudi journal of biological sciences*, 17(3), pp. 219-225.

Anjum, M.I., Khan, A.G., Azim, A., Afzal, M. (2005). 'Effect of dietary supplementation of multi-strain probiotic on broiler growth performance', *Pak. Vet*. J., 25(1), pp.25-29.

Bai, K., Feng, C., Jiang, L., Zhang, L., Zhang, J., Zhang, L., Wang, T. (2018). 'Dietary effects of Bacillus subtilisfmbjon growth performance, small intestinal morphology, and its antioxidant capacity of broilers', *Poultry science,* 97(7), pp. 2312-2321.

Behnke, K. C. (1998). *'Why pellet?',* In: proceedings of kansas State university/american feed industry association pellet conference', manhattan, KS. USA.

Castanon J.I.R. (2007). 'History of the use of antibiotic as growth promotersin European poultry feeds', *Poultry Science*, 86, pp. 2466–2471.

Chen, Y.C., Yu, Y.H. (2020). 'Bacillus licheniformis–fermented products improve growth performance and the fecal microbiota community in broilers', *Poultry science*, 99(3), pp.1432-1443.

Chiang, S.H., Hsieh, W.M. (1995). 'Effect of direct femicroorganism on broiler growth performance and litter ammonia level', *Asian-Aust. J. Anim. Sci*., 8, pp.159-162.

Corzo, A., Mejia, L., Loar II, R.E. (2011). 'Effect of pellet quality on various broiler production parameters', *Journal of Applied Poultry Research*, 20(1), 68-74.

Duncan, D.B. (1955). 'Multiple ranges and multiple T-test',*Biometrics*, 11, pp. 1–42.

Fairfield, D.A. (2003). 'Pelleting for profit-part1. National Grian and Feed Assoc. Feed and Feeding digest', 54, pp.1-5.

Gibson, G.R., Roberfroid, M.B. (1995). 'Dietary modulation of the human colonic microbiota. Introducing the concept of prebiotics', *Journal of Nutrition*, 125(6), pp. 1401-1412.

Hamdy, A.H. (2014). *'Some managerial manipulations for improving egg and meat production in chickens',* (Doctoral dissertation, Ph. D. thesis, Department of Poultry Production, Faculty of Agriculture, South Valley University, Egypt).

Jafarnejad, S., Farkhoy, M., Sadegh, M., Bahonar, A.R. (2010). 'Effect of crumble-pellet and mash diets with different levels of dietary protein and energy on the performance of broilers at the end of the third week', *Veterinary medicine international*.

Jahan, M.S., Asaduzzaman, M., Sarkar, A.K. (2006). 'Performance of broiler fed on mash, pellet and crumble', *Int. J. Poultry Sci*., 5, pp. 265-270.

Janardhana, V., Broadway, M.M., Bruce, M.P., Lowenthal, J.W., Geier, M. S., Hughes, R.H., Bean, A.G.D. (2009). 'Prebiotics modulate immune responses in gut-associated lymphoid tissue of chickens', *J. Nutr*., 139, pp.1404–1409.

Nabi, F., RIND, M.I., LI, J., ZULQARNAIN, M., SHAHZAD, M., AHMED, N., Rehman, M.U. (2017). 'Influence of different feed forms and particle size on efficiency of broiler production',*Online Journal of Animal and Feed Research*, 7(2), pp. 24-28.

Nir, I., Twina, Y., Grossman, E., Nitsan, Z. (1994). 'Quantitative effects of pelleting on performance, gastrointestinal tract and behaviour of meat-type chickens',*British Poultry Science*, 35(4), pp. 589-602.

NRC [National Research Council]. (1994). *'Nutrient requirements of poultry',* 9th revised ed., *National Academie Press, Washington*, D. C., 155 pp.

Rehman, A., Arif, M., Sajjad, N., Al-Ghadi, M.Q., Alagawany, M., Abd El-Hack, M.E., Swelum, A. A. (2020). 'Dietary effect of probiotics and prebiotics on broiler performance, carcass, and immunity', *Poultry Science*, 99(12), pp. 6946-6953.

SAS, Institute. (2005). *'User's Guide: Statistics',* Version 9.1. SAS Institute, Inc., Cary, NC, USA.

Serrano, M.P., Frikha, M., Corchero, J., Mateos, G.G. (2013). 'Influence of feed form and source of soybean meal on growth performance, nutrient retention, and digestive organ size of broilers. 2. Battery study', *Poultry science*, 92(3), pp.693-708.

Song, J., Xiao, K., Ke, Y.L., Jiao, L.F., Hu, C.H., Diao, Q.Y., Zou, X.T. (2014). 'Effect of a probiotic mixture on intestinal microflora, morphology, and barrier integrity of broilers subjected to heat stress', *Poultry science*, 93(3), pp.581-588.

Turnidge, J. (2004). 'Antibiotic use in animals-prejudices, perceptions and realities', *J. Antimicrob.Chemother*, 53, pp. 26–27.