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EFFECTIVENESS OF CERTAIN NATURAL FEED SUPPLEMENTS ON PRODUCTIVE PERFORMANCE, NUTRIENTS DIGESTION COEFFCIENT, CARCASS CHARACTERISTICS, AND SOME BLOOD PARAMETERS OF BROILER CHICKS

SHORT TITLE: EFFECT OF NATURAL FEED ADDITIVES ON BROILER

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ABSTRACT: This experiment was made to evaluate the effect of adding leaves powder of (*Moringa olifera*), fenugreek seeds (*Trigonella foenum*), dry yeast (*Saccharomyces cerevisiae*) and mixture (fenugreek + Moringa + yeast) on growth, carcass traits, nutrients digestibility, some blood constituents and economic efficiency of Sasso broiler chicks. A total number of 150 one day age broiler chicks (Sasso) were divided into 5 groups. Each one composed of 3 replicates (10 chicks each). The first group received a basal diet without any supplementations (control). Whereas, second, third, fourth and fifth groups received the control diet supplemented with 0.5% fenugreek seed powder (FSP), 0.5% moringa leaves powder (MLP), 0.5% dry yeast (DY) and 0.5 % mixture as (0.167% FSP + 0.167% MLP + 0.167 %DY). The obtained results showed that there were significant differences among treatments. The birds fed DY recorded improvement ($P < 0.01$) in body weight, body gain, crude protein digestibility, dressing percentage, total serum protein, and economic efficiency compared with the birds fed the other feed additives as growth promoters.

Key words: growth promoters, broiler performance ,digestibility, carcass, blood

INTRODUCTION

The cost of feeding poultry is not less than 70 % of the overall cost of the production (Mukhtar, 2007). Natural feed additives as a kind of alternative growth promoters are assuming the apposition of prime importance in poultry nutrition for naturally boosting growth and safer than antibiotics. Growth enhancer is the substances that when added to a nutritionally balanced diet may provoke response towards the exploitation of the maximum genetic potential of the host, in terms of growth as well as improvement in feed conversion ratio (Kuldeep et al., 2014). Feed additives include enzymes, amino acids, pigments, minerals, vitamins and antibiotics (Mukhtar et al., 2012). Several years ago, considerable attention was given to the use of probiotics. Most interests have been generated because of increased public awareness and objection to the excessive use of antibiotics as growth promoter (Al-Homidan and Fahmy, 2007). Addition of probiotics or natural supplementation as herbs can be used instead of antibiotics to promote performance, improve meat quality, carcass characteristics, and enhance the health of the birds. Moringa *(Moringa olifera*) is one of the plants that can be utilized in the preparation of poultry feeds. The plant apart from being a good source of vitamins and amino acids, it has medicinal uses (Makkar and Becker., 1997). Moringa leaves contain very high antioxidants and anti-inflammatory compounds (Yang et al. 2006). Besides, moringa leaves, flowers, and pods are used as good sources of many nutrients such as vitamins, essential minerals, amino acids, beta-carotene, antioxidants, inflammatory nutrients, phytochemicals, and it also contains both omega -3- and omega- 6 fatty acids (Kasolo et al. 2010). Fenugreek seeds (*Trigonella foenum*) have been known and valued as medicinal material long time ago. Fenugreek has widespread use, as a healing herb. Its seeds are of commercial interest as a source of an essential steroid diosgenin to the pharmaceutical industry (Mehrafarin et al., 2010). Fenugreek seed is rich in protein, fat, total carbohydrates, and minerals such as calcium, phosphorus, iron, zinc, magnesium (Gupta et al., 1996), fatty acids predominantly linoleic. Linolenic, oleic, and palmitic (Schryver, 2002). It also has neuron, biotin, trimethylamine, which tend to stimulate the appetite by their action on the nervous system (Michael and Kumawat, 2003).Yeasts are microscopic species distinguishable from the typical microorganisms by their comparatively larger cell size, oval, elliptical, and spherical cell shapes, and by their bud development during the division cycle. For its high-quality protein content, yeast (*Saccharomyces cerevisiae*) was known as a feed supplement, because it contains lysine and vitamin B complex. Yeast also enhances immune response, bowel growth, feed conversion ratio, and decreases aflatoxin toxicity (Abd El -Aziz and Abdel-Raheem, 2018). The mode of action of yeast products is yet needed to be clarified. Some studies have confirmed the effect of yeast culture (YC) in increasing concentrations of beneficial microbes or suppressing pathogenic bacteria (Stanley et al., 2004). Therefore, the current study aimed to find out natural and safe growth promoters as an alternative to antibiotics. Thus, it is expected that the use of moringa leaves (*Moringa olifera),* fenugreek seeds (*Trigonella foenum*), dry yeast (*Saccharomyces cerevisiae*) and mixture (fenugreek + moringa + yeast) may

enhance the growth rate, dressing percentage, nutrients digestibility, some metabolic responses and net revenue of Sasso broiler chicks.

MATERIALS AND METHODS

This study was carried out at Animal and Poultry Production Farm, Faculty of Agriculture, Minia University, Egypt.

Preparation of additives: Fenugreek seeds were purchased from the local market, then washed by freshwater, and were air-dried in shadow place for one week. Then, seeds were collected and ground to a fine powder and kept at room temperature until requested. Fresh moringa leaves were collected from moringa trees planted in Farm of Horticulture Department, Faculty of Agricultural, Minia University. The leaves were air-dried in shadow place for one week. Then, leaves were collected and ground to a fine powder and kept at room temperature until requested. Dry yeast was purchased from a local market and kept in glass cans for usage. The proximate analysis of additives was as shown in Table 2.

Experimental birds and diets: A total number of one hundred fifty unsexed, one-day old Sasso broiler chicks were used in this study. Chicks were randomly distributed in cages and housed in two-tiers floor batteries located in an open house under similar managerial conditions. Artificial lighting was provided 24 hours daily during the first week; after that, it was reduced 2 hours \ day until the end of the experimental period (8 weeks of age). The temperature in the brooding house was about 34°±0.5 C for the first 3 days of age; after that, it was reduced 2 degrees every week until the 4th week of age. Then, the temperature was kept at 25° C until the end of the experimental period. The birds had free access to water and feed all the time. The chicks were divided into 5 groups, 30 birds each. Each group contained 3 replicates of 10 birds. During the experimental period, all birds were provided with a starter and grower diets. The diets were formulated to meet the moderate requirements of broiler chicks as recommended by the NRC (1994) and Farmer's guide to Sasso coloured broilers management. Chicks were fed on a starter ration for the first two weeks and then transformed to grower ration till the end of the experiment. The formula and proximate analysis of the diets are shown in Table (1). The first group considered as the control group (without addition), the second group fed the commercial diet supplemented with 0.5% FLP, the third group fed the commercial diet supplemented with 0.5% MLP, the fourth group fed the commercial diet supplemented with 0.5 % DY, and the fifth group fed the commercial diet supplemented with 0.5 % mixture of FLP+ MLP + DY**.**

Growth performance: The live body weight of each replicates recorded to the nearest gram every two weeks through the experimental periods from 0 to 8 weeks of age. Feed intake was measured by weighing the quantity of feed offered and leftover to each group at the beginning, and at the end of each two weeks. Body weight gain of the bird was calculated (g / bird) during the periods 0 to 2, 2 to 4, 4 to 6, 6 to 8, and 0 to 8 weeks of age. The feed conversion ratio was calculated (g feed/g body weight gain).

Digestibility trial: At the beginning of the 9th week of age, birds were fed on the same diets used during the experimental period, which means no need for a preliminary period. So, the collection period directly for three days. Feed intake was determined, and feces output was collected daily, scattered feed and feather were separated and taken out of the feces. Samples of the diets studied, and the feces obtained for each treatment were

pooled together, dried at 60 ^{o}C to a constant weight, ground in a mill, and then kept in glass cans for chemical analysis. Chemical analysis of the experimental diets feed additives, and excreta were undertaken according to the official methods of A.O.A.C (1990). Fecal nitrogen was determined according to Jakobsen et al. (1960): seventy ml-distilled water was added to 29 ml of dried excreta in a 300 ml beaker plus 20 ml sodium borate and 6 ml potassium permanganate were added. The beaker was placed in water bath at a temperature of 50 ℃ and was stirred for an hour. It was left to settle for at least one hour at a room temperature. About 30 ml 10% tri-choloro acetic acid (TCAA) was added and stirred with a glass wand. The beaker was left again for half an hour at room temperature, then filtered through 15 cm ashless filter paper and washed 4 times with 25-30 ml 2% (TCAA) for each. The filter paper containing the sample was dried in an oven at 90 ˚ C, and then the sample along with the filter paper was digested following the Kjeldahle meth for determining the nitrogen content of feaces. Then, the digestion coefficient was calculated as follows:

$$Digestibility\ (\%) = \frac{(Nutrient\ in\ feed \times FI) - (Nutrient\ in\ faeces \times FO) \times 100}{Nutrient\ in\ feed \times FI}$$

Where: FI = Feed intake, FO = fecal Output

Slaughter test: At the end of the trial (8 weeks of age), three birds from each group were chosen to slaughter and individually weighed. All slaughtered birds after complete bleeding were scalded, and feathers were plucked. Carcasses were eviscerated, heads and shanks were separated, then the carcass was chilled in tap water for about 10 minutes. Eviscerated carcasses were individually weighed and dressing percentage was calculated (weight of carcass × 100 / pre-slaughter weight). Percentage of giblets (liver + gizzard + heart) and abdominal fat were calculated in relation to carcass weight.

Blood constituents: Blood samples were collected from three birds (3/group) during slaughtering in un-heparinized tubes. Then these samples for each group were centrifuged at 3000 rpm\min., for 20 minutes to obtain blood serum. The serum was kept at -20 ˚C until analysis. Serum total protein, albumin, glucose, and liver enzymes (ALT and AST) were determined according to the commercial reagent kits protocols. Serum globulin and albumin/globulin concentration were calculated. Serum total cholesterol and triglycerides were determined in a blood research laboratory in El Minia- Egypt.

Economic efficiency: The economic efficiency of dietary treatments was estimated at the end of the experimental period, as described by Bayoumi (1980) as net revenue per unit of feed cost. Cost of one-kilogram feed for different diets, the cost of feed/ kg gain, and the cost of feed/ birds were calculated based on the prices of feed and one kilogram of live body weight prevailing in the local market at the time of experiment. The relative economic efficiency was estimated as follows:

Total revenue (TR)= final live body weight (FLBW)× market price of one kg of LBW

Net revenue (NR)= total revenue- total feed cost (TFC)

Whereas, TFC= total feed intake × price of feed

Economic efficiency (EE)= NR\TFC

Relative economic efficiency (REE)= (EE for treatment group\ EE for the control group)× 100

Statistical analysis: The data obtained were statistically analyzed using one way ANOVA General Linear Model (GML)

procedure described in the SAS User's Guide SAS,(1998). Significant differences among treatments were separated by Duncan's multiple range tests Duncan,(1955).

The following statistical model was used.

$Yij = \mu + Ti + Eij$

Where:

Yij = Experiment observations.

μ = The overall mean.

Ti= The effect of dietary treatment.

Eij = The experimental error.

RESULTS AND DISCUSSION

Chemical composition of feed additives:

The proximate analysis of feed additives is presented in (Table 2). The results revealed that fenugreek seed powder (FSP) contain 90.67%, 30.82%, 14.80%, 3.42%, 4.50% and 46.46% of dry matter (DM), crude protein (CP), crude fiber (CF), ether extract (EE), ash and nitrogen-free extract (NFE) as respectively. While Moringa leaves powder (MLP) contains 92.68, 21.91, 10.95, 5.63, 15.21, and 46.30 of DM, CP, CF, EE, ash, and NFE respectively. These results confirm the results of other researchers, where in (2007),Nazar and El-Tinay found that fenugreek seeds contained 28.4%, 9.3% and 7.1% for crude protein, crude fiber and ether extract respectively. Also, Mamoun et al., (2014) concluded that *Trigonella foenum* seed content of dry matter, crude protein, crude fat and crude fiber was 95.9%, 25.68%, 27.6% and 0.4% respectively. The results of moringa leaves are supported by Gupta et al. (1989) as they stated that the contents of leaves as follows: 26.4 CP, 6.5 fat and 12% for ash. Besides, Nuhu (2010) reported values of crude protein, ether extract, crude fiber, and ash to be 29.55, 2.2.3, 19.5, and 7.13% respectively. Dry yeast (DY) contains 94.57% DM, 42.73% CP, 2.07%CF, 1.59% ash and 47.77% NFE. Hamad,(1986) stated the composition of yeast as follow: 95.7% DM, 10.7% ash, 48.7% CP, 0.55% oil, 0.5% CF and 35.5% soluble carbohydrates.

Growth performance:

The effects of adding 0.5% (FSP), 0.5% (MLP), 0.5% (DY) and 0.167% FSP+ 0.167% MLP + 0.167% DY to Sasso broiler diets on live body weight and body gain are shown in Table (3). The results revealed that insignificant ($P>0.05$) changes on live body weight were observed as a result of adding either FSP or MLP or DY, or their mixture to Sasso broiler diet compared with the control diet at the periods of 2, 4, and 6 weeks of age. Also, the differences observed on body gain as a result of supplementing feed additives to broiler diets during (0-2), (2-4), (4-6) weeks of age were insignificant. It was observed that adding dry yeast and a mixture of feed additives to the broiler diet recorded a slight improvement ($P>0.05$) in body weight during the same periods. Birds fed the control diet supplemented with 0.5% DY recorded the highest value ($P < 0.01$) of body gain followed by birds fed control diet supplemented with the mixture (FSP+MLP+DY) compared with control and other treatments during (6-8) weeks of age. This result is partially similar with the finding of Abd El-Aziz and Abdel-.Raheem (2018) who found that the best overall mean body gain was observed in yeast group followed by moringa group when supplementing Baladi pigeones diet with 2% fenugreek seeds, 2% moringa leaves and 2% dry yeast compared to control diet. The positive response on body weight as a result of adding yeast might be due to that mannan oligosaccharide (MOS) from

yeast cell walls have been researched concerning their value in immune modulation (Newman and Newman, 2001; and O'Quinn et al., 2001) and the reduction of intestinal pathogen colonization (Newman,1994). Some studies suggest that mannan oligosaccharides (MOS) may improve growth performance in young pigs (Davis et al.,1999). Furthermore, yeast can inhibit pathogenic bacteria, as reported by Line et al. (1998) and Soliman et al. (2003). Additionally, Abdel-Azeem (2002) found that the number of anaerobic and cellulolytic bacteria increased when the experimental diet was supplemented with yeast, which increased the use of lactate and moderated the media pH. Therefore, yeast improves nutrients digestibility and growth performance. Effect of feed additives on feed intake and feed conversion ratio are presented in Table (4), the results have shown insignificant differences ($P > 0.05$) among different dietary groups in feed intake during all experimental periods except the period (4 – 6 wks) of age. The highest value of FI ($P < 0.05$) was determined to chicks fed the control diet without any addition, followed by birds fed the control diet with FSP addition. During all periods of the experiment (0 to 2, 2 to 4, 4 to 6, 6 to 8 and 0 to 8 weeks of age) the lowest value ($P > 0.05$) of FI was recorded for birds fed the control diet supplemented with the mixture (FSP+MLP+DY) compared to the other treatments. This result is close to that of Ghally and Abd El Latif (2007), who revealed that quails fed the basal diet, presented the highest feed intake compared with others fed graded levels of dietary yeast. Also, the 0.05% level of FSM did not achieve significant differences in feed intake in comparison with control diet. This result was concluded by El-Kloub (2006). On the other hand, Omar (2017) found that the highest feed intake was recorded for quail birds fed the dietary1% fenugreek seeds followed by mixture diet (0.5%fenugreek seed + 0.5% *Saccharomyces cerevisiae*) compared to other feed additives. This study confirms that there are insignificant differences among dietary treatments in feed conversion of Sasso broiler during 0 to 2, 2 to 4, and 4 to 6 weeks of age with slight improvement for birds fed 0.5% yeast compared with other treatments. The best value of feed conversion was recorded for birds fed 0.5% yeast followed by birds fed mixture (FSP+MLP+ DY) from 6 to 8 weeks of age and the whole period from 0 to 8 weeks of age. The increase in FC may be due to increased body gain and reduced feed intake for birds in the dry yeast and mixture groups, and the effects of nucleotide content in yeast extract and the incidence of glucans/mannan / fructooligosaccharides in yeast Rutz et al. (2006). This result in an agreement with Hassan et al. (2012), who found that groups provided a control diet supplemented with 3 g yeast/kg showed substantial progress in conversion of feed for quails only at the age of the second week. Also, Abd El- Aziz and Abdel-Raheem (2018) found that the best feed conversion ratio was recorded when feeding with yeast, which indicates less feed consumed to gain one kilogram per body weight, by comparing with other treatments (fenugreek and moringa) and control. Also, Paryad and Mahmoudi (2008), Hosseini (2011) and Onifade (1997) found that adding dry yeast to broiler diet has increased body weight gain and feed conversion ratio.

Digestibility of nutrient:

The averages of digestibility's nutrients as impacted by the addition of different feed additives as growth promoters are located in Table (5). The results revealed that birds were consumed a basal diet added with various feed additives recorded significant differences ($P < 0.01$) in crude protein digestion coefficient. The highest percentage of digestibility for the crude protein was calculated for broilers received basal diet with 0.5% DY addition compared to the others. However, broiler chicks fed (Con., 0.5% FSP, 0.5% MLP and mixture) showed no significant differences ($P > 0.05$) in digestibility of other nutrients like dry matter, organic matter, crude fiber, ether extract or nitrogen-free extract. The improvement in crud protein digestibility for birds in dry yeast group may be related with the balanced microbial population by altering metabolism in increasing digestive enzyme activity and decreasing bacterial enzyme activity in the gastrointestinal tract (Lutful Kabir, 2009). Also, may be related with the role of *Saccharomyces cerevisiae* in the health and better performance of the broilers by enhancing the efficacy of the immune system, and increased digestion and absorption of nutrients (Thong song et al., 2008 and Zhang et al. 2005). Besides, Omar (2017) confirmed that birds fed either yeast culture at all levels or mixture of yeast culture and fenugreek seed recorded the greatest ($P<0.01$) crude protein digestibility. In addition, El bushra, (2012) who showed that supplementation of fenugreek to broiler chicks significantly ($p< 0.05$) improve protein efficiency ratio values compared with the un-supplemented diets**.** However, Abd El- latif and Abd El latif (2019) found that the greatest value of CP digestion coefficient recorded for Sasso broiler chicks fed 0.1% FSM compared with control and other dietary graded levels of MLP.

Carcass characteristics:

The effect of different feed additives on carcass yield is presented in Table (6). The obtained data revealed insignificant differences ($P > 0.05$) were noticed among treatments on the liver%, gizzard%, heart%, giblets% and abdominal fat%. The highest values ($P < 0.05$) of carcass and dressing% were obtained for broilers fed 0.5% DY followed by the birds received the mixture compared to the control and the other treated groups (FSP and MLP). The enhancement of dressed carcass as a result of 0.5% DY supplementing may be a result of the advancement of live weight, weight gain, and higher protein digestion coefficients for these birds. This result likewise Hana et al.,(2015) who showed that chicks fed with dry yeast at 0.3% level had a significantly higher effect on carcass weight as compared to all treatments. On the other hand, Hosseini (2011) found that addition of yeast caused a reduction in the carcass weight, and a somewhat similar result was recorded by Onwurah and Okejim (2014) who found that levels of yeast at 1.5g/L and 2 g/L in water for broiler chicken gave dressing percentage of 64.51 and 69.13, respectively. Also, Abd El-Aziz and Abdel- Raheem (2018) found that Moringa showed an improving effect on the carcass yield (dressing %), while yeast. Also, Elagib et al. (2013) found that feeding of broiler chicks with fenugreek gave a dressing percentage of 69, while cinnamon and ginger gave a dressing rate of 72.05 and 73.65, respectively and fenugreek showed lower carcass yield than control in pigeon diet.

Abbas (2010) found that characteristics had no significant differences among all treatments when fed chicks on a diet with FSP at 3 g/kg or diet with basil at 3 g/kg or diet with parsley at 3 g/kg.

Blood parameters:

Effect of different additives on the biochemical blood parameters of Sasso broiler chicks on serum total protein (TP), albumin (AL), globulin (G), albumin/ globulin ratio (Al\G) ratio, glucose, total cholesterol (TC), triglycerides (TG) and transaminase enzymes (alanine aminotransferase ,ALT and aspartate aminotransferase ,AST) are presented in Table (7). The obtained results revealed that the impact of dietary treatments were insignificant ($P > 0.05$) on serum AL, G, Al/G ratio, glucose, TC, TG, ALT, and AST values, while serum TP value was significant ($P<0.05$). Broiler chicks fed diet supplemented with 0.5% dry yeast had significantly the highest value of serum total protein, showed insignificant improved value of serum albumin, globulin, glucose and aspartate aminotransferase, and lowest value of triglycerides compared to other dietary treatments. Similarly, Mohamed et al. (2015) and El- Naga (2018) who found that levels of TG did not differ significantly between yeast supplemented group and control group. With regard to serum protein value, this result is similar to the finding of El- Naga (2012) and El-Naga (2018), who found significantly higher total serum protein in 0.5% yeast group followed by 0.2% yeast group compared to the control group respectively. However, The lowest value of cholesterol was recorded for the fenugreek seeds meal group compared to chamomile + 2.5 kg nigella seeds/ton of broiler diet, followed by those acquired 2.5 kg chamomile/ton of diet alone. other dietary treatments. Likewise, Abdul-Rahman (2012) and Safaei et al. (2013) reported that feeding commercial broiler chicks on diet containing fenugreek seed powder lowered total cholesterol levels. The decrease in serum cholesterol levels might be due to the presence of Saponins and Tannins that inhibit bile acid and inhibit intestinal cholesterol absorption Petit et al., (1995)

Economic efficiency:

The impact of dietary feed additives on economic efficiency is shown in Table (8). Total revenue, net revenue, and relative economic efficiency were improved for the broilers got DY followed by the birds fed the mixture compared with the other treatments.

The price of feed per kg was increased for the groups supplemented with the feed additives, the higher feed price was recorded for the diet supplemented with MLP. Increasing the profitability of broilers fed rations containing herbal growth promoters might be attributed to the better efficiency of feed utilization, which resulted in more growth and better conversion feed to live weight gain Toaha et al., (2016). The profitability of using yeast supplementation depends upon the yeast price, and the growth performance of birds fed these dietary additives Ghally and Abd EL-Latif (2007). Also, Omar, (2017) noticed that adding FSP to growing Japanese quail diets at the level of 0.5% recorded the highest values of economic efficiency, relative economic efficiency percent, and net revenue compared with the control diet and the yeast group. Abaza et al. (2004) concluded that the highest economic efficiency was noted by chicks fed 2.5 kg

CONCLUSION

In conclusion, adding 0.5 % dry yeast alone or in mixture 5% of (0.167 dry yeast + 0.167 fenugreek seed+ 0.167 Moringa leaves) as natural growth promoters to Sasso broiler chicks diet improved final live body weight and feed conversion, digestibility of crude protein, dressing percentage, some metabolic responses, and economic efficienc.

Table (1): The formula and the proximate analysis of experimental diets.

Ingredients%	**Starter diet**	**Grower diet**
Yellow corn	55.00	59.00
Soybean meal 44%	27.20	21.50
Broilers concentrate	10.00	10.00
Wheat bran	3.00	3.90
Oil	3.20	4.00
Lime stone	0.70	0.70
Di-calcium phosphate	0.20	0.20
L-lysine	0.10	0.10
Common salt	0.30	0.30
Premix *	0.30	0.30
Total	100.00	100.00
Calculated analysis		
Metabolizable energy, ME(k cal\ kg)	3025.60	3118.74
Crude protein, CP%		
Crude fiber, CF%	21.45	19.60
Calcium%	3.45	3.86
Available phosphorus, Av. Pho.%	1.00	0.94
Lysine%	0.46	0.44
Methionine+ Cysteine%	1.10	0.90
Laboratory analysis	0.82	0.74
Mois.[1]%		
DM[2] %	9.02	9.68
OM[3] %	90.98	90.32
CP%	82.45	82.96
CF%	21.73	19.42
EE%	3.66	3.99
Ash%	3.98	5.00
NFE[4] %	8.53	7.36
	62.10	64.23

* Each 1 kg Premix contained: Vit A 3350000 IU Vit D3 760 000 IU Vit E 6700 IU Vit K3 335 mg Vit B1 334 mg Vit B2 1670 mg Vit B6 500 mg Vit B12 3.4 mg Niacin 10 000 mg , Ca.D. Pantothenate 3 334 mg Biotin 16.7 mg Folic acid 334 mg, Trace minerals: Iron 13 350 mg, Copper 3 335 mg Zinc 16 700 mg Manganese 25 000 mg Iodine 500 mgCobalt 84 mg Selenium 100 mg, Additives: Ethoxyquine 600 mg, and Carrier (Ca co3) up to 1 kg

[1]Moisture [2]DM= 100- moisture% [3] OM= DM%- ash%

[4] Nitrogen free extract (NFE) = 100 – (CP%+ CF%+EE%+Ash%

Table (2): Proximate analysis of fenugreek seed powder, moringa leaves to powder, and dry yeast.

Content %	FSP	MLP	DY
Dry matter	90.67	92.68	94.57
Crude protein	30.82	21.91	42.73
Crude fiber	14.80	10.95	2.07
Ether extract	3.42	5.63	1.53
Ash	4.50	15.21	5.90
Nitrogen free extract*	46.46	46.30	47.77

* Nitrogen free extract (NFE) = 100 – (CP%+ CF%+EE%+Ash%)

Table (3): Effect of different treatments on live body weight (LBW) and body gain (BG) of Sasso broiler chicks.

Items	Age\ weeks	Treatments					SEM	*P*-value
		Con.	FSP	MLP	DY	mix.		
LBW	0	42.00	41.67	44.33	41.67	42.00	1.29	0.570
	2	209.32	211.33	211.00	214.00	213.33	9.54	0.977
	4	650.54	656.66	619.00	658.33	650.00	20.14	0.597
	6	1341.49	1313.33	1304.00	1352.34	1335.33	25.52	0.659
	8	2090.82^{ab}	2052.00^{b}	2003.34^{b}	2185.33^{a}	2111.66^{ab}	34.91	0.039
BG	0-2	173.30	169.66	166.67	172.34	175.33	9.67	0.971
	2-4	437.60	445.33	408.00	444.33	442.67	18.73	0.607
	4-6	691.00	657.33	658.00	694.00	675.33	20.25	0.714
	6-8	732.00^{bc}	705.33^{c}	699.33^{c}	833.00^{a}	776.33^{ab}	20.18	0.004
	0-8	2045.00^{abc}	1989.00^{bc}	1959.00^{c}	2143.67^{a}	2069.60^{ab}	32.49	0.018

a,,b and c means in the same rows for each treatment having different letter(s) are significantly different ($p<0.05$), LBW= live body weight, BG= Body gain, FSP= fenugreek seeds powder, MLP= moringa leaves powder and DY=dry yeast

Table (4): Effect of different treatments on feed intake (FI) and feed conversion (FC) of Sasso broiler chicks.

Items	Age\ weeks	Treatments					SEM	P-value
		Con.	**FSP**	**MLP**	**DY**	**mix.**		
FI	0-2	325.00	305.67	306.60	294.30	301.67	7.61	0.139
	2-4	876.60	846.66	815.00	793.33	797.67	19.92	0.064
	4-6	1498.30^{a}	1395.66^{b}	1333.00^{b}	1349.67^{b}	1340.00^{b}	24.80	0.004
	6-8	1826.00	1946.67	1835.00	1826.66	1797.60	52.62	0.366
	0-8	4526.00	4494.67	4335.66	4264.00	4236.66	79.33	0.086
FC	0-2	1.91	1.79	1.86	1.71	1.72	0.09	0.484
	2-4	2.01	1.90	2.01	1.79	1.81	0.094	0.344
	4-6	2.17	2.12	1.95	1.94	1.98	0.07	0.206
	6-8	2.43^{ab}	2.70^{a}	2.61^{a}	2.19^{b}	2.32^{b}	0.08	0.010
	0-8	2.20^{a}	2.22^{a}	2.20^{a}	1.99^{b}	2.05^{b}	0.03	0.004

$^{a,,b\ and\ c}$ means in the same rows for each treatment having different letter(s) are significantly different ($p<0.05$)' FI= Feed Intake, FC= Feed conversion, FSP= fenugreek seeds powder, MLP= moringa leaves powder and DY=dry yeast

Table (5): Effect of different treatments on digestibility of nutrients of Sasso broiler chicks.

Items	Treatments					SEM	*P*-value
	Con.	**FSP**	**MLP**	**DY**	**mix.**		
DM%	76.15	73.57	72.27	79.77	76.69	2.38	0.273
OM%	73.46	73.77	73.49	74.70	74.49	1.86	0.981
CP%	80.39^{bc}	78.95^{b}	81.17^{bc}	85.44^{a}	82.21^{b}	0.873	0.004
CF%	29.94	28.98	32.34	30.00	30.89	1.23	0.432
EE%	87.72	88.22	88.89	87.38	87.75	1.07	0.931
NFE%	75.59	74.71	75.83	75.96	75.26	1.87	0.989

$^{a,,b\ and\ c}$ means in the same rows for each treatment having different letter(s) are significantly different ($p<0.05$) DM= dry matter OM= organic matter CP= crud protein CF=crud fiber EE=ether extract NFE=nitrogen free extract, FSP= fenugreek seeds powder, MLP= Moringa leaves powder and DY=dry yeast

Table (6): Effect of different treatments on carcass characteristics of Sasso broiler chicks.

Items	Treatments					SEM	*P*-value
	Con.	FSP	MLP	DY	mix.		
Pre slaughter w.	2213.87	2118.33	2196.97	2288.34	2386.67	103.08	0.466
Carcass w.%	1513.23^{ab}	1442.67^{ab}	1499.63^{b}	1674.00^{ab}	1724.33^{a}	78.85	0.012
Dress. %	68.31^{b}	68.11^{b}	68.25^{b}	73.19^{a}	72.24^{a}	1.18	0.025
Liver %	3.55	3.49	3.89	3.25	3.52	0.31	0.711
Gizzard %	1.77	2.52	2.13	2.48	2.27	0.21	0.155
Heart %	0.88	1.42	0.92	1.16	1.31	0.23	0.453
Abd. fat%	1.69	2.19	1.77	1.89	1.88	0.33	0.849
Giblets %	6.49	8.04	7.21	7.87	7.22	0.651	0.490

$^{a,,b\ and\ c}$ means in the same rows for each treatment having different letter(s) are significantly different ($p<0.05$), FSP= fenugreek seeds powder, MLP= Moringa leaves powder and DY=dry yeast

Table (7): Effect of different treatments on some blood constituents of Sasso broiler chicks.

Items	Treatments					SEM	*P*-value
	Con.	FSP	MLP	DY	mix.		
Total protein(g/dl)	2.73^{b}	2.76^{b}	2.29^{b}	3.44^{a}	2.97^{ab}	0.20	0.029
Albumin(g/dl)	1.20	1.23	1.24	1.71	1.36	0.17	0.265
Globulin (g/dl)	1.57	1.43	1.06	1.72	1.61	0.23	0.368
Al./G. ratio	0.81	0.94	1.24	1.09	0.89	0.22	0.696
Glucose (mg/dl)	173.00^{b}	184.37^{ab}	153.86^{b}	243.79^{a}	186.67^{ab}	20.34	0.090
Total cholesterol (mg/dl)	141.83	123.57	134.00	133.45	130.00	9.39	0.753
Triglycerides (mg/dl)	321.63	289.66	283.53	270.00	276.60	16.51	0.286
ALT (U/L)	18.70	16.00	15.67	17.07	17.01	1.71	0.729
AST (U/L)	137.60	133.39	138.09	140.00	139.68	9.61	0.987

$^{a,,b\ and\ c}$ means in the same rows for each treatment having different letter(s) are significantly different ($p<0.05$), FSP= fenugreek seeds powder, MLP= Moringa leaves powder and DY=dry yeast

Table (8): Effect of different treatments on the economics of Sasso broiler chicks.

Items	Treatments				
	Con.	FSP	MLP	DY	mix.
Live weight (0-8) wks	2090.82	2052.00	2003.34	2185.33	2111.7
Feed intake (0-8) wks	4526.00	4494.76	4335.66	4264.00	4236.66
Price of feed* E.P.\1 kg	6.20	6.25	6.85	6.40	6.48
Total feed cost	28.06	28.08	29.69	27.28	27.44
Total revenue	52.28	51.30	50.08	54.63	52.80
Net revenue	24.22	23.22	20.39	27.35	25.36
Economic efficiency	0.86	0.83	0.69	1.00	0.92
Relative economic efficiency	100.00	96.51	80.23	116.28	106.98

* price of 1 kg FSP= 10.00 LE Price of 1 kg MLP = 120.00 LE Price of 1 kg DY = 40.00 LE, FSP= fenugreek seeds powder, MLP= Moringa leaves meal, DY= dry yeast

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الملخص العربي

تأثير بعض الاضافات الغذائية الطبيعيةعلى الاداء الانتاجي، معاملات هضم العناصر الغذائية، صفات الذبيحة، وبعض قياسات الدم لدجاج التسمين

مها أحمد عبد اللطيف عمر

قسم الانتاج الحيوانى والداجني – كلية الزراعة – جامعة المنيا- المنيا- مصر

اجريت هذه الدراسة لتقييم تأثير اضافة مسحوق اوراق المورينجا، مسحوق بذور الحلبة، الخميرة الجافة وكذلك خليط منهم على النمو ، صفات الذبيحة، المعاملات الهضمية للعناصر الغذائية وبعض مكونات الدم وكذلك الكفاءة الاقتصادية لدجاج الساسو النامى

تم استخدام ١٥٠ كتكوت عمر يوم وتم تقسيمهم عشوائيا الى ٥ مجموعات كل مجموعة تضم ٣٠ طائر(٣ مكررات ×١٠ طيور). المجموعة الاولى تم اختيارها كعليقة مقارنة بدون اى اضافات، المجموعات الثانية، الثالثة ، الرابعة والخامسة تم تغذيتهم على العليقة المقارة مضافا اليها ٠.٥ % مسحوق اوراق المورينجا، ٠.٥ % مسحوق بذور الحلبة، ٠,٥ % خميرة جافة وكذلك ٠,٥ % خليط من الثلاثة اضافات (٠,١٧٦ % + ٠,١٧٦ % + ٠,١٧٦ %) على التوالى.تم تقدير قياسات النمو الانتاجية، وتم عمل تجربة ذبح فى نهاية فترة التجربة وتم اخذ عينات الدم لتقدير بعض القياسات الفسيولوجية. كما اجريت تجربة الهضم فى نهاية الاسبوع الثامن من التجربة وتم حساب الكفاءة الاقتصادية للاضافات المستخدمة فى عليقة الدجاج الساسو النامى.

اوضحت النتائج المتحصل عليها ان:

الطيور المغذاة على عليقة المقارنة مضافا اليها٠,٥ % خميرة جافة يليها المجموعة المغذاة على الخليط بنسب متساوية من كل من اوراق المورينجا وبذور الحلبة والخميرة : اظهرت تحسنا معنويا فى كل من الزيادة فى وزن الجسم ، معامل هضم البروتين الخام، نسبة تصافى الذبيحة، الروتين الكلى لسيرم الدم وكذلك الكفاءة الاقتصادية للدجاج النامى وذلك مقارنة المجموعات الاخرى.