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(Original Article)

Validation of the Effect of Some Nutritional Manipulations on the Productive Performance of Broiler Chickens

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Abstract

The objectives of the experiment were to investigate the effects of different nutritional manipulations on the performance and carcass traits of broiler chickens. Seven treatments were used: control, super pre-starter diet (25% P) during the first three days of age, mix. of 2g of both yeast and glucose anhydrous, 2g synbiotic/Kg feed, 20g/500 ml water of synbiotic spraying, mix. of 2g synbiotic/Kg feed+20g/500 ml water of synbiotic spraying and mix. of super pre-starter diet (25% P) and 2g synbiotic/Kg feed. Two hundred eighty, one day old of broiler chicks were randomly selected in experiment lasted in 6 weeks of age. Body weight, feed consumption, body weight gain, feed conversion ratio and some carcass traits were studied. The results indicated that there was significant ($P<0.05$) increase in body weight due to super pre-starter supplementation at 4, 5 and 6 weeks of age. Body weight gain, feed consumption and feed conversion ratio were significantly ($P<0.05$) improved during the periods from (3-6) and (0-6) weeks of age. Dressed carcass percentage was increased significantly ($P<0.05$) in chicks fed mix. of synbiotic in feed and spray compared to the other treatments, the increased was 79.77% compared to control one (75.14%). Breast% was increased in chicks fed mix. of yeast and glucose anhydrous and also in chicks fed synbiotic in feed.

Results concluded that using of super pre-starter diet during the first 3 days of age at level of (25% P) improved growth performance of broiler chicks.

Keywords: *Broiler; Super pre-starter; Yeast; Glucose Anhydrous; Synbiotic*

Introduction

Broiler production has developed in recent years and has become dependent on science and technology to obtain the largest economic return in the least time and at the lowest possible cost (Zuidhof *et al.*, 2014).

Super pre-starter (SPS) ration is to fulfill the specific nutritional needs of the young chick, supporting its transition from consuming the yolk sac to the first diet consumed. Availability of nutrients immediately after hatch is critical for growth and development, in the first week of life of a broiler chicken has a

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massive impact on its health, welfare, and growth performance as it matures (Lemot, 2017).

Synbiotics are a mixture of probiotics and prebiotics that beneficially affects the host by improving the survival and implantation of live microbial dietary supplements in the gastrointestinal tract growth and stimulating the metabolism of one or a limited number of health-promoting bacteria, thus improving host welfare (Awad *et al.,* 2009). Synbiotics encourage the growth of the probiotic organism by providing the specific substrate to the probiotic organism for its fermentation (Farnworth, 2001). The synbiotic treatment significantly increased BW and decreased feed: gain ratios and decreased the mortality (Awad *et al.,* 2009).

Spraying synbiotic solutions application on the feathering of newly hatched chicks were proposed to foster an early GI colonization by probiotic strains and to enforce competitive exclusion (CE) against harmful microorganisms (Goren *et al.,* 1984). Spray application offers low-cost and efficient application of biologic and reduced concerns regarding diverse water quality and medicator/proportioner function, chicks were sprayed held for 8 hours prior to housing, simulating a challenge occurring at the hatchery, when performed in this manner, can be effective for protection of chicks against Salmonella infection (Wolfenden *et al*., 2007).

Stanley *et al*., (2004) confirmed that yeast has potential as an alternative to antibiotic-based drugs in broiler feed a few years ago. Active live yeast, has been documented as probiotic feed additive for poultry due to its improvement effect on performance characteristics. Supplementation of broiler feed with yeast has a positive effect on their performance, and behavior, so it can be concluded that, the inactivated yeast probiotic "Thepax" can be included in broiler diets for their beneficial effect and improvement of behavioral and productive performance of broilers (Kassem and Fayed, 2012).

Glucose as a highly available energy source such has potential to improve growth performance, enhance flock health, and perhaps increase profitability. Glucose is a simple sugar with less complex structures compared with starch. Newly hatched chicks can use this simple carbohydrate efficiently. Glucose oxidase supplement could improve the growth performance in comparison with control group by improving small intestinal digestive enzymies activities and apparent nutrient digestibility (Shengru *et al.,* 2019). Chickens need glucose for tissue multiplication, egg production, and maintenance. Instead of glucose, metabolizible energy (ME) was used in nutritional requirements (John, 2008).

Therefore, the objective of the present study was to evaluate the validation of some nutritional manipulations on the growth performance and carcass traits of broiler chickens.

Materials and Methods

The present work was carried out in February 2020 at Poultry Research Farm of Poultry Production Department, Faculty of Agriculture, Assiut University.

Management of experimental Birds

A total number of 280 Ross broiler chicks, one day old were used in the present study. All chicks weighted to the nearest gram, chicks were wing-banded, and randomized distributed into 7 treatments placed in pens, each one (2 × 0.75 × 1) m. Experimental pens were equipped with a pan feeder, a manual drinker, ventilation and gas heating system to provide the required temperature. Birds were exposed to the continuous lighting program (23 hrs /day) from one day old till the end of the experiment at 42 days of age. Chicks were received starter diet for the two weeks of age, then grower diet from three to four weeks of age and finisher diet from five to six weeks of age (Table 1).

Experimental design

The seven experimental treatments as follow:

Control (C): Chicks fed basal control diet (Table 1) without any supplementation.

Treatment 1 (T1): A super pre-starter diet (Table 1), fed to the newly hatched chicks for 3 days followed by the control diet.

Treatment 2 (T2): Chicks were fed the control diet with the addition of 2 gram active commercial yeast (Table 2) and 2 gram glucose anhydrous/Kg feed from one day old till the end of experiment.

Treatment 3 (T3): Chicks were fed the control diet with the addition of commercial synbiotic (PoultryStar®ME) at a level of 2g/Kg feed from one day old till the end of experiment (Table 3). Poultry Star is an Australian product made from a mixture of beneficial bacterial isolates including lactic acid bacteria as well as a mixture of *Enterococcus spp., Bifidobacterium spp., Pediococcus spp., and Lactobacillus spp.* For 2×10^{11}CFU/Kg^{-1} of probiotics. The commercial name is PoultryStar®ME and Distributor is Dakhalia Poultry Company.

Treatment 4 (T4): The commercial synbiotic (PoultryStar®sol) (Table 4) was sprayed on newly hatched chicks before housed at a level of 20g / 500 ml of tap water by using a hand-held sprayer. Commercial name is (PoultryStar®sol) and purchased from Dakhalia Poultry Company. Chicks were fed the control basal diet till the end of the period.

Treatment 5 (T5): Chicks were sprayed on newly hatched chicks before housed at a level of 20g /500 ml of tap water by using a hand-held sprayer, after that, chicks were fed control basal diet with the addition of commercial synbiotic

(PoultryStar® ME) at a level of 2g/Kg feed from a one day old till the end of experiment and commercial synbiotic (PoultryStar®sol) were also.

Treatment 6 (T6): **(**SPS) diet fed to the newly hatched chicks for 3 days with the addition of commercial synbiotic (PoultryStar® ME) at a level of 2g/Kg feed, then chicks were fed the control diet with the addition of commercial synbiotic (PoultryStar® ME) at a level of 2g/Kg feed From a one day old till the end of experiment.

Table 1. The composition and proximate chemical analysis of the basal super pre-starter, starter, grower and finisher diets

Ingredients	Super pre-starter diet %	Starter diet%	Grower diet %	Finisher diet %
Yellow corn grains	48.59	50.55	57.23	62.59
Corn Gluten (60%)	6	5.20	4.90	4.60
Soybean meal (44% CP)	39	36	29.79	24.70
Limestone ($CaCO_3$)	1.35	1.35	1.10	1.08
Di-phosphate calcium	1.90	1.90	1.67	1.55
Salt (NaCL)	0.40	0.40	0.40	0.40
Soya oil	2	3.50	4.00	4.25
Vitamins minerals mixture *	0.30	0.30	0.30	0.30
DL – Methionin	0.24	0.31	0.25	0.21
Lysine-HCL	0.20	0.32	0.25	0.23
Total	100	100	100	100
Calculated analysis **				
Metabolizable energy kcal/kg diet	2918	3046	3157	3238
Crude protein, %	25.1	23.01	21.03	19.04
Crude fiber, %	2.21	3.86	3.45	3.3
Crude fat, %	2.86	5.5	5.8	5.8
Calcium, %	1.06	1.07	0.90	0.85
Available phosphorus, %	0.49	0.51	0.45	0.42
Methionine & Cysteine %	0.66	0.69	0.60	0.55
Lysine %	1.44	1.45	1.25	1.10
Moisture, %	12	12	12	12

*Each 3 Kg of premix contains: Vitamins: A: 12000000 IU; Vitamins; D3 2000000 IU; E: 10000 mg; K3: 2000 mg; B1:1000 mg; B2: 5000 mg; B6:1500 mg; B12: 10 mg; Biotin: 50 mg; Choline chloride: 250000 mg; Pantothenic acid: 10000 mg; Nicotinic acid: 30000 mg; Folic acid: 1000 mg; Minerals: Mn: 60000 mg; Zn: 50000 mg; Fe: 30000 mg; Cu: 10000 mg; I: 1000 mg; Se: 100 mg and Co: 100 mg.

**According to NRC, 1994.

Table 2. Composition of Commercial Active Yeast

Amino Acids		Vitamins	Minerals
Histidine	Serine	Vitamin B1	Calcium
Isoleucine	Selenocysteine	Vitamin B2	Zinc
Leucine	Proline	Vitamin B6	Selenium
Methionine	Ornithine	Vitamin B12	Chromium
Phenylalanine	Glycine	Panthonic acid	Cupper

Theronine	Glutamine	Niacine	Magnesium
Tryptophan	Glutamic acid	Choline	Iron
Valine	Cystine	Biotine	Phospours
Tyreosine	Aspartic acid	Folic acid	Sodium
Alanine	Asparagine		Cobalt
Lysine	Arginine		Heavy metals
			Potassium
			Sulfur

Table 3. Composition of Synbiotic (PoultryStar®ME) (supplemented in feed). Each 100 gm of Synbiotic contains

Fructo-Oligosaccharides(Prebiotic)	90 gm
Blend of bacteria (Probiotic)	10 gm
Bacteria in blend	*Enterococcus* sp.
	Bifidobacterium sp.
	Pediococcus sp.
	Lactobacilluc spp.
Product contains a minimum of 5 x 10^{11} CFU/ Kg of Blend of bacteria	

CFU=colony-forming unit

Table 4. Composition of Synbiotic (PoultryStar®Sol) (supplemented in spray). Each 100 gm of Synbiotic contains

Fructo-Oligosaccharides (Prebiotic)	90 gm
Blend of bacteria (Probiotic)	10 gm
Bacteria in blend	*Enterococcus sp.*
	Bifidobacterium sp.
	Pediococcus sp.
	Lactobacilluc spp.
Product contains a minimum of 5 x 10^{12} CFU/ Kg of Blend of bacteria	

Growth parameters

The individual body weight (g) and feed consumption for all chicks per treatment (40 chicks) were recorded weekly all over the experimental period, body weight gain and feed conversion were calculated weekly.

The average body weight gain (ABGW) as (g/bird) was estimated according to the following equation:

$$WG = W_1\text{-}W_0$$

Where: WG = Average weight gain (g), W_1= Average final weight (g) and W_0= Average initial weight (g).

Feed conversions were calculated as following equation:

$$\text{Feed conversion ratio (FCR)} = \frac{\text{Feed consumption (g)}}{\text{Live body weight gain (g)}}$$

Dressing carcass percentage was calculated as follows:

$$\text{Dressed carcass \%} = \frac{\text{Carcass and giblets weight (g)}}{\text{Live body weight (g)}} \times 100$$

Statistical analysis

The obtained data were statistically analyzed by ANOVA using General Liner Models (GLM) procedure of SAS software SAS procedure (Version 9.2, 2009). Duncan's multiple range test (Duncan, 1955), was used to determine differences among means when treatment effects were significant at level ($P<0.05$). The mathematical model used was:

$$Y_{ik} = \mu + T_i + e_{ik}$$

Where: Y_{ik} =The individual observation, μ = The overall mean, T_i = Treatment effect, (i = 1,2……7) and e_{ik} = The experiment error.

Results and Discussions

Growth Performance

Body Weight (BW)

The results of body weight (BW) of broiler chickens as affected by super pre-starter diet**,** yeast + glucose Anhydrous, synbiotic feed and synbiotic spraying are presented in Table (5).

Table 5. Effect of Some Nutritional Manipulations Treatments on Live Body Weight (g/bird)

Treatments	Periods						
	One day old	1st W	2nd W	3rd W	4th W	5th W	6th W
(C)	41.1±0.5	140.1±2.4^{cd}	389.2±6.9^{c}	778.9±13.0	1229.8±27.3^{ab}	1677.0±29.9^{a}	2213.1±35.1^{ab}
(T1)	41.8±0.6	148.4±2.1^{ab}	418.2±7.8^{ab}	793.1±12.5	1276.1±32.4^{a}	1745.1±46.1^{a}	2311.2±48.4^{a}
(T2)	41.6±0.4	153.2±2.3^{a}	411.3±6.8^{abc}	764.7±13.1	1146.3±18.8^{c}	1529.1±31.3^{bc}	1971.0±35.5^{c}
(T3)	41.5±0.4	155.6±2.2^{a}	431.2±10.9^{a}	769.5±14.5	1127.3±21.8^{c}	1434.2±36.2^{c}	1895.3±49.1^{c}
(T4)	41.8± 0.5	133.4±2.8^{d}	389.1±7.7^{c}	768.4±14.2	1238.0±25.3^{ab}	1696.0±36.7^{a}	2176.5±55.5^{b}
(T5)	40.9±0.3	142.1±2.9^{bc}	397.7±8.8^{bc}	773.6±15.2	1168.7±23.6^{bc}	1555.2±35.7^{b}	2009.8±42.9^{c}
(T6)	41.4±0.4	137.5±4.1^{cd}	398.8±12.2^{bc}	763.0±20.5	1123.0±24.5^{c}	1567.7±31.6^{b}	2002.8±41.9^{c}

$^{a–d}$ Means with different superscripts in the same columns are significantly different ($P \leq 0.05$).
C= Control (without any supplementation), T1=Super pre-starter diet, T2 =Yeast + Glucose Anhydrous T3=Synbiotic feed, T4=Synbiotic spraying, T5= Synbiotic spraying and in feed and T6=Super pre-starter diet with synbiotic feed

Data showed that there were no significant (P≥0.05) effects due to treatments on BW (P > 0.05) during the 3th week of age. In the first and second weeks of age the birds were fed diets with (synbiotic feed) achieved the highest BW compared to other treatments and control. In 2nd week, BW of chicks fed synbiotic were higher by about 10.79% than control one.

During the 4th, 5th and 6th weeks of age the birds treated with super pre-starter died achieved the highest BW compared to other treatments. In the same previous weeks, chicks fed synbiotic (T3) had the lowest BW compared to the other treatments.

Therefore, improvement in BW may be due to super pre-starter diet is promoting gut development. The gastrointestinal tract grows four times faster than the rest of the body during the first two weeks of life (Sasyte *et al.,* 2018). Our findings agreed with that obtained by Gheisari *et al.,* (2011) who mentioned that japanese quail diet should be contain high protein level (24%) when compared with quail fed low protein level (21%). Sasyte., *et al* (2018) stated that the application of super pre-starter diet improved body weight by 3% in birds fed super pre-starter diet 22.5% crude protein compared to control group.

El-Faham *et al.,* (2017) reported that broiler chicks fed super starter diet (25.01% CP) at level of (500g/chick) for 14 days of age gave higher live body weight compared to control group (23% CP). Caker *et al*., (2006) showed no significant (P>0.05) effect of dietary supplementation of Syn (Biomin®IMBO) at level 1g/kg on BW of growing JQ from 1 to 42 day of age. Hassanpour *et al., (*2013) showed that the initial body weight for Ross broiler chickens when supplemented diets with 0.1 or 0.2% synbiotic was not different from the control.

On the other hand, Katarzyn *et al*. (2020) who found that the average body weight of broiler chickens was significantly increased in groups with synbiotic in a dose of 0.5 g kg−1 of feed. Supplementation of synbiotic (PoultryStar® ME) at 0.5 g/kg feed for broiler chicks had no significant effects on body weight (BW) at 21 d and 42 d of age (P > 0.05) compared to control group (Shanmugasundaram *et al.,* 2019). Abdel-Wareth *et al.,* (2019) showed that higher inclusion levels of synbiotic significantly increased BW (*P* < 0.001) at 21 and 35 d of age. Vahdatpour *et al*., (2011) found that the birds fed 0.1% Syn (Protexin®+ *Fermacto*®) in diets had the higher (P≤0.05) BW than birds fed diets without Syn from 1 to 42 day of age.

Body weight gain (BWG)

The results of body weight gain (BWG) of broiler chickens as affected by super pre-starter diet**,** yeast +glucose Anhydrous, synbiotic feed and synbiotic spraying were presented in Table (6).

Table 6. Effect of Some Nutritional Manipulations Treatments on Body Weight Gain (g/bird/day)

Treatments	Periods		
	0 – 3 W	3 – 6 W	0 – 6 W

(C)	736.95±14.58	1441.63±49.91^{ab}	2178.57±61.96^{ab}
(T1)	751.30±20.08	1518.13±73.75^{a}	2269.43±93.57^{a}
(T2)	738.25±9.26	1277.71±54.37^{bc}	2015.97±58.55^{bc}
(T3)	726.97±24.13	1121.54±79.87^{c}	1848.51±103.55^{c}
(T4)	727.29±15.67	1415.21±43.60^{ab}	2142.50±57.72^{ab}
(T5)	733.46±16.60	1236.84±28.45^{c}	1970.31±38.47^{bc}
(T6)	723.40±45.36	1241.23±20.62^{c}	1964.62±60.42^{bc}

$^{a–c}$ Means with different superscripts in the same columns are significantly different ($P \leq 0.05$). C= Control (without any supplementation), T1=Super pre-starter diet, T2 =Yeast + Glucose Anhydrous, T3=Synbiotic feed, T4=Synbiotic spraying, T5= Synbiotic spraying and in feed and T6=Super pre-starter diet with synbiotic feed.

The cumulative body weight gain showed an increasing trend reaching the highest value during the periods of (3-6) and (0-6) weeks of age in T1 (the super pre-starter group) against all other treatments. In the same previous periods, chicks were fed synbiotic feed (T3) had the lowest BWG compared to other treatments. There was no significant difference in the cumulative body weight gain of broilers between different treatments during the periods from (0-3) weeks of age.

The obtained results agree with, Mohsen *et al*., (2004) who showed that a significant increased ($P<0.05$) in body weight gain in broiler chicks fed high crude protein (23%) in diets when compared to low protein diet (19%) during the period from one day old to 3 weeks of age in Ross broiler chicks.

On the other hand, our findings conflicted with, Sozcu and Ipek, (2017) who reported that 6.7% superior in BWG in chicks received diet contained 0.05% synbiotic. Ghasemi *et al.,* (2014) observed that improvement in body weight gain of broiler chickens fed 0.1% synbiotic. Abdel-Hafeez *et al.,* (2017) reported that 4.8% improved in BWG of broiler chickens fed diets contained 0.1% synbiotic. Nihar et al., (2016) found that BWG didn't affect by synbiotic addition at range from 0.05% to 0.2%.

Feed consumption (FC)

The results of feed consumption (FC) of broiler chickens as affected by super pre-starter diet**,** yeast + glucose Anhydrous, synbiotic feed and synbiotic spraying are presented in Table (7).

Table 7. Effect of Some Nutritional Manipulations Treatments on Daily Feed Consumption (g/bird/day)

Treatments	**Periods**		
	0 – 3 W	**3 – 6 W**	**0 – 6 W**
(C)	1006.25±10.05^{b}	2405.00±14.60^{bc}	3411.25±19.15^{b}
(T1)	1018.13±6.67^{ab}	2501.13±25.21^{a}	3519.25±25.64^{a}
(T2)	1023.13±8.50^{ab}	2414.75±23.62^{bc}	3437.88±29.59^{ab}
(T3)	1008.63±25.54^{b}	1999.88±38.01^{d}	3008.50±63.54^{c}

(T4)	1038.25±9.08^{ab}	2440.75±8.99^{ab}	3479.00±16.65^{ab}
(T5)	1056.63±11.90^{a}	2354.38±27.63^{c}	3411.00±24.52^{b}
(T6)	1044.00±18.98^{ab}	2405.13±10.07^{bc}	3449.13±14.73^{ab}

$^{a–d}$ Means with different superscripts in the same columns are significantly different ($P \leq 0.05$). C= Control (without any supplementation), T1=Super pre-starter diet, T2 =Yeast + Glucose Anhydrous, T3=Synbiotic feed, T4=Synbiotic spraying, T5= Synbiotic spraying and in feed and T6=Super pre-starter diet with synbiotic feed.

Data shows that during the periods from (0-3) weeks of age, the birds treated with synbiotic spraying + synbiotic feed (T5) had the highest FC compared to other treatments. Also, during the periods from (3-6) and (0-6) weeks of age, the birds were fed super pre-starter diet (T2) achieved the highest FC compared to other treatments. However, FC was increased during the same previous weeks of age by about 4 and 3.16% compared to control treatment respectively. T3 (synbiotic feed) achieved the lowest FC during all experimental periods.

Our findings agree with that reported by El-Faham *et al.*, (2017) who mentioned that feed intake/per bird (g) was increased by feeding super starter diet at level of (25%) crude protein when compared to another treatment received crude protein at level (23%) protein. Mohsen *et al*., (2004) concluded that increasing crude protein level improve FC significantly ($P<0.05$) in broilers fed high CP 23 % for 1 to 10 days.

On the other hand, the obtained results disagreed with, Sozcu and Ipek, (2017) who reported that 11.5% superior in feed consumption in chicks received diet contained 0.05% synbiotic. Abdel-Hafeez *et al.*, (2017) reported that 1.4% improved in FC of broiler chickens fed diets contained 0.1% synbiotic. Nihar *et al.*, (2016) found that FC didn't affect by synbiotic addition at range from 0.05% to 0.2%.

Feed conversion ratio (g feed/g gain)

The results of feed conversion ratio (g feed/g gain) of broiler chickens as affected by super pre-starter diet**,** yeast +glucose Anhydrous, synbiotic feed and synbiotic spraying were presented in Table (8).

Table 8. Effect of Some Nutritional Manipulations Treatments on Feed Conversion Ratio (g feed/g gain)

Treatments	**Periods**		
	0 – 3 W	**3 – 6 W**	**0 – 6 W**
(C)	1.37±0.030	1.67±0.050^{b}	1.57±0.041^{b}
(T1)	1.36±0.034	1.66±0.073^{b}	1.56±0.057^{b}
(T2)	1.39±0.020	1.90±0.092^{a}	1.71±0.057^{ab}
(T3)	1.39±0.024	1.80±0.103^{ab}	1.64±0.065^{ab}
(T4)	1.43±0.020	1.73±0.056^{ab}	1.63±0.042^{ab}

(T5)	1.45±0.032	1.91±0.059[a]	1.73±0.032[a]
(T6)	1.46±0.080	1.94±0.033[a]	1.76±0.044[a]

[a–d] Means with different superscripts in the same columns are significantly different ($P \leq 0.05$). C= Control (without any supplementation), T1=Super pre-starter diet, T2 =Yeast + Glucose Anhydrous, T3=Synbiotic feed, T4=Synbiotic spraying, T5= Synbiotic spraying and in feed and T6=Super pre-starter diet with synbiotic feed.

There was no significant ($P>0.05$) differences in feed conversion ratio of broilers between different treatments during the period from (0-3) weeks of age. Also, during the periods from (3-6) and (0-6) weeks of age, it was noticed that chicks fed super pre-starter diet (T2) and control group achieved the highest FCR compared to other treatments. While, chicks treated with synbiotic spraying + synbiotic feed (T5) and super pre-starter diet + synbiotic feed (T6) had the lowest FCR compared to the other treatments.

These results are in harmony with Sasyte *et al*., (2018) who showed that broiler chicks were fed super pre-starter diet 22.5% CP for eight days of age decreased feed conversion ratio by 3% during all the experimental period. El-Faham *et al.,* (2017) reported that the values of FCR indicted significant differences between birds fed super starter diet (25% CP) compared to those fed diet (23% CP). FCR was improved significantly ($P<0.05$) in broiler fed high CP 23% compared to low diets CP 19% during the period from 1 - 10 days of age (Mohsen *et al*., 2004). However, the results in the present study are in disagreement with the findings of Ghasemi *et al.,* (2014) who observed that improvement in feed conversion ratio of broiler chickens fed 0.1% synbiotic. Abdel-Hafeez *et al.,* (2017) reported that 13.5% improved in FCR of broiler chickens fed diets contained 0.1% synbiotic. Nihar *et al.,* (2016) found that FCR didn't affect by synbiotic addition at range from 0.05% to 0.2%. Ali *et al.,* (2015) found that supplementation of synbiotic (1g/kg feed) showed a significant ($P < 0.05$) decreased in FCR of broiler chickens compared to the other treatments.

Carcass Criteria

Table (9) shows the effect of some feeding manipulations (super pre-starter diet**,** yeast + glucose Anhydrous, synbiotic feed and synbiotic spraying) on some carcass characteristics at the end of experiment.

Chickens fed T5 (synbiotic spraying and in feed) gave nurmerically ($P<0.05$) that achieved the highest dressed carcass percentage (79.77) compared to those fed different dietary manipulations. The obtained findings are in disagreement with Yagoub and Babiker, (2008) who revealed that there was no significant ($P>0.05$) difference in dressing percentage among different treatments. However, application of yeast and glucose anhydrous (T2) and synbiotic feed (T3) had positive effect in breast and drum% compared to other treatments expect (T4) in drumstick%. Morever, no significant ($P\geq0.05$) effect on thigh% in all studied parameters treatments. Whereas, the birds in control group and synbiotic feed (T3) had significantly more abdominal fat compared to the other manipulations, while the lowest value of abdominal fat% found in T6 (

super pre-starter diet + synbiotic feed) compared to other treatments. The present data showed that the back and wings % in control group higher by 18.07 and 14.93 % than those fed super pre-starter diet + synbiotic feed (T6) (P>0.05), respectively.

The results are in same line with the findings of Mirza, (2009) who reported that a significant increase in ileum villus height at 42 days of age as a result of synbiotic supplementation to the broiler diet. Similar results were found by Widyaratne *et al.*,(2001), who found that breast meat yield was significantly higher in broiler chickens fed high protein diets than control one.

The results of the present study are disagreement with the finding of Mohsen *et al.*, (2004) who found that increasing crude protein level in starter diet improved breast meat yield significantly (P<0.05) in broiler fed high CP diets (23%) compared to low CP (19%) in Ross broiler chick. Sasyte *et al.*, (2018) showed that application of super pre-starter diet (22.5% CP) during 1-8 days of age had a positive effect (P>0.05) in carcass yield, breast% was increased by about 2%, compared to control treatment (21% CP). Lemme, *et al* (2019) illustrated that breast meat yield of broiler chicks fed 22% crude protein didn't differ than those of fed control diet (21%).

Table 9. Effect of Some Nutritional Manipulations Treatments on Carcass Traits and Abdominal Fat Percentage

Traits	Treatments						
	(C)	(T1)	(T2)	(T3)	(T4)	(T5)	(T6)
Dressed, (including giblets)	75.14±0.44^{b}	74.82±0.78^{b}	74.48±1.58^{b}	75.36±0.96^{b}	75.81±0.75^{b}	79.77±0.55^{a}	77.44±1.19^{ab}
Breast	27.53±0.51^{ab}	28.42±0.98^{ab}	29.97±1.27^{a}	29.56±0.34^{a}	28.66±0.68^{ab}	26.54±0.36^{b}	27.77±0.65^{ab}
Drum	10.98±0.38^{ab}	10.98±0.19^{ab}	11.82±0.27^{a}	12.03±0.24^{a}	11.58±0.24^{a}	10.33±0.18^{b}	11.52±0.76^{ab}
Thigh	15.62±1.74	17.47±0.16	16.66±0.26	16.42±1.28	17.30±0.85	15.07±0.86	15.21±0.36
Back	16.72±0.48^{a}	15.87±0.91^{ab}	15.85±1.00^{ab}	16.41±0.73^{ab}	17.61±0.80^{a}	15.96±0.43^{ab}	14.16±0.41^{b}
Wings	12.08±2.08^{a}	10.35±0.25^{ab}	10.07±0.24^{ab}	10.21±0.18^{ab}	9.94±0.24^{ab}	8.79±1.15^{b}	10.51±0.71^{ab}
Neck	2.70±0.10^{b}	2.69±0.17^{b}	2.96±0.10^{ab}	2.81±0.15^{ab}	3.06±0.15^{ab}	2.93±0.16^{ab}	3.49±0.45^{a}
Abdominal fat	2.22±0.14^{a}	1.74±0.20^{ab}	1.50±0.06^{bc}	2.32±0.30^{a}	2.05±0.32^{ab}	1.47±0.07^{bc}	1.10±0.12^{c}
Organs (%)							
Spleen	0.21±0.02^{b}	0.20±0.01^{b}	0.30±0.02^{a}	0.19±0.01^{b}	0.20±0.03^{b}	0.22±0.02^{b}	0.23±0.00^{b}
Gall bladder	0.12±0.01	0.11±0.02	0.11±0.01	0.12±0.01	0.13±0.01	0.10±0.01	0.10±0.01
Small intestine	5.50±0.44^{b}	6.67±0.37^{a}	6.01±0.11^{ab}	6.56±0.19^{ab}	5.43±0.21^{b}	5.75±0.33^{ab}	6.34±0.58^{ab}
Giblets							
Heart	0.50±0.04	0.48±0.02	0.53±0.01	0.51±0.03	0.54±0.02	0.55±0.02	0.51±0.03
Liver	3.02±0.31	2.59±0.10	2.82±0.07	2.81±0.10	3.11±0.09	3.12±0.19	3.03±0.25
Gizzard	1.78±0.15	1.53±0.09	1.80±0.03	1.83±0.17	1.58±0.12	1.62±0.05	1.75±0.12
Body organs length (cm)							
Small intestine	196.75±11.86	212.25±12.22	218.00±1.78	203.25±7.94	196.00±5.72	207.75±10.33	201.00±9.77

Large intestine	8.50±0.65	8.88±0.31	8.25±0.25	8.00±0.00	8.63±0.38	9.00±0.58	8.25±0.48

[a–d] Means with different superscripts in the same columns are significantly different ($P \leq 0.05$).
C= Control (without any supplementation), T1=Super pre-starter diet, T2 =Yeast + Glucose Anhydrous, T3=Synbiotic feed, T4=Synbiotic spraying, T5= Synbiotic spraying and in feed and T6=Super pre-starter diet with synbiotic feed.

Spleen% of chicks fed yeast + glucose anhydrous (T2) achieved the highest value (0.3%) compared to other treatments. Also, small intestine % of birds treated with super pre-starter diet (T1) had the highest value (6.67%) compared to other treatments. Spleen% in chickens fed yeast and glucose anhydrous supplemented diets higher by about 42.85% than control chickens, also, in the same trend, small intestine % was achieved higher value by about 21.27% than control in the same treatment. No significant (P>0.05) effects due to treatments on gall bladder, heart and liver, gizzard percentages, length of small and large intestine during all experimental periods.

Concerning with liver and spleen%, Yousefi *et al.,* (2014) found that there were no significant differences due to manipulations in experiment in which birds fed super pre-starter diet (22.92%) for 5 days. The obtained results are in disagreement with Sasyte *et al.,* (2018) found that application of super pre-starter diet 22.5% CP during eight days of age had a positive effect (P>0.05) on carcass characteristics of broiler chickens.

Conclusion

From the present results, it could be stated that the application of super pre-starter diet for broiler chickens for the first 3 days of age could improve body weight, body weight gain, feed consumption and feed conversion ratio, but, the manipulations of synbiotic spraying and in feed improved dressed percentage of broiler chickens by about 6.16% than control one.

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دراسة صلاحية تأثير بعض المعاملات الغذائية على الأداء الإنتاجي لدجاج تسمين اللحم

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الملخص

الهدف من هذه الدراسة هو معرفة تأثير إضافة بعض المعاملات الغذائية المختلفة على الأداء الإنتاجي وصفات الذبيحة لدجاج تسمين اللحم. تم إستخدام سبع معاملات: الكنترول، Super pre-starter diet عند مستوى (25٪) بروتين وذلك خلال الثلاث أيام الأولى من العمر، خليط من 2جم لكلا من Yeast و ال Glucose anhydrous ، 2 جم Synbiotic/ feed كجم علف ، 20جم 500/Synbiotic spraying مل ماء ، خليط من2 جم Synbiotic/ feedكجم علف و20جم 500/Synbiotic spraying مل ماء ، خليط من Super pre-starter diet (25٪) بروتين و 2 جم 13 Synbiotic/ كجم علف.

تم اختيار 280 (مائتان وثمانون) كتكوت تسمين عمر يوم عشوائياً في تجربة إستمرت 6 أسابيع من العمر. تم دراسة وزن الجسم ،إستهلاك العلف ، زيادة وزن الجسم ، نسبة التحويل الغذائي وبعض صفات الذبيحة.

أشارت النتائج إلى وجود زيادة معنوية في وزن الجسم نتيجة إضافة ال Super pre-starte diet (25٪) في عمر4 و 5 و 6 أسابيع، كما تحسن أيضا معدل الزيادة في وزن الجسم وإستهلاك العلف ومعدل التحويل الغذائي معنويا خلال الفترات من (3-6) و (0-6) أسابيع من العمر. أيضا تحسنت نسبة الذبيحة المجهزة معنويا في الطيور التي تم معاملتها بخليط من 2جم Synbiotic feed/كجم علف و20جم 500/Synbiotic spraying مل ماء مقارنة بالمعاملات الأخرى وكانت الزيادة 79.77٪ مقارنة بالكنترول (75.14٪). كما تحسنت نسبة الصدر في الكتاكيت التي تم تغذيتها بخليط من 2جم لكلا من Yeast و ال Glucose anhydrous وكذلك في الكتاكيت التي تتغذى على in feed Synbiotic وأوصت النتائج إلى أن إستخدام Super pre-starter diet خلال الأيام الثلاثة الأولى من العمر عند مستوى 25٪ يحسن من معدل أداء نمو كتاكيت اللحم.