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PRODUCTIVE PERFORMANCE, SOME PHYSIOLOGICAL PARAMETERS AND IMMUNE RESPONSE IN LOCAL LAYING HENS FED DIETS SUPPLEMENTED WITH YEAST PREPARATION

By

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Abstract: *This experiment was conducted to investigate the effect of yeast preparation supplemental to the diets on growth, productive performance, physiological parameters and immune response of two local strains Gimmizah and Mamourah. A total number of three hundred laying hens at 28 weeks (150 Gimmizah and 150 Mamourah strain) were individually caged in an open sided building and divided into five dietary treatments for each strain, each treatment consisted of three replicates each of 10 birds. A commercial layer diet was used as the control basal diet group (I), group II diet containing basal diet plus one gm Bio-Buds (BB)/kg diet, group III diet containing basal diet plus two gm Bio-Buds (BB)/kg diet, group IV diet containing basal diet plus one gm yeast (Y)/kg diet and group V diet containing basal diet plus 2 gm yeast/kg diet. The main results could be summarized as follows:*

- *The addition of 1 or 2 gm (BB)/kg diet significantly decreased feed intake, and improved feed conversion and egg weight.*
- *The addition of either yeast preparations (BB or Y) 1 or 2 gm/kg diet improved significantly fertility and hatchability percentages in addition to hatched chick weight.*
- *Adding 1 or 2 gm BB to the layer diets had significantly decreased on yolk cholesterol level and serum cholesterol level at 40 weeks of age.*
- *Significant differences were detected in serum AST and ALT levels in all groups ($P<0.05$).*

- *Hens fed diet containing 1 or 2 gm BB/kg diets were recorded the best significant value of antibody production at 40 weeks of age.*
- *Hens fed diets containing 2 gm BB or 1 gm Y/kg diet had significantly increased (P<0.05) in serum total protein and globulin level.*
- *The histopathological results indicated that the lesions in the liver and spleen were parallel with the addition 2 gm Y/kg diet (group V) of the Mamourah laying hens and 2 gm BB or 1 gm Y or 2 gm Y/kg diet (group III, IV and V) of the Gimmizah laying hens.*

INTRODUCTION

Cancer, birth abnormalities, toxicity and resistance to therapeutic drugs are problems associated with drug and/or hormone residues in meat, milk and eggs. Therefore, the public has strong conservation towards the use of hormones and drugs as unnatural promoters in livestock production and stands behind the use of only natural ones such as probiotic (Makled, 1991). During the last decades a great attention was payed towards "Probiotic".

Probiotics are defined as organisms and substances which contribute to intestinal microbial balance in a positive way ; or product or organisms that in one way or another can enhance life performance. Probiotics as defined by Crawford (1979) and Fuller (1989) is a culture of specific living micro-organisms that implants in animal to feed and ensure the effective establishment of intestinal populations of both beneficial and pathogenic organisms.

Recently, many countries tend to prevent use of antibiotics as growth promoters because of possible residual effects in meat and egg. Probiotics having positive benefits on the growth, feed conversion efficiency and immunity in animals. The beneficial effects of probiotic may be mediated by a direct antagonistic effect against specific groups of organisms, resulting in a decrease in number (Fuller, 1977 ; Wathins, 1982 and Hentages, 1983) or by stimulation of immunity (Umesb, 1999).

Researches conducted on probiotic for laying hens indicated that addition of probiotic had positive effects on egg yield and some traits of egg quality (Thayer et al., 1978 ; Mohen Kumar and Cristopher, 1988 and Mohan et al., 1995).

Probiotics are divided into three types: a) Microbial probiotics (strain Lactobacilli and Streptococci) (Lyons, 1989 ; Marionnet and Lebas, 1990 and De Blas et al., 1991); b) Acidifiers (citric, fumaric, acetic and propionic

acids) (Chapman, 1988 ; Lyons, 1992 and Kermauner, 1994) and c) Yeast cultures (Chapman, 1988 ; Hollister et al., 1989 ; Gerendia et al., 1992 and Lyons, 1992).

Yeast culture utilization in the animal feed industry has steadily expanded in the last decade and has found application in many animal species. The practical benefits from use of yeast culture in poultry include; improvement in feed efficiency, in shell quality and improvement in semen quality of breeder males and decrease in embryo mortality (Lyons, 1989 and Tawfeek and Marai, 1997).

Saccharomyces cerevisiae have been used as probiotic by some workers (Kautz and Arens, 1998).

Yeast culture (*Saccharomyces cereviside*) contains large amounts of yeast metabolites. These metabolites component inhibit harmful bacteria, altering microbial metabolism and decrease intestinal pH and use as probiotics (Makled, 1991 and Miles and Bootwella, 1991).

Broiler chicks live body weight, daily weight gain, survival rate (%), protein efficiency ratio, efficiency of energy utilization were significantly improved by diet supplementation with Yea-sacc (1 gm/ kg feed) from hatching to marketing age (7 weeks of age). Feed intake, feed conversion and performance index showed similar trends (McDaniel, 1990 ; Voget and Motthes, 1991 ; Ali, 1994 ; Omar, 1996 ; Osman, 1996 and Tawfeek and Maria, 1997). These findings indicated that many of the beneficial effects attributed to yeast culture are associated with alterations in the digestive processes, which resulted in improvement in the efficiency of feed utilization (Stockland, 1993).

Also, broiler chicks fed Yea-sacc supplementation in growing ration significantly increased ($P<0.05$) globulin, glucose, creatinine and thyroxine hormone content in blood indicating that the increase of thyroxin stimulated the proteins synthesis (Omar, 1996 and Tawfeek and Maria, 1997).

Feeding broiler on diet supplemented with Yea-sacc (gm/kg feed) clear beneficial effects on egg production traits, quantity of feed consumed/kg of egg produced, shell strength, shell thickness, yolk weight, yolk index, albumin index fertility and hatchability percentage (Lyons, 1990 ; Gerendia et al., 1992 ; Lim, 1992 and Tawfeek and Maria, 1997). Moreover, Thayer et al. (1978) and Brake (1991) reported that diets containing live yeast culture increased egg production, egg weight and egg specific gravity when turkeys were fed phospharous-deficient diets.

Kupina (1985) reported that Eprin is a yeast grown in synthetic ethyl alcohol, is a good source of protein and is complete in amino acids, except methionine and systine. Also, dried yeast is rich in protein, energy and many amino acids particularly lysine, but it is low in methionine content (Osaman, 1996).

Therefore, the present study was conducted to investigate the effect of yeast on productive performance and some physiological parameters and immune response in two local strains of laying hens.

MATERIALS AND METHODS

Birds and management:

Two yeast preparations were tested on two different Egyptian strains Gimmizah and Mamourah laying hens. One hundred and fifty, 28 weeks old, laying hens of each strain were experimented and taken from Gimmizah Poultry Research Farm belonging to Agricultural Research Center at Gharbia Governorate, Egypt. The hens had a body weight of about 1.6±0.141 kg on the average. The birds were housed in an open sided building. They were hygienically managed, and were exposed to a photoperiod of 16 hrs daily, from 6.00 a.m. to 10.00 p.m. Food and water were continually available. The experimental diets used were composed of a basal ingredients shown in table 1 and just differ in the yeast additive added, either in source or level. The yeast additives used were tested for their effect on egg production, fertility and hatchability, some physiological parameters and immune response.

Table 1: Composition and calculated analysis of the basal diet used.

Ingredients	Amount %
Physical composition:	
Ground corn	67.93
Soybean meal (44%)	19.50
Wheat bran	2.50
Limestone	7.60
Dicalcium phosphate	1.70
Sodium chloride	0.30
Vitamins & minerals (premix)*	0.30
DL-Methionine	0.17
Total	**100.0**
Calculated analysis:**	
ME (k cal/kg)	2749
Crude protein	15.04
Crude fiber	3.13
Ether extract	2.81
Calcium	3.32
Av. Phosphorus	0.43
Met.+ Cyc.	0.67
Lys.	0.74

* Premix at 0.30% of the diet supplies, the following per kg: Vit A., 10000 IU ; Vit. D_3, 2000 IU ; Vit. E, 10 mg ; Vit. K, 1 mg ; Vit B_1, 1 mg ; Vit B_2, 5 mg ; Vit B_6, 1.5 mg ; Vit B_{12}, 0.01 mg ; Folic acid, 0.35 mg ; Biotin, 0.05 mg ; Pantothenic acid, 10 mg ; Niacin, 30 mg ; Choline, 250 mg ; Fe, 30 mg ; Zn, 50 mg ; Cu, 4 mg and Se, 0.1 mg.

** The calculated analysis followed the feed composition tables in NRC (1994).

The additive "Bio-buds" consists of dried *Saccharomyces cerevisiae* fermentation products, corn distillers with soluble, roughage products, calcium carbonate and soybean oil, produced by Brookside Agra L. C., USA.

The other yeast preparation contains ingredient from natural yeast *(Saccharomyces cerevisiae)* and food grade emulsifier.

The experimental design:

Two levels of the two yeast preparations were tested. The first level was 1 gm/kg diet, while in the other level 2 gm were added. Eventually five

diets were fed in five groups in each of two strains. Each of the 10 groups was treated as 3 replicates of 10 birds each. The experimental design is shown in the following table:

Table 2: The experimental design:

	Yeast preparation			
	Bio-buds		**Yeast**	
Group	**Amount / kg diet**			
	1 gm	**2 gm**	**1 gm**	**2 gm**
I (basal)	A basal diet with no yeast preparation (control)			
II (BB1)	+			
III (BB2)		+		
IV (Y1)			+	
V (Y2)				+

The tested parameters:

Body weight: The body weight of the layers was recorded in the two strains at 28 and 40 weeks of age to trace any negative or positive effects.

Feed intake: The diets were offered on *ad libitum* basis and the daily feed intake per hen was recorded. The efficiency of food conversion into eggs was calculated as the number of kilograms of food needed for the production of 1 kg eggs.

Egg production: Rate of egg production was calculated in each group by recording the number of eggs laid by each hen. The eggs laid in each of the ten groups were individually weighed.

Reproductive performance: Artificial insemination (AI) was used during the third month of the experiment (at 36 week). The insemination procedure (Lake and Stewart, 1978) was started and repeated two times weekly for evaluating the reproductive performance in each group. 90 eggs were collected from each experimental group (450 eggs for each strain) and were incubated to estimate the fertility and hatchability percentage. After hatching, chicks were weighed and average weights were calculated.

Blood samples: Six blood samples were obtained from wing vein of hens at 40 weeks of age from each group (30 samples for each strain). Blood samples were centrifuged at 3000 rpm for 10 min and the serum was stored at –20^{o}C for chemical analysis.

The calorimetric determination of total protein and albumin was carried out by diagnostic kits produced by Bio-ADWIC according to Doumas (1975) for protein and Doumas *et al.* (1971) for albumin.

Aspartate Transaminase (AST) and Alanine Transaminase (ALT) were determined by a method illustrated by Reitman and Frankel (1957) using Boehringer Mannhein GMBH-Germany, commercial kits.

The calorimetric determination of serum cholesterol was carried out with the principle that cholesterol forms a colored complex with acetic anhydride and concentrated sulfuric acid. The colored complex is measured photometrically. Determination of yolk cholesterol was performed according to Washburn and Nix (1974) depending on the same principle.

Birds were vaccinated by using water soluble vaccine "Lasota" at 38 weeks for immunological examination. Blood samples were collected at 7 and 14 days after vaccination and centrifuged at 3000 rpm for 15 min and was determine HI in serum according to Hitchner *et al.* (1980).

Histopathological examination:

At the end of experiment 3 hens from each group were randomly chosen and slaughtered, samples from liver and spleen were taken to the histopathological examination, tissues were fixed in 10% formalin saline. Following dehydration, paraffin secretion (5-7 μ thick) were prepared, stained with hematoxlin and eosin (Culling, 1974) for routine examination. Then sections were examined microscopically.

Statistical analysis:

Data were statically analyzed using the general linear model procedure of the SPSS program (1997). Comparison among treatments was made using Duncan's multiple range test (Duncan, 1955).

The following model were used for all traits:

$X_{ijk} = \mu + \alpha_i + \beta_j + \alpha\beta_{ij} + e_{ijk}$

Where:

X_{ijk} = observations
μ = The overall mean
α_i =The effect of yeast preparation
β_j = The effect of strain
$\alpha\beta_{ij}$ = The interaction between strain and yeast preparation.
e_{ijk} = Random error

RESULTS AND DISCUSSION

The experiment was performed to trace the effect of feeding two yeast preparations, Bio-Buds and yeast culture, on the performance of two egg-laying local strains, the Gimmizah and Mamoura. The experiment extended from 28 wks of age to 40 wks of age and testing two levels, 1 or 2 gm/ kg diet, of each of the two additives.

Body weight change:

The two yeast preparations showed no clear effect in the two strains (Table 3). The live body weight of laying hens during the experimental period was not affected by the different levels of yeast preparation in the diet. Also, live body weight of laying hens in different experimental groups was insignificantly affected by the interaction between strain and yeast preparation.

These results were agreed with those obtained by Day et al. (1987) who noticed no effect on body weight or weight gain in white Leghorn at 29 weeks of age through 308 day, when 0.25 or 0.50% live yeast culture were added to the basal diet, also, Youssef et al. (2001) who reported that yeast had insignificant effect on body weight throughout the experimental periods when fed Gimmizah laying hens on dry yeast Saccharomyces cerevisiae at levels 0, 0.5, 1.0 and 1.5 kg/ton diet, from 32 to 52 weeks of age. However, Tangendjaja and Yoon (2002) showed little effect when diet supplemented with 0, 0.1, 0.2 and 0.3% of a commercial yeast culture product for 20 weeks.

In addition, Abd El-Rahman (1993); Nahashon *et al.* (1994) and Ali *et al.* (2000) found no significant differences, due to feeding yeast culture, in body weight change in laying hens or quails. This effect may be attributed to poor availability of the yeast in methionine and total sulfur amino acids.

Moreover, laying hens as they are adult and reached to their maximum growth they were not able any more to grow. The effects of additives were toward to increase the efficiency of the food to gain better egg production than to effect body gain.

Feed intake:

Results concerning the effect of yeast preparation on feed intake of laying hens are presented in Table 3. The results indicated that daily feed intake did not differ in two strains in spite of there were significantly differences ($P<0.001$) between treatments. Also, results of interaction

between strain and treatments showed significant effect (P<0.01) on daily feed intake. The addition of the two yeast preparations decreased the feed intake with significantly effect (P<0.01) in the (BB) group in the two strains and less clear in the yeast ones especially at the rate of 1 gm Y/kg diet.

Similar results were obtained by Gippert and Bodrogi (1992) and Kim *et al.* (1992), they reported that feed consumption was increased by supplementing diet with biological feed additives (Yea-Sac., Lacto-Sacc).

Efficiency of feed utilization in egg production:

Reviewing table 3, it was found that in Gimmizah, it needs 4.7 kg diet for the production of 1 kg eggs in case of feeding the basal diet. The efficiency of production increased and the amount of food needed decreased by 19.4% in group II (1 gm BB/kg diet); 25.5% in group III (2 gm BB/kg diet), while after the addition of Y at 1 or 2 grams, it reached 14.3 and 17.4%. In Mamourah the improvement were 12.3, 17.6, 8.4 and 8.4%. In addition, it is noted that Mamourah is better than Gimmizah in its food utilization efficiency and its conversion into eggs.

These results are in agreement with those obtained by Haddadin *et al.* (1996) ; Huthail and Najib (1996) and Tongendjaja and Yoon (2002). They found that yeast culture improved (P<0.05) feed conversion ratio (feed/egg) significantly by up to 8.5% compared to control when fed Lohman brown layers at 20 weeks of age on diet containing 0, 0.1, 0.2 and 0.3% yeast culture products.

In broiler chicks feed intake, feed conversion and performance index were significantly improved by supplementation with Yea-Sacc (1 gm/kg feed) (McDaniel, 1990 ; Voget and Motthes, 1991 ; Ali, 1994 ; Omar, 1996 and Osman, 1996). These findings indicated that many of the beneficial affects attributed to yeast culture are associated with alterations in the digestive processes, which resulted in improvements in the efficiency of feed utilization (Stockland, 1993).

Reproductive traits:

Three parameters were recorded to test the effect of yeast preparation on reproduction. Eggs were incubated to estimate the percentages of fertility and hatchability in addition to the weight of the hatched chicks (Table 4). Results indicated that fertility and hatchability percentage were improved but not affected significantly by supplemented yeast preparation levels. The fertility percentage differs from 85% in Mamourah to 87% in Gimmizah. Also the hatchability percentage in the two strains differed, the maximum hatchability in Gimmizah reached

90.81%±0.23 while in Mamourah reached 92.20±0.24% at the addition of 1 gm Y/kg diet and 2 gm BB/kg diet, respectively, compared to 88%±0.20 and 90%±0.17 in the first treatments.

Regarding of hatched chick weight, both of two preparations in its two levels of addition had a significant effect ($P<0.05$) and increased the weights from 30.79±0.13, 30.73±0.11 gm in group I (basal diet) to a maximum of 32.12±0.10 and 32.07±0.15 gm in group III (2 gm BB/kg diet) in both strains Gimmizah and Mamourah, respectively. These findings may be due to beneficial effects attributed to yeast culture are associated with alteration in the digestive processes, protein synthesis which resulted in improvement in egg weight and hatched chick weight. Also, Lyons (1990), Gerendia *et al.* (1992) and Lim (1992) reported that breeder broiler fed supplementation diet with Yea-sacc (1 gm / kg feed) had clear beneficial effects on fertility and hatchability percentage, while McDaniel (1990) found no improvement in fertility percentage as a result of supplementing with Yea-sacc (1 gm/kg diet).

Egg production:

Egg number:

Results in table (5) indicated that the two strains differed in egg production from about 44.79±0.32 eggs in Gimmizah to 49.86±4.22 in Mamourah, so Mamourah surpassing the Gimmizah strain in egg production. The yeast additions showed significant effects ($P<0.05$) in egg number. Also, the interaction between strain and treatments showed significant effect ($P<0.05$) in egg number, Mamourah hens fed diet containing 2 gm BB/kg diet showed the highest significant value ($P<0.05$) of egg number (56.76±4.02). Similar results were obtained by Lyons (1990); Gerendia *et al.* (1992) and Lim (1992) on broiler breeder. Also, Yousseef *et al.* (2001) noticed significantly effect ($P<0.01$) on egg number when dry yeast was incorporated (at level 0.1%) in layer diets and were more acceptable than other levels of yeast (0.5 and 1.5%). On the other hand Brake (1991) found that no beneficial effect on egg production when broiler breeder fed diets containing live yeast culture at level 0, 0.01, 0.03 and 0.05%.

Egg weight:

On the other hand, the differences in egg weights in each of the ten treatments were small to the degree that the standard errors differed from 0.11 to 0.24. The narrow ranges in egg weights allowed the small differences between treatments to be significant and even highly significant,

in spite of differences reaching at maximum 1.75 gm or 3.6% of that of the weight in the first treatment.

BB significantly increased the weight in Gimmizah at 1 or 2 gm/kg diet. In Mamourah it had a little effect and it was clear in treatment III (2 gm BB/kg) at $P<0.05$. The Y preparation increased the weight at 1 gm addition. No other effect was noted for the Y in the other groups.

These results agree with Huthail and Najib (1996), Joo and Yoon (2002) and Liu *et al.* (2002) who found an improvement in egg weight for Hyline hens (20 weeks of age) when fed on diets containing commercial yeast culture product at levels 0, 0.1, 0.2 and 0.3%.

Yolk cholesterol:

It is interesting to note from table (5) that Mamourah produces eggs with low cholesterol level than Gimmizah by about 7%. The level in Gimmizah was found to be 30.89 mg/gm yolk in group I (basal diet) and the yeast preparations both the BB & Y decreased the level especially in the BB where the level reached about 26 mg/gm yolk, more effective than in the Y groups (27.5 mg/gm yolk). In the Mamourah strain the cholesterol decreased significantly ($P<0.05$) to an average of 25.67±0.38 mg/gm yolk when hens fed diet containing 1 gm BB/kg diet. It seems that the body mechanism of these Egyptian strains, could not decrease the egg cholesterol more than a level of 26 mg/g/yolk, and with the aid of yeast preparations. It seems it is the general metabolism, not that of the reproductive system, that is effectively responded as the serum cholesterol also decreased especially in Mamourah group III (1 gm BB/kg diet) where the decrease was highly significant.

These results were agreement with those obtained by Haddadin *et al.* (1996) who found that cholesterol values in yolk were decreased when White Lohman laying hens were fed for a 48-wk period with a basal diets supplemented with *Lactobacillus acidophilus* at level 0, 0.67, 2.0 and 4.0 cfu 10^6 g compared with the control.

Serum cholesterol and liver function analyses:

Serum cholesterol concentration results are listed in Table (6). The results showed that the serum cholsterol levels decreased significantly ($P<0.05$) in hens fed diet containing 2 gm BB/kg diet at 40 weeks of age, compared with the other treatment groups. Interaction between strain and yeast preparation showed significantly, Mamourah hens fed diet containing 2 gm BB/kg diet had the lowest serum cholsterol value (103.33±0.96 mg/dl).

The serum cholesterol demonstrated significant decrease in the group fed diet containing 2 gm BB/kg diet may be due to the inhibiting effect of dry yeast, containing bacterial metabolites, on cholesterol synthesis. The same results were obtained by Abdel-Azeem *et al.* (2001) and Youssef *et al.* (2001) who found that serum cholesterol of Gimmizah layer hens was decreased significantly when the diet was supplemented by dried *Saccharomyces cerevisiae* at levels 0, 0.5, 1.0 and 1.5 kg/ton.

Liver function data presented in table 7, showed that hens fed diets containing 1 or 2 gm BB /kg diet had significant effect ($P<0.05$) on serum AST and ALT. The interaction between strain and yeast preparation showed significant decrease ($P<0.05$) in AST and ALT. The results were in agreement with those obtained by El-Hindawy *et al.* (1997) ; Abdel-Azeem *et al.* (2001) and El-Ghamry *et al.* (2002) who reported that supplemented yeast culture showed significant effect on AST and ALT. The present results of AST may reflect an increase in hepatic function.

Immune response:

The results of the immune response parameters are presented in Table (7). Humeral immune response as represented in haemagglutination inhibition (HI) titers, against Newcastle disease (ND) virus vaccination, demonstrated that the groups fed diets supplemented with 2 gm BB/kg diet showed improvement in immune response as compared with other groups.

Interaction between strain and yeast preparation showed that Mamourah hens fed the diet containing 2 gm BB/kg diet had the highest significant value ($P<0.05$) of HI than all treatments, serum total protein level and serum globulin level. These results may be attributed to prevention of the growth of the harmful bacterial by the dry yeast. These results were in agreement with finding by Sissons (1988); Makled (1991) ; Omar (1996) and Osman (1996) who reported that the mode of action of probiotics may operate by producing antibiotic substances and inhibiting harmful bacterial microbial metabolism and decreasing intestinal pH. This effect may be help to reduce the use of more antibiotics.

Histopathological findings:

Microscopical examination of liver and spleen of Mamourah and Gimmizah hens, revealed that untreated hens showing no histopathological changes of liver and spleen in two strain (Figs. 1, 6 and 11). Liver of Mamourah hens fed diets containing 1 gm BB or 2 gm BB or 1 gm Y/kg diet showing perviascular mononuclear leucocytic cells infiltration and hepatocelluler vaciolizations (Figs. 2, 3 and 4), while liver of Mamourah

hens fed diets containing 2 gm Y/kg diet showing facol hepatic necrosis completely replaced by monoclear cells infiltration (Fig. 5). Spleen of Mamourah hens fed diet containing 1 gm BB/kg diet showing no histopathological alterations (Fig. 7), while spleen of Mamourah and Gimmizah hens fed diets containing 2 gm BB or 1 gm Y or 2 gm Y /kg diet showing thickening in the wall of follicular artery, hemorrhage, slight lymphocytic depletion and few heterophilic cells infiltration (Figs. 8, 9, 10, 18, 19 and 20). Spleen in Gimmizah hens fed basal diet and fed diet containing 1 gm BB/kg diet showing deposition of golden brown haemosidrim pigments, slight lymphocytic depletion and hyperplasia of reticular cells (Figs. 16 and 17). In respect of liver in Gimmizah hens fed diets containing 2 gm BB or 1 gm Y or 2 gm Y/kg diet showing focal hepatic necrosis completely replaced by lecucocytic cells infiltration (Figs. 13, 14 and 15), while liver of hens fed diet containing 1 gm BB/kg diet showing small focal leucocytic cells aggregation as well as portal infiltration with few leucocytic cells (Fig. 12). As a general the lesion in the liver and spleen was parallel with the addition the yeast preparation, these results were agreement with results obtained from productive, physiological and immune response data. This results indicated that adding 2 gm BB/kg diet on commercial diets for Mamourah strain improved the productive physiological traits and immune response.

Table (3): Body weight change in the different groups (Mean±SE).

Traits / Effects	Initial body weight (28 week) (kg)	Body weight at 40 week (kg)	Feed intake (gm/hen/day)	Feed conversion
Treatments:				
I (Basal)	1.59±0.20	1.66±0.19	120.11±0.68^{A}	4.42±0.25^{A}
II (BB1)	1.60±0.12	1.67±0.21	114.77±0.79^{D}	3.71±0.15^{AB}
III (BB2)	1.60±0.08	1.68±0.06	114.48±0.86^{D}	3.46±0.14^{B}
IV (Y1)	1.61±0.02	1.68±0.05	117.74±0.60^{B}	3.91±0.19^{AB}
V (Y2)	1.59±0.06	1.66±0.14	116.80±1.01^{C}	3.84±0.15^{AB}
Sig.	NS	NS	***	*
Genotype:				
Gimm.[1]	1.60±0.15	1.68±0.18	116.97±0.44	3.98±0.20^{A}
Mamo.[2]	1.59±0.12	1.67±0.15	116.59±0.37	3.76±0.15^{B}
Sig.	NS	NS	NS	*
Interaction:				
I x Gimm.	1.59±0.26	1.67±0.30	120.15±0.57^{a}	4.70±0.37^{a}
I x Mamo.	1.58±0.14	1.66±0.09	120.08±0.80^{a}	4.15±0.13^{ab}
II x Gimm.	1.61±0.16	1.67±0.23	114.83±0.92^{d}	3.79±0.17^{b}
II x Mamo.	1.58±0.08	1.67±0.20	114.72±0.67^{d}	3.64±0.14^{b}
III x Gimm.	1.59±0.12	1.69±0.07	115.50±0.83^{d}	3.50±0.11^{b}
III x Mamo.	1.61±0.04	1.67±0.05	113.49±0.90^{e}	3.42±0.18^{b}
IV x Gimm.	1.60±0.03	1.68±0.04	117.86±0.61^{b}	4.03±0.23^{a}
IV x Mamo.	1.61±0.01	1.69±0.07	117.62±0.59^{b}	3.80±0.15^{b}
V x Gimm.	1.60±0.06	1.67±0.10	116.55±0.92^{c}	3.88±0.15^{ab}
V x Mamo.	1.58±0.07	1.65±0.19	117.05±1.10^{bc}	3.80±0.16^{b}
Sig.	NS	NS	**	*

NS non-significant * P<0.05 **P<0.01 ***P<0.001

a, b, c… A, B, C… Means in the same column with different litters are significantly different (P<0.05).

I = Basal diet (control)

II (BB1) = Bio-Buds added at the rate of 1 gm/kg diet.

III (BB2) = Bio-Buds added at the rate of 2 gm/kg diet.

IV (Y1) = Yeast added at the rate of 1 gm/kg diet.

V (Y2) = Yeast added at the rate of 2 gm/kg diet.

Gimm.[1]= Gimmizah strain Mamo.[2]= Mamourah strain

Table 4: Reproductive performance in the different groups (Mean±SE).

Traits / Effects	Fertility (%)	Hatchability (%)	Chick weight (gm)
Treatments:			
I (Basal)	86.12±0.11	89.00±0.09	30.76±0.07^{B}
II (BB1)	87.63±0.11	89.93±0.11	31.67±0.13^{AB}
III (BB2)	89.76±0.12	90.90±0.11	32.10±0.12^{A}
IV (Y1)	87.52±0.10	89.17±0.10	31.44±0.11^{AB}
V (Y2)	88.79±0.11	90.55±0.10	31.75±0.13^{AB}
Sig.	NS	NS	*
Genotype:			
Gimm.[1]	88.15±0.11	88.88±0.22	31.52±0.10
Mamo.[2]	87.85±0.27	90.76±0.21	31.55±0.13
Sig.	NS	NS	NS
Interaction:			
I x Gimm.	87.17±0.26	88.00±0.20	30.79±0.13^{b}
I x Mamo.	85.25±0.20	90.00±0.17	30.73±0.11^{b}
II x Gimm.	87.66±0.17	88.63±0.22	31.67±0.12^{ab}
II x Mamo.	87.60±0.26	91.34±0.22	31.66±0.14^{ab}
III x Gimm.	89.82±0.24	89.60±0.18	32.12±0.10^{a}
III x Mamo.	89.70±0.20	92.20±0.24	32.07±0.15^{a}
IV x Gimm.	87.82±0.17	88.36±0.23	31.40±0.09^{ab}
IV x Mamo.	87.22±0.25	89.97±0.19	31.48±0.12^{ab}
V x Gimm.	88.28±0.19	90.81±0.23	31.66±0.12^{ab}
V x Mamo.	89.30±0.29	90.30±0.20	31.83±0.14^{ab}
Sig.	NS	NS	*

NS non-significant * P<0.05 **P<0.01 ***P<0.001

a, b, c… A, B, C… Means in the same column with different litters are significantly different (P<0.05).

I = Basal diet (control)

II (BB1) = Bio-Buds added at the rate of 1 gm/kg diet.

III (BB2) = Bio-Buds added at the rate of 2 gm/kg diet.

IV (Y1) = Yeast added at the rate of 1 gm/kg diet.

V (Y2) = Yeast added at the rate of 2 gm/kg diet.

Gimm.[1]= Gimmizah strain Mamo.[2]= Mamourah strain

Table 5: Egg production and yolk cholsterol in the different groups (X±SE).

Traits / Effects	Egg number	Egg weight (gm)	Yolk cholesterol (mg/gm yolk)
Treatments:			
I (Basal)	47.33±3.60^{C}	49.65±0.12^{B}	29.83±0.57
II (BB1)	53.44±4.50^{B}	50.53±0.17^{A}	26.00±0.27
III (BB2)	56.02±4.40^{A}	50.91±0.17^{A}	26.17±0.86
IV (Y1)	52.29±3.80^{B}	49.85±0.18^{B}	27.17±0.84
V (Y2)	52.69±5.00^{B}	49.82±0.19^{B}	27.00±0.69
Sig.	*	**	NS
Genotype:			
Gimm.[1]	51.19±5.03^{B}	50.03±0.18	27.71±0.91
Mamo.[2]	53.52±4.48^{A}	50.26±0.16	26.75±0.71
Sig.	*	NS	NS
Interaction:			
I x Gimm.	44.79±3.20^{b}	49.17±0.11^{d}	30.89±0.33^{a}
I x Mamo.	49.86±4.22^{ab}	50.13±0.13^{bc}	28.78±0.80^{ab}
II x Gimm.	53.00±4.01^{a}	50.49±0.14^{ab}	26.33±0.16^{b}
II x Mamo.	53.89±5.22^{a}	50.57±0.21^{ab}	25.67±0.38^{b}
III x Gimm.	55.26±4.91^{a}	50.92±0.16^{a}	26.00±0.88^{b}
III x Mamo.	56.76±4.02^{a}	50.89±0.18^{a}	26.33±0.84^{b}
IV x Gimm.	50.80±3.62^{ab}	49.83±0.22^{cd}	28.00±1.00^{ab}
IV x Mamo.	53.80±3.21^{a}	49.86±0.13^{cd}	26.33±0.69^{b}
V x Gimm.	52.10±5.43^{a}	49.76±0.24^{cd}	27.33±0.69^{ab}
V x Mamo.	53.31±4.61^{a}	49.88±0.14^{bc}	26.67±0.69^{b}
Sig.	*	*	*

NS non-significant * P<0.05 **P<0.01 ***P<0.001

a, b, c… A, B, C… Means in the same column with different litters are significantly different (P<0.05).

I = Basal diet (control)

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III (BB2) = Bio-Buds added at the rate of 2 gm/kg diet.

IV (Y1) = Yeast added at the rate of 1 gm/kg diet.

V (Y2) = Yeast added at the rate of 2 gm/kg diet.

Gimm.[1]= Gimmizah strain Mamo.[2]= Mamourah strain

Table 6: Serum cholesterol and liver function as affected by different treatments (Mean±SE).

Traits / Effects	Serum cholesterol (mg/dl)	Serum AST (U/L)	Serum ALT (U/L)
Treatments:			
I (Basal)	122.44±2.93^{A}	120.83±0.70^{A}	20.50±0.61^{A}
II (BB1)	111.38±6.41^{B}	117.33±0.88^{B}	17..3±0.50^{B}
III (BB2)	105.66±7.48^{C}	116.17±0.68^{C}	19.30±0.12^{AB}
IV (Y1)	118.60±9.53^{B}	121.00±1.85^{A}	18.80±0.30^{AB}
V (Y2)	114.00±4.42^{B}	117.17±0.65^{AB}	18.83±0.60^{AB}
Sig.	**	*	*
Genotype:			
Gimm.[1]	115.46±3.55	116.86±1.25^{B}	19.52±1.22^{A}
Mamo.[2]	113.37±10.11	120.13±3.12^{A}	18.38±0.55^{B}
Sig.	NS	*	*
Interaction:			
I x Gimm.	124.66±2.53^{a}	119.67±1.92^{ab}	21.00±1.52^{ab}
I x Mamo.	120.22±3.33^{a}	122.00±0.87^{a}	20.00±1.15^{ab}
II x Gimm.	111.44±6.31^{b}	116.33±2.17^{bc}	16.00±1.33^{b}
II x Mamo.	111.33±6.51^{b}	118.33±1.66^{ab}	18.67±0.35^{ab}
III x Gimm.	107.99±14.00^{bc}	115.00±1.15^{c}	20.00±0.01^{ab}
III x Mamo.	103.33±0.96^{c}	117.33±1.71^{bc}	18.61±0.34^{ab}
IV x Gimm.	118.21±7.11^{ab}	115.33±2.27^{c}	19.30±0.77^{ab}
IV x Mamo.	118.99±11.96^{ab}	126.67±4.30^{a}	18.30±0.51^{ab}
V x Gimm.	115.00±4.40^{b}	118.00±0.60^{ab}	21.33±0.38^{a}
V x Mamo.	113.00±4.44^{b}	116.33±1.92^{bc}	16.33±1.17^{ab}
Sig.	*	*	*

NS non-significant * P<0.05 **P<0.01

a, b, c… A, B, C… Means in the same column with different litters are significantly different (P<0.05).

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IV (Y1) = Yeast added at the rate of 1 gm/kg diet.

V (Y2) = Yeast added at the rate of 2 gm/kg diet.

Gimm.[1]= Gimmizah strain Mamo.[2]= Mamourah strain

Table (7) : Antibody production developed against NDV-vaccination, serum total protein, albumin and globulin levels in the different groups (Mean±SE).

Traits / Effects	Hemogglutination inhibition (HI) at 39 week of age	Hemogglutination inhibition (HI) at 40 week of age	Serum total protein (gm/dL)	Serum albumin	Serum globulin
Treatments:					
I (Basal)	4.12±0.89	5.67±0.25C	4.78±0.17	0.98±0.06	$3.80±0.13^{AB}$
II (BB1)	5.33±0.54	$7.33±0.42^{AB}$	5.16±0.15	1.57±0.08	$3.59±0.18^{B}$
III (BB2)	5.33±0.25	$7.67±0.16^{A}$	5.13±0.09	1.54±0.04	$3.59±0.09^{B}$
IV (Y1)	5.50±0.42	$6.83±0.51^{AB}$	5.06±0.16	1.52±0.09	$3.54±0.12^{B}$
V (Y2)	4.83±0.59	$6.83±0.55^{AB}$	6.03±0.18	1.65±0.10	$4.37±0.23^{A}$
Sig.	NS	**	NS	NS	*
Genotype:					
Gimm.[1]	4.68±0.74	6.93±0.31	5.16±0.33	1.30±0.17	3.45±0.24
Mamo.[2]	5.36±0.61	6.80±0.44	5.30±0.27	1.60±0.18	3.70±0.35
Sig.	NS	NS	NS	NS	NS
Interaction:					
T1 x Gimm.	4.10±1.20	$6.00±0.33^{bc}$	$4.56±0.53^{b}$	$0.84±0.12^{b}$	$3.72±0.42^{ab}$
T1 x Mamo.	4.15±0.58	$5.33±0.16^{c}$	$4.99±0.08^{ab}$	$1.12±0.14^{ab}$	$3.87±0.06^{ab}$
T2 x Gimm.	4.67±0.16	$8.00±0.33^{ab}$	$4.90±0.07^{ab}$	$1.19±0.04^{ab}$	$3.71±0.05^{ab}$
T2 x Mamo.	6.00±0.92	$6.67±0.51^{abc}$	$5.43±0.44^{ab}$	$1.95±0.10^{a}$	$3.47±0.55^{ab}$
T3 x Gimm.	5.00±0.33	$6.67±0.16^{abc}$	$4.99±0.25^{ab}$	$1.61±0.04^{ab}$	$3.38±0.23^{ab}$
T3 x Mamo.	5.67±0.16	$8.67±0.16^{a}$	$6.65±0.11^{a}$	$1.42±0.24^{ab}$	$5.22±0.11^{a}$
T4 x Gimm.	4.67±0.69	$7.00±0.33^{abc}$	$4.71±0.14^{ab}$	$1.45±0.12^{ab}$	$3.25±0.19^{b}$
T4 x Mamo.	6.33±0.16	$6.67±0.69^{abc}$	$5.42±0.35^{ab}$	$1.59±0.23^{ab}$	$3.83±0.28^{ab}$
T5 x Gimm.	5.00±0.66	$7.00±0.33^{abc}$	$5.28±0.04^{ab}$	$1.48±0.12^{ab}$	$3.80±0.16^{ab}$
T5 x Mamo.	4.67±0.51	$6.67±0.77^{abc}$	$5.42±0.43^{ab}$	$1.89±0.24^{a}$	$3.53±0.53^{ab}$
Sig.	NS	*	*	*	*

NS non-significant * P<0.05 **P<0.01

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V (Y2) = Yeast added at the rate of 2 gm/kg diet.

Gimm.[1]= Gimmizah strain Mamo.[2]= Mamourah strain

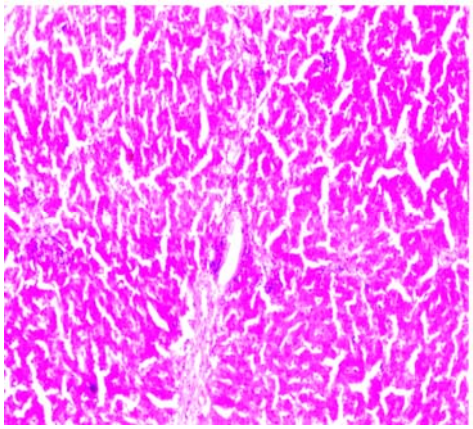


Fig. 1

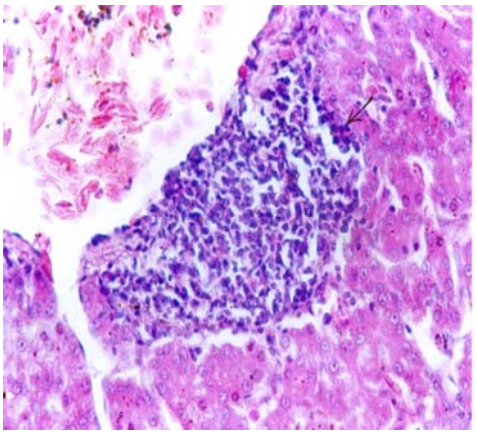
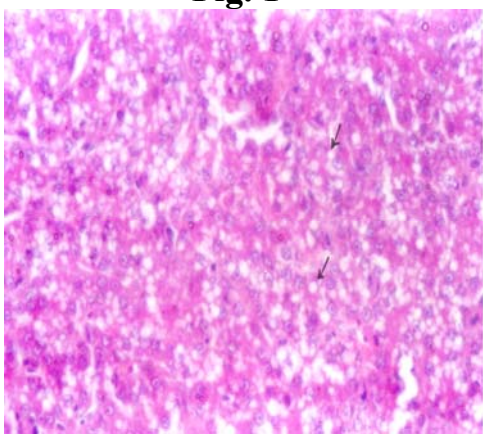


Fig. 2



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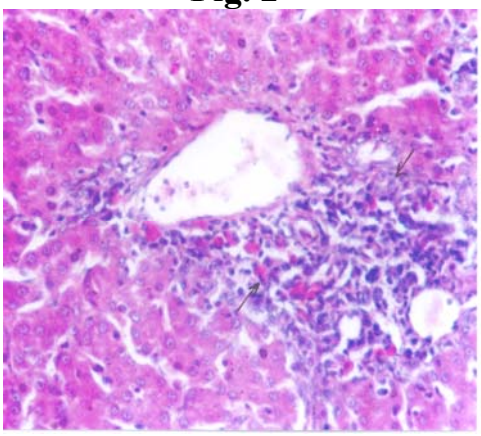

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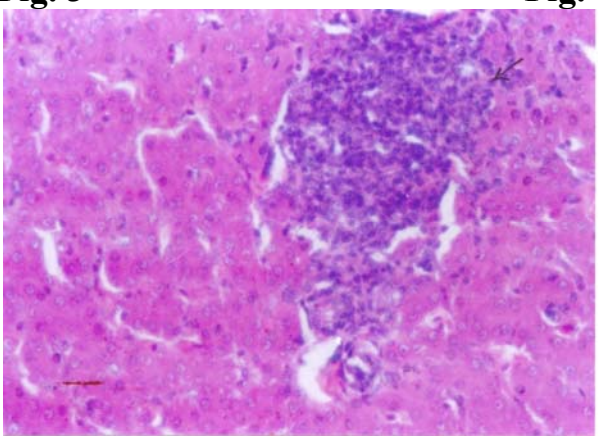
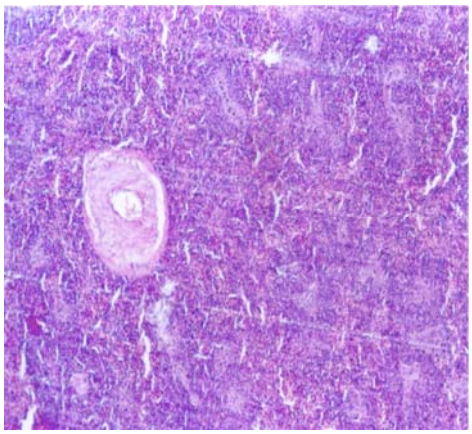


Fig. 5



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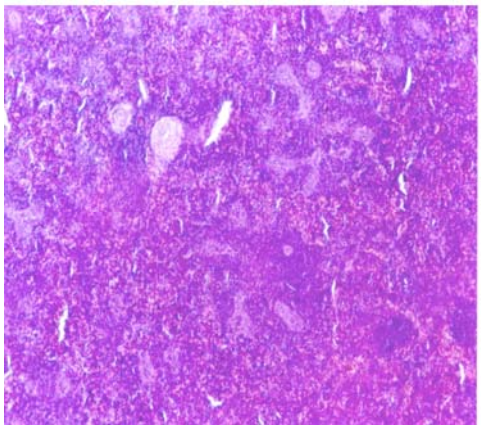

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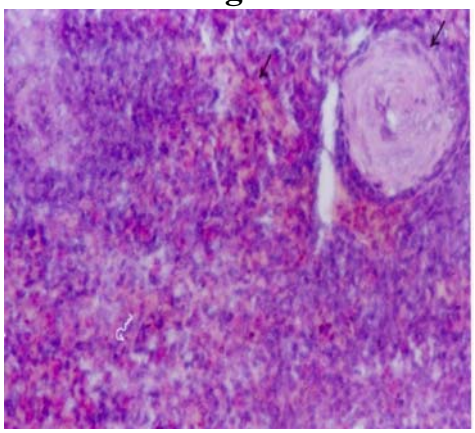

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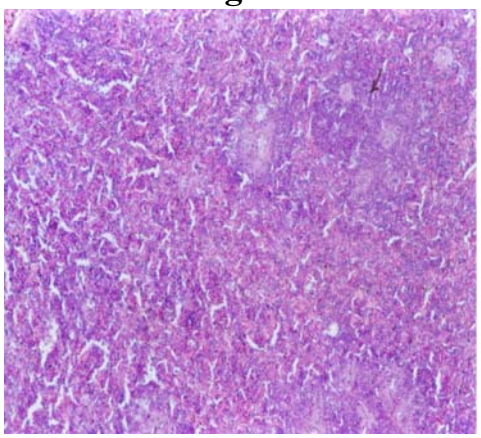


Fig. 9

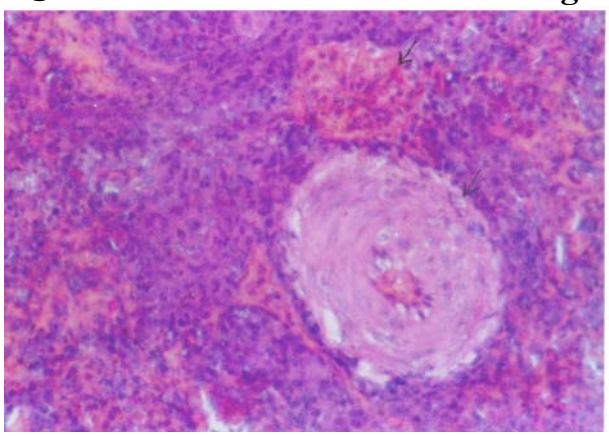


Fig. 10

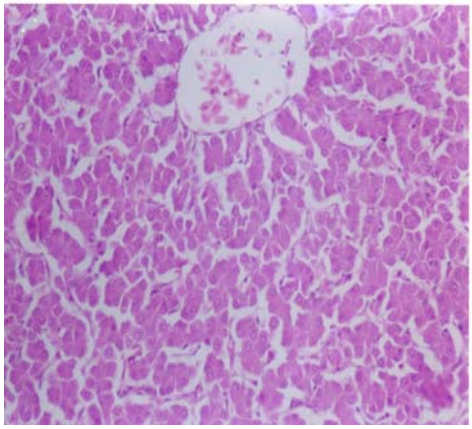


Fig. 11

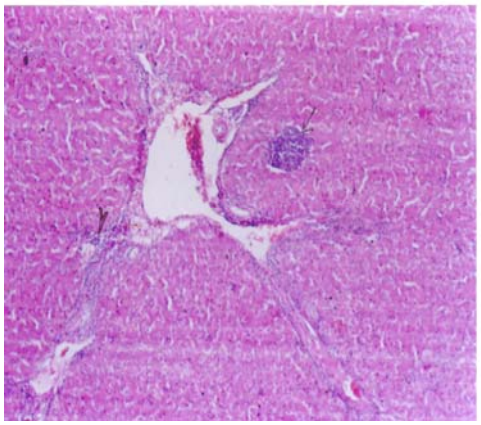


Fig. 12

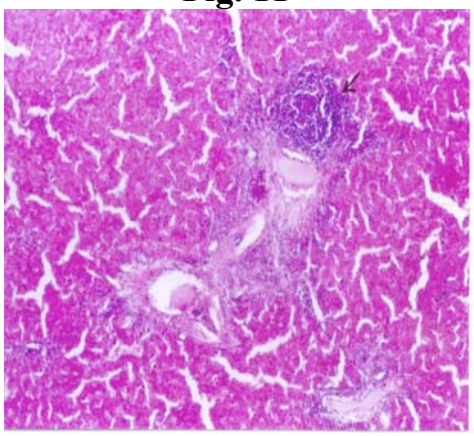
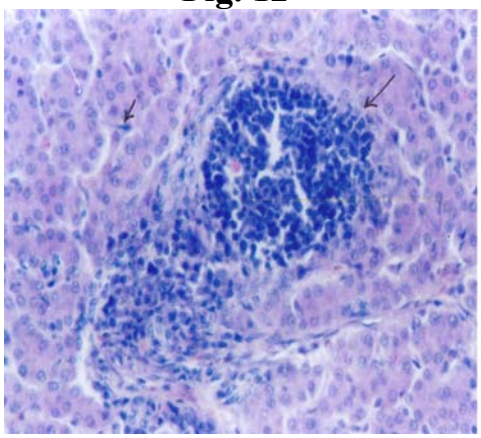


Fig. 13



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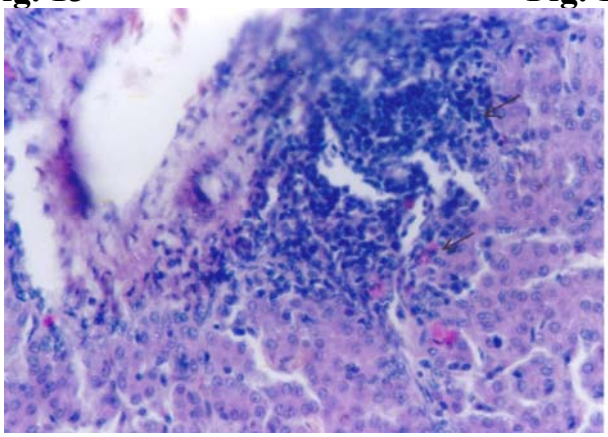

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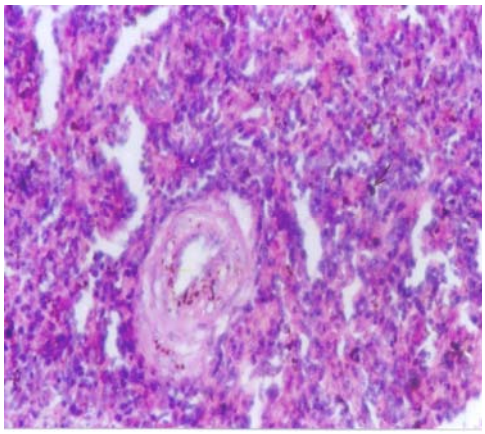

Fig. 16

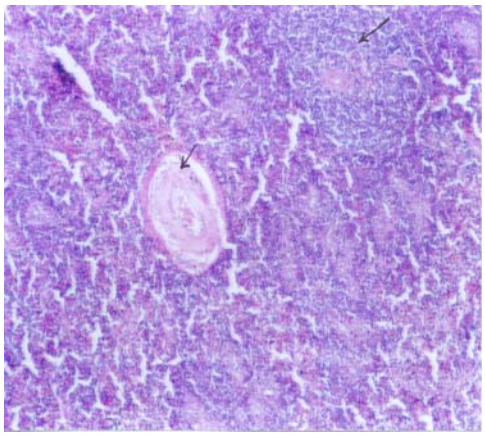

Fig. 17

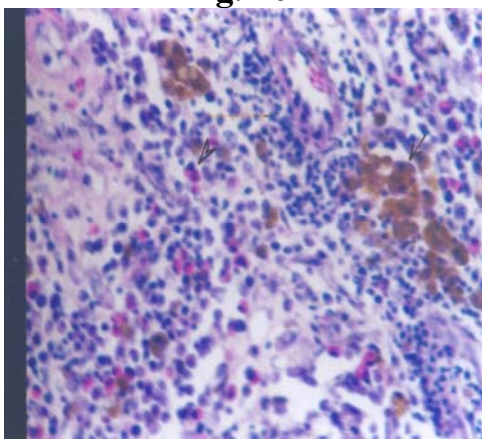

Fig. 18

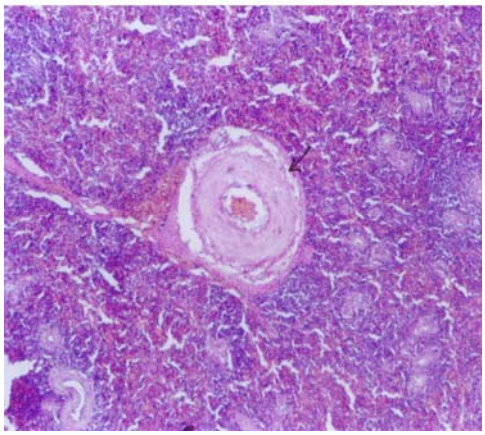

Fig. 19

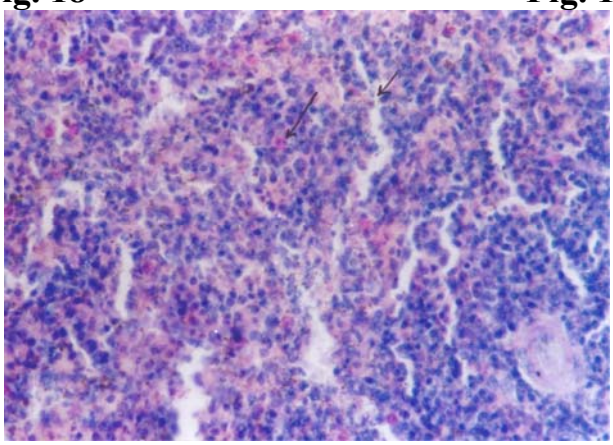

Fig. 20

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الكفاءة الانتاجية وبعض القياسات الفسيولوجية والاستجابة المناعية فى الدجاج البياض المحلى المغذى على علائق مدعمة بالخمائر المجهزة

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اجريت هذه الدراسة فى الفترة من نوفمبر ٢٠٠١ الى يناير ٢٠٠٢ بهدف دراسة تأثير اضافة مستحضرات الخمائر للعليقة على الاداء الانتاجى وبعض القياسات الفسيولوجية والمناعية على نوعين من الدجاج المحلى (الجميزة والمعمورة).

استخدمت ٣٠٠ دجاجة فى هذه الدراسة (عمر ٢٨ اسبوع) منها ١٥٠ دجاجة جميزة ، ١٥٠ دجاجة معمورة وتم اخذهم من القطيع المربى بمحطة بحوث الانتاج الحيوانى بالجميزة التابعة لمركز البحوث الزراعية وتم تسكين الدجاجات فرديا فى اقفاص فردية وغذيت بخمس معاملات غذائية لكل سلالة وقسمت كل معاملة الى ثلاث مكررات واستخدم عليقة بياض تجارية كمعاملة مقارنة ثم اضيف اليها مستويات مختلفة من مستحضر الـ Bio-buds وخميرة الخبز بحيث كانت المعاملة الثانية محتوية على ١ جم Bio-Buds (BB) والمعاملة الثالثة على ٢ جم Bio-Buds والمعاملة الرابعة على ١ جم خميرة خبز والخامسة على ٢ جم خميرة خبز.

وكانت اهم النتائج كالتالى:

١- لم تظهر اى فروق معنوية بالنسبة لوزن الجسم الحى والزيادة فى الوزن عند اضافة مستحضرات الخمائر وكذلك التداخل بين السلالة والمعاملات التجريبية .

٢- اضافة ١ أو ٢ جم (BB) ادى الى حدوث تحسن معنوى فى معدل التحويل الغذائى واستهلاك العليقة طوال التجربة وايضا ادى الى تحسن فى وزن البيض .

٣- لم تتأثر النسبة المئوية للخصوبة والنسبة المئوية للفقس معنويا بالمعاملات التجريبية ولكن ظهر تأثير معنوى بالنسبة لوزن الكتاكيت عند اضافة مستحضرات الخمائر خاصة عند اضافة ٢ جرام BB لكل كيلوجرام عليقة فى دجاجات المعمورة والجميزة.

٤- اظهرت الدجاجات المغذاة على ١ أو ٢ جم BB لكل كيلوجرام عليقة تفوقا معنويا بالنسبة لكوليسترول الدم وكولسترول البيض وكانت دجاجات المعمورة أفضل من دجاجات الجميزة.

٥- تأثر مستوى AST أو ALT بالنسبة للدجاجات المغذاة سواء على BB أو الخميرة عند مستوى معنوية ٠,٠٥ وكانت دجاجات الجميزة أفضل من المعمورة.

٦- ظهرت فروق معنوية خلال اسبوع الرابع بالنسبة لمستوى الاجسام المضادة المنتجة وذلك للدجاج المغذى على ١ أو ٢ جرام من BB لكل كيلوجرام عليقة بالنسبة لدجاج المعمورة.

٧- ظهرت فروق معنوية عند مستوى ٠,٠٥ بالنسبة لمستوى الدم من البروتين الكلى والالبيومين والجلوبيولين وكانت دجاجات المعمورة افضل فى مستوى البروتين الكلى والجلوبيولين.

٨- اما بالنسبة لنتائج الفحص الهستوباثولوجى فكانت مجموعة دجاجات المعمورة المغذاة على ٢ جم خميرة لكل كيلوجرام عليقة (مجموعة V) سيئة من حيث التلف الذى ظهر فى الانسجة. أما فى دجاجات الجميزة فكانت المجموعات التى غذيت على ٢ جم BB والمجموعة التى غذيت على ١ جم خميرة وايضا المجموعة التى غذيت على ٢ جرام خميرة لكل كيلوجرام عليقة سيئة من حيث التلف الذى ظهر فى انسجة الكبد والطحال .