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Economic Evaluation of Using Dried Brewer's yeast as Feed Additives for two Broiler Breeds

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A B S T R A C T

The effect of feeding different levels of yeast on growth performance, blood constituents, and economic efficiency was studied. An experiment was conducted on 300 one day old chicks. There were 3 dietary treatments each consisting of 5 replicates with 10 chicks in each replicates. The treatments were 0% control, 0.2 and 0.4% Brewer's yeast respectively. The data were obtained for body weight, daily gain, feed intake feed conversion ratio during the experimental period. At the end of experiment concentration of protein, glucose, cholesterol, total lipids, phospholipid in serum and haemoglobin were evaluated. Also different dressing percentages were evaluated. results showed that chicks fed 0.4% yeast had higher body weight gain (BWG), feed intake (FI)and better of feed conversion ratio(FCR). Chicks fed ration containing 0.2 and 0.4 % of yeast increase in serum phospholipidand total protein of their concentration. Also total variable cost, total costs and total returns (LE/bird) were high in groups feeding 0.2 and 0.4% brewer's yeast Finally we may concluded that from blood concentration parameters that feeding brewer's yeast had low percentages for total lipids, cholesterol and high concentration of total protein and glucose. Economic parameters showed that high net profit was in 0.4% than those of 0.2 of brewer's yeasts. Cobb breeds was preferred than Hubbard breeds from measures of blood parameters and economic efficiency.

Keywords: Brewer's yeast; Cobb and Hubbard ; Economic efficiency; Productive; Carcass; Blood parameters.

1. Introduction

Feed costs had a considerable percentage of total costs in livestock production, especially up to 75-80 % for poultry production. Therefore in the last years it was investigated feed additives to increase feed efficiency (Ayhan and Aktan, 2004).

Brewer's yeast is commonly used in the animal feed industry as a specialty amino acid, vitamin and mineral supplement. Brewer's yeast is a natural source of protein and B complex vitamins. The commercial preparations are either powdered or compressed are added to the animal feeds for their nutritional contents and as it provides the highest activity at the lowest used cost. Yeasts are single cell, eukaryotic microorganisms classified in the fungi kingdom (Bennett, 1998; Ingraham, 2010). Yeasts are characterized as heterotrophs in which they rely on living and dead organic material as sources of energy and nutrients (Bennett, 1998).

Yeats is a general term including single celled usually rounded fungi. They are fermenters of carbohydrates and are fed to colonize the intestinal environment and promote a biter flora balance.

Yeast has a beneficial effects on broiler performance and economic effficiency (Ashayerizadeh et al., 2009), modulation of the intestinal histological changes (Kabir el., 2005), reduce mortality (Vicente et al., 2007) immunomodualion (Apata, 2008), certain haematological parameters (Ashayerizadeh et al., 2009), improve sensory characteristic of dressed broiler meat and meat quality of broilers (Pelicano, et al, 2003).

The gastrointestinal tract is developmentally very active in the early period post hatch in poultry species (Uni el., 2000). The intestinal crypt that form on the day of hatch become defined in the first 48 to 96 hours and continue to grow rapidly during the first 7 days. The intestinal villi increase significantly in diameters during the first 7-10 days after hatch

This study was designed to investigate the effect of two different levels of Brewer's yeast supplement to broiler breed (Hubbard and Cobb) chicks diets on growth performance (body weight, body weight gain, feed intake, feed conversion ratio) carcass traits, blood constituent and economic efficiency in terms of costs, returns and net profit.

2. Material and methods

2.1. Materials

This study was carried out during period extended from 1th December 2018 till 10th of January 2019 to study the effect of two different levels of Brewer's yeast supplement to broiler breed (Hubbard and Cobb) chicks on economic efficiency of broilers.

2.2. Experimental birds

Two breeds (Hubbard and Cobb) of boilers are used in this research (150 birds for each breed). Three groups of each breed were randomly distributed (50) were used, where one control group and the other two groups were used 0.2 and 0.4 of brewer yeast that added freshly to the diets.

2.3. Management

2.3. 1. Housing

The birds were housed in a clean, well ventilated farm that previously disinfectant and prepared for receiving birds for experiment.

2.3. 2. Temperature

The starting temperature was 33°c±1 during the 1st week then decrease gradually until reach 25°c±1 at the 7th week.

2.3. 3. Lighting

The birds were subjected to continuous lighting program (natural and artificial).

2.3. 4. Feeding

The birds were feeding on starter and finisher ration according to (National Research Council,1994). Feed and water was provided *ad libtium*. Brewer's yeast was added freshly to the diets

2. 4. Performance measurements

2.4.1. Growth parameters

1. Body weight gain (BWG)

At the beginning of the experiment (at one day old), the chicks were individually weighted to the nearest gm, and then they were weighted weekly till the end of the experiment. The body weight gain per week was calculated by subtracting the body weight between two successive weights.

2. Feed intake and feed conversion:

a. Feed intake/gm, the daily feed intake was calculated by the difference between the weight of offered feed and the remained part. The total feed consumption per day was divided by the number of birds of

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Table 1: Effect of different breeds with different levels of dried brewer's yeast on body weight gain, feed intake and feed conversion ratio

Performance parameter	Hubbard			Cobb		
	Control	**0.2 B. yeast**	**0.4 B. yeast**	**Control**	**0.2 B. yeast**	**0.4 B. yeast**
Initial body weigh	45.41±0.22[a]	45.1±0.15[a]	45.3±0.22[a]	45.6±0.11[a]	45.11±0.2[a]	46.10±0.22a
Body weight gain (gm)	1880.1±45,17[b]	1916.12±58,1[b]	1920.2±55,1[a]	1960.1±50,17[b]	1960.12±50,17[b]	2000.2±60.11[a]
Feed intake(gm)	4012.5±8.17[c]	4070.2±10,17[b]	4120.2±11.12[a]	4065.3±22,17[c]	4090.2±18,17[b]	4255.1±20,17[a]
Feed Conversion Ratio	2.13±0.02[a]	2.12±0.02[a]	2.14±0.01[a]	2.07.2±0.01[a]	2.08±0.01[a]	2.12±0.012[a]

Table 2: Effect of different breeds with different levels of dried brewer's yeast on Carcass traits of different broiler breeds

Performance parameter	Hubbard			Cobb		
	Control	**0.2 B. yeast**	**0.4 B. yeast**	**Control**	**0.2 B. yeast**	**0.4 B. yeast**
Dressing (%)	80.00 ± 0.65[a]	81.29± 0.68[a]	80.22± 0.65[a]	80.15± 0.65[a]	80.28 ± 0.65[a]	80.19 ± 0.69[a]
Gizzard fat %	0.60[a] ± 0.12	0.62[a] ± 0.12	0.68[a] ± 0.11	0.69[a] ± 0.14	0.65[a] ± 0.12	0.69[a] ± 0.16
Abdominal fat %	1.12[a] ± 0.12	1.11[a] ± 0.12	1.10[a] ± 0.11	1.10[a] ± 0.12	1.12[a] ± 0.10	1.13[a] ± 0.12
Gizzard %	1.62[a] ± 0.01	1.63[a] ± 0.02	1.62[a] ± 0.04	1.62[a] ± 0.02	1.62[a] ± 0.04	1.60[a] ± 0.04
Liver %	2.12±0.01[a]	2.12±0.02[a]	2.04±0.01[a]	2.07.2±0.02[a]	2.08±0.01[a]	2.12±0.012[a]

Values represent mean and standard error (Mean ± SE).

Table 3: Effect of different breeds with different levels of dried brewer's yeast on Economic parameters traits of different broiler breeds (LE/bird) (

Performance parameter	Hubbard			Cobb		
	Control	**0.2 B. yeast**	**0.4 B. yeast**	**Control**	**0.2 B. yeast**	**0.4 B. yeast**
Haemoglobin(gm/100ml)	10.20[a] ± 0.10	11.10[a] ± 0.10	11.12[a] ± 0.12	10.12[a] ± 0.110	11.80[a] ± 0.10	11.70[a] ± 0.10
Total protein gm/100ml	5.63[a] ± 0.12	5.80[a] ± 0.13	6.90[a] ± 0.11	5.70[a] ± 0.11	6.00[a] ± 0.12	6.89[a] ± 0.16
Glucose mg/100ml	181.2[a] ± 4.52	185.23[a] ± 3.57	189.65[a] ± 8.56	180.22[a] ± 5.52	188.2[a] ±4.52	190.2[a] ± 5.58
Total lipids gm/100ml	106.8[a] ± 2.25	90.21[a] ± 11.21	88.21[a] ± 10.23	102.21[a] ± 8.52	89.21[a] ± 9.55	87.22[a] ± 7.84
Cholesterol mg /100ml	168.21 ± 5.45	145.56[a] ± 4.58	138.2[a] ±6.25	165.21[a] ± 11.21	144.55 ± 8.54	135.21[a] ± 5.90
Phospholipid mg/100ml	220.21 ±18.21	275.25± 16.57	300.21[a] ± 12.24	227.21 ± 11.24	265.55 ± 12.25	302.21 ± 21.21

Values represent mean and standard error (Mean ± SE).

Table 4: Effect of different breeds with different levels of dried brewer's yeast on Economic parameters traits of different broiler breeds (LE/bird)

Performance parameter	Hubbard			Cobb		
	Control	**0.2 B. yeast**	**0.4 B. yeast**	**Control**	**0.2 B. yeast**	**0.4 B. yeast**
Total variable cost (LE/bird)	31.10 ± 0.10[a]	31.12 ± 0.10[a]	31.45 ± 0.12[a]	31.11 ± 0.110[b]	31.89 ± 0.10[b]	32.18 ± 0.10[a]
Total fixed cost (LE/bird)	9.50 ± 0.12[a]	9.51 ± 0.13[a]	9.51 ± 0.11[a]	9.51 ± 0.11[a]	9.50± 0.12[a]	9.51 ± 0.16[a]
Total cost (LE/bird)	40.61± 4.52[a]	40.62 ± 3.57	40.96 ± 2.56[a]	40.62± 5.52[b]	41.39 ±4.52[b]	41.69 ± 5.58[a]
Total return (LE/bird)	44.286 ± 2.25[b]	45.108 ± 5.21[a]	45.206 ± 6.23[a]	45.120 ±4.52[c]	46.131 ± 3.55[b]	47.064 ±4.84[a]
Net profit (LE/bird)	3.67 ± 0.45[c]	4.48 ± 0.58[a]	4.246 ±0.25[b]	4.50 ± 0.21[c]	4.741± 0.54[b]	5.374± 0.90[a]

Values represent mean and standard error (Mean ± SE).

each group to obtain the average daily feed consumption per bird per group.

b. Feed conversion ratio (FCR)

FCR was recorded every week according to (Wanger et al. 1983).

2.4.2 Evaluation of carcass quality

At the end of growing period, 5 birds from each dietary treatment for the two breeds were randomly taken, fasten for 12 hours then each bird was weighed live, slaughtered by neck cut and allowed to bleed according to the methods of Brake et al.(1993).

2.4.3.Blood samples

Blood samples were collected from five slaughtered birds from each group where, heamoglobin (Zijlsta N. 1960), serum total protein (Henry R.1974), cholesterol (Tietz N. 1995), total lipids (Schmit J M 1964), phospholipids and glucose (Tinder P 1969) were calculated.

2.5. Economic measures

A. Costs and returns of Broiler production (LE/bird)

It was calculated according to previous studies (El-Tahaway, 2007; Omar, 2003; Atallah 1997).

B. Net income was calculated according to the following equation

Net profit = Total returns – Total costs

2.6. Statistical analysis

The data were analyzed using the SPSS (Statistical Package for Social Science (version 23). The using of SPSS programs (Noursis, 1984; Einspruch, 1998; Kinnear and Gray, 2000 and Foster, 2001) were used for analysis of ANOVA test and post hoc testes.

3. Results

3.1. Growth performance

Results of Dietary supplementation of brewer's yeast on body weight gain; feed intake and feed conversion ratio were illustrated in table (1). Where there were non-significant effect between all groups in initial body weight where its value were (45.41±0.22) for control Hubbard and (45.10±0.15), (45.3± 0.22) in 0.2 and 0.4 brewer's yeast respectively. Meanwhile it were (45.3± 0.22), (45.3± 0.22), (45.3 0.22) in control and 0.2 and 0.4 brewers' yeast respectively. Body weight gain were high significant at ($P < 0.05$) in Hubbard groups where it value was (1920.20± 55.1) for 0.4 group and low value was at control group (1880.1± 45.17) in cobb breed there were significant difference for different groups the highest value was at 0.4 brewer's yeast and the lowest value were at the control groups.

Regards to feed intake, results showed that significant difference between groups in Hubbard and cobb where 0.4 Brewer’s yeast consumed more feed than control groups and 0.2 group there values were (4120.2± 11.2) and (4255.1± 20.17) for Hubbard and cobb groups.

Feed conversion ratios were non-significant even though there values were different in Hubbard and Cobb groups.

3.2. Carcass traits

Findings of carcass traits in table (2) showed non-significant differences ($P \geq 0.05$) for the dressing percentage for all groups where, they ranged (80.2± 0.65). For gizzard % showed significant difference among groups where the Cobb groups (control and treated groups) were (0.69 ± 0.14), (0.65 ± 0.12) and (0.69 ± 0.16) respectively. Meanwhile for Hubbard groups (control and treated groups) were (0.60 ± 0.12), (0.62 ± 0.12) and (0.68 ± 0.16) respectively. Abdominal fat and Liver % are non-significant differences between all groups.

3.3. Blood biochemical parameters

The two breed showed significant different in the blood biochemical parameters. For Hubbard breeds, the Haemoglobin (gm/100ml) were 10.2 ± 0.10 for control and 11.1 ± 0.1, 11.12 ± 0.12 for 0.2 and 0.4 B.yeast group. The total protein (gm/100ml) for 0.2 and 0.4 B yeast were 5.80±0.13 and 6.9 ±0.11 respectively.

The glucose mg/100ml also showed significant different between groups, it was 181.2 ±4.52 for control and 185.23±3.57 and 189.65 ± 8.56 for 0.2 and 0.4 B. yeast groups. Total lipids gm/100ml showed significant different and it values were 88.21 ±10.23 and 90.21± 11.21 for treated groups and 106.8±2.25 for the control groups. The cholesterol mg/100ml showed significant difference and values for control was 168.21±5.45 and for treated groups 0.2 and 0.4 were 145.56±4.58 and 138.2±6.25. Phospholipid mg/100ml appeared significant and values for control was 220.21 ± 18.21 but for 0.2 and 0.4 B. yeast were 275.25±16.57 and 300.21± 12.24. For Cobb breeds, the Haemoglobin (gm/100ml) were 10.12 ± 0.11 for control and 11.8 ± 0.1, 11.70 ± 0.10 for 0.2 and 0.4 B. yeast group. The total protein (gm/100ml) for 0.2 and 0.4 B yeast were 6.00 ±0.12 and 6.89 ±0.16 respectively.

The glucose mg/100ml also showed significant different between groups, it was 180.2 ± 5.52 for control and 188.2± 4.52 and 190.2 ± 5.58 for 0.2 and 0.4 B. yeast groups. Total lipids gm/100ml showed significant different and its values were 89.21 ±9.55 and 87.22± 7.84 for0.2 and 0.4 treated groups and 102.21±8.52 for the control groups. The cholesterol mg/100ml showed significant difference and values for control was 165.21±11.21 and for treated groups 0.2 and 0.4 were 144.55±8.54 and 135.21± 5.90. Phospholipid mg/100ml showed significant and values for control was 227.21 ± 11.24 but for 0.2 and 0.4 B. yeast were 265.55±12.25 and 302.21± 21.21 respectively.

3.4. Economic parameters

Table 4 showed the different economic parameters for the different groups and the net profit was 5.3 ± 0.9 LE/bird for 0.4 B. yeast cobb breeds mean while it was 4.24± 0.25 LE/bird for 0.4 B yeast Hubbard for 0.2 B. yeast Cobb breed it was 4.74 ± 0.54 LE/bird and for 0.2 B.yeast Hubbard breed it was 4.48 LE/birds.

4. Discussion

The present results in table (1) revealed a high significant increase of feed consumption with dietary supplementation in all yeast levels with 0.2 and 0.4 for Cobb and hubbard breeds. A high feed consumption was recorded when yeast was supplemented compared to control as mentioned by (Rameshwari and Karthikeyan, 2005).This increase is related to yeast constituent with metabolites such as peptides, organic acids oligosaccharides, organic acids, flavor possibly some unidentified growth factors which have been proposed to produce beneficial responses in animal production (Gao et al., 2008; Zhang et al., 2005). These results agree with(Markovic et al .2009) that revealed that addition of Brewer's yeast on the feed improved broiler body weight as yeast improve the intestinal mucosal aspects and produce new epithelial cells in the intestinal crypts and migrate along the villi to the top.

Findings of carcass traits in table (2) showed non-significant differences ($P \geq 0.05$)for the dressing, gizzard percentage and abdominal fat, liver percentage also non-significant. These results agree with (Abaza et al., 2009) they concluded that fat and dressing percentage are not affected by the addition of b. yeast to the poultry diets.

Table (3) showed increase the hemoglobin level of broiler chicks fed Brewer’s yeast at 0.2 and 0.4 % comparing with the control diets and these increase are non-significant and appositive correlation between dietary levels of brewers yeasts and hematological finding reported by (Yalcinkaya, et al., 2008). Also results of high significant level of total protein and phospgolipids agree with (Oyedeji et al., 2008; Mahdavi et al., 2005).

Lower serum cholesterol in this study and previous studes (Oyedeji et al., 2008; Mahdavi et al., 2005) investigation may be due to serum cholesterol regulation by prebiotics which contributed to the deconjunction of bile, since the deconjugated of bile acid is enhanced and cholesterol is its precursor, more molecules are spent for recovery of bile acids which synthesized by yeast. And as the result of increased synthesized of bile acids the level of serum cholesterol was expected to reduce.

Results for the economic parameters in table (4) showed significant differences ($P < 0.05$) for the net profit (LE/ bird) where, the treated Ross was the largest (2.01 LE/ bird) and the second was the treated Hubbard group (1.95 LE/ bird). Meanwhile the lowest net profit LE/bird profit was the control Hubbard group, it was (1.34 LE/ bird).These results agree with (Nilson et al., 2004; Zhang et al., 2005; Halaet al., 2010) They reported that enhancement of the economic efficiency of broiler fed experimental yeast diets due to improving feed conversion or reducing the feed required to produce the bodyweight gain.

In conclusion, the supplementation of dried brewer’s yeast as 0.4 % for broiler breeds is more economic profit than 0.2% and control. Also from our results the Cobb breed is more beneficial than Hubbard breeds from results of biochemical and economic measures.

Competing Interests

The authors have no conflict of interest.

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