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# A preliminary study on the effect of employing bile liquid in a starter diet on performance of young heavy breed chicks

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**Abstract**

Heavy breed day-old chicks fed Isonitrogenous-Isocaloric diets supplemented with 0.0, 2.0 and 4.0% fresh bovine bile liquid, for three weeks. The three types of diets comprised the experimental dietary treatments, from which the effect of including bile liquid in heavy breed chicks diet on their most prominent economical traits were studied. Results showed that the three groups of birds, consumed almost the same amount of feed during the three weeks of experimental period. However, a significant increase in daily growth rate(DGR)occurred as a result of bile liquid in starter diets. The estimated superiority of this traits, DGR, was found to be 10.76% on an average basis, higher than that of the control group. A good reflection of this phenomenon on feed conversion ratio was observed, as birds fed diets contained 2.0 and 4.0% bile liquid surpassed the control group by 8.75 and 10.63%, respectively. Body weights at third week of age were 8.06 and 10.60% heavier for the two treated groups, respectively, than the control one. Results indicate that the nutritive value of starter diets supplemented with bile liquid warrant further investigation based on long term experiments to make a decision in this direction.

***Keywords:*** Bile liquid; Chicks; Performance; Diet.

# دراسة أولية عن تأثير إضافة سائل الغدة الصفراوية إلى العليقة البادئة على الأداء الإنتاجي لأفراخ الدجاج ذات العروق الثقيلة

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**الخلاصة**

تم تغذية أفراخ بعمر يوم واحد من السلالات الثقيلة ثلاثة أنواع من العلائق البادئة المتماثلة في الطاقة الممثلة والبروتين الخام والمحتوية على نسب مختلفة من سائل الغدة الصفراوية (صفر، ٢، ٤%)، لمدة ثلاثة أسابيع شكلت الأنواع الثلاثة من العلائق معاملات تغذوية، خلالها، تم دراسة تأثير إضافة سائل الغدة الصفراوية على أهم الصفات الاقتصادية لأفراخ العروق الثقيلة في الأعمار المبكرة. أظهرت النتائج على أن طيور المجاميع الثلاثة تناولت نفس كميات العلف، تقريبا خلال فترة أسابيع التجربة. كما لوحظ ، حدوث زيادة معنوية في معدلات النمو اليومية كنتيجة لإضافة سائل الغدة الصفراوية إلى العليقة البادئة، وبتفوق قدره ١٠,٧٦%، كمعدل، في طيور المعاملتين مقارنة مع طيور معاملة السيطرة. ووجد أن هناك انعكاسا جيدا" على معامل التحويل الغذائي، حيث أن المجاميع التي تناولت العلائق المحتوية على ٢ و٤% سائل الغدة الصفراوية تفوقت في هذه الصفة بنسبة ٨,٧٥ و ١٠,٦٣%، على التوالي، على طيور معاملة السيطرة.و كانت أوزان الجسم عند عمر ثلاثة أسابيع متفوقة معنويا في مجاميع الأعلاف المعاملة بنسبة ٨,٦ و ١٠,٦%، على التوالي، على مجموعة المقارنة. دلت النتائج المتحصل عليها على أن إضافة سائل الغدة الصفراوية أدى الى تحسين القيمة الغذائية للأعلاف البادئة، قيد الدراسة، وان الأمر يستحق مواصلة البحث العلمي في هذا الاتجاه على أساس تجارب طويلة الأمد.

## Introduction

A considerable number of bile salts have been found in animals, being principally conjugates with taurine of cholic acid and other acids. Cholesterol and phospholipids are also found in normal bile being the metabolites of many naturally occurring hormones, like thyroxine and steroids (1). As it is well known, liver plays an important role in the process of digestive function, being the organ where bile is synthesized in. The bile action in the process of digesting food is to emulsify fats and it has an activating effects on pancreatic lipase and in the digestion of carbohydrates, by virtue of the amylase present in it (2). However, It has been reported that young chicks, day-old to 3 weeks, are less able to digest dietary fats and to benefit of saturated - type fatty acids than older birds, 4 weeks or older (3 and 4). Reported by (5), on the other hand, lipase enzyme increases at slow rates as young chicks age. Also comparable facts about lipase enzyme levels in small intestine contents of young broiler chicks were emphasized by (6). On the other hand, (7) has extensively explained the role of many factors in contribution of energy to poultry by dietary fats. They did focus on type of fat and age of birds being the most crucial factors affecting digestion and absorption of fatty acids from the intestinal tract. Stated by (8) young birds are less able to digest saturated fats and the digestibility of palmitic acid, for instance, increased by 50-85 % as bird aged from 14-56 days of age. They ascribed the case to less bile-salts production in young birds.

In this regard, (8) cited the work of Atteh and Lesson who stated that an important factor associated with micelle formation is availability of bile salts and the age-related effect on digestion of fats is partly accounted for by inefficient bile –salts recycling in very young chicks. They highly recommended adding cholic acid to the broiler starter diet to gain some advantages in birds performance and fats utilization. Accordingly, many studies were performed to investigate the effect of including bile salts in either practical- type or purified diets on fats absorption and over all performance of young chicks . shown by (9) that absorption of tallow was improved by 15-20% in chicks 4-7 days of ages by adding to the diets either cholic acid ,chenodeoxycholic acid or sodium taurocholate (NaT) . Other researchers (10) noted that 0.04% cholic acid significantly improved tallow absorption by chicks fed practical –type diets. Also (4) in their 3-week experiment on heavy breed chicks substantiated that the addition of 0.04% sodium taurocholate (NaT) improved lipid retention in heavy breed chicks during their first week of age. They also reported that employing bile salt in practical starter-type diets tented to improve lipid absorption with better apparent metabolizable energy. A recent study by (11) using dehydrate bile component in broiler ration contained animal fats showed a significant improvement in fat digestion and substantial increase in overall feed conversion ratio.

This preliminary study was carried out to asses any effect that may occur from employing bile liquid, as it is, in starter practical-type diets on some performance traits of heavy breed chicks.

## Materials and methods

A preliminary study was performed at AL-Rashidia poultry experiment station, Mosul province, Iraq, in year 2003, to investigate the effect of employing bile liquid in broiler starter diet on early performance traits of Fawbro broiler chicken.

A total of 1600 day–old male heavy breed chicks were obtained from IPA research station. Chicks sexing was performed based on wing sex-linked fast feathering appearance. To minimize the experimental error, only 360 chicks were chosen to represent a homogenous group of birds a round 0.5±SD of the average body weight. Thirty birds were randomly distributed into each of 12 floor pens (2×2.6m) covered with wood shavings litter.

All birds were wing banded and individually weighed to the nearest 1.0 gm .The chicks were housed in gas heated house where the required temperature and ventilation were secured .The experimental diets are shown in table 1. In regard to the employment of bile liquid, three type of dietary treatments were formed. Treatment 1 was free of bile and considered as a control, for the purpose of comparison. Treatment 2 and 3 were employed with bile liquid at levels of 2.0 and 4.0%, respectively, (Table1). The bile liquid was obtained from the main large animal slaughtering house of mosul city. The three types of diets were formulated accordingly, to be isocaloric-isonitrogenous. Four replications per treatment, with thirty birds per replicate were used. Feed and water were available at *ad libitum* intake during the 21 days of experimental period. The chicks were individually weighed and feed intake was recorded at 1, 7, 14 and 21 days of age, for each replicate. Mortality was recorded as it occurred. Thus, accurate daily feed intake was determined, g/b/d, for each replicate of each treatment. Data of performance were studied by analysis of variance. Significant treatment differences were assessed using Dunnent t-test.

Table (1): Composition of experimental diets

| Ingredient, % | Types of diets according to bile employment | | |
|---|---|---|---|
| | Diet 1 | Diet 2 | Diet 3 |
| Yellow Corn | 57.00 | 57.00 | 57.00 |
| Soybean MeaL,45% | 36.00 | 36.00 | 36.00 |
| Vegetable Ghee | 3.00 | 3.00 | 3.00 |
| Broiler Premix* | 3.50 | 3.50 | 3.50 |
| Limestone | 0.25 | 0.25 | 0.25 |
| Salt | 0.25 | 0.25 | 0.25 |
| Bile liquid | 0.00 | 2.00 | 4.00 |
| Total | 100% | 102% | 104% |
| | Calculated Analysis | | |
| C.P % | 21.3 | 21.3 | 21.3 |
| ME, Kcal/kg | 3028 | 3028 | 3028 |

***** Contained the recommended levels of vitamins and trace minerals.

**Results**

Starting with mean feed consumption, g/b/d, there were no significant differences between each one of the groups contained bile liquid in their diets and the control group, during each of the experimental weeks, and on overall experimental period basis, as such . However, the third group chicks fed starter diet contained 4.0% bile liquid consumed, on an average basis, numerically less feed than the other two groups (Table 2). The efficiency of the diet, had influenced, to marked extent, the daily growth rate. A significant improvement ($P<0.05$) in DGR with an average of 11.03%, more for the groups of chicks raised on diets contained bile liquid, than the chicks of control group, which were raised on the same type of diet but free of added bile. This phenomenon was clear during each week of the experimental period (Table 2). The data on absolute body weights are presented in (Table 2). There was a significant ($P<0.05$) alteration in favor of chicks fed diet contained bile liquid. This superiority was found to be 8.06 and 10.60% for chicks on treatments two and three, respectively. It has been found, in this experiment that there was a constant trend for feed conversion ratio, FCR, to be influenced by the presence or absence of bile liquid in the starter experimental diets. The two groups of chicks overcome their counterpart chicks of the control treatment by 8.75 and 10.63%, respectively. The efficiency of feed to gain ratio was excellent throughout, so nearly linear improvement in this trait, FCR, was detected (Table 2). The inclusion of bile liquid in starter diet showed a significant ($P<0.05$) influence on body weight. This superiority was most manifested at 3 weeks of age, where the groups of birds raised on diets with 2 and 4% bile liquid out weighted the control group chicks by 50.26 and 66.04 g, respectively (Table 2). Mortality figures were null with no worth of mentioning.

Table (2): Early performance traits in young heavy breed chicks fed starter diets with different ratios of bile liquid

| Treatment | Week1 | Week2 | Week3 | Average |
|---|---|---|---|---|
| | | Feed Consumption, g/b/d ±SE | | |
| 0.0% Bile | 19.63 ±0.91 | 41.36 ±1.18 | 74.65 ± 3.47 | 45.21 ±1.04 |
| 2.0% Bile | 19.58± 1.40 | 40.50* ± 1.23 | 77.34 ± 4.99 | 45.81 ±2.13 |
| 4.0% Bile | 20.51± 0.81 | 40.19* ± 1.65 | 71.90± 5.91 | 44.20± 1.69 |
| | | Mean Daily Growth Rate, g/b/d ±SE | | |
| 0.0% Bile | 13.63± 0.20 | 24.14± 1.05 | 45.57± 1.08 | 27.78± 0.42 |
| 2.0% Bile | 14.28*± 0.15 | 28.53*± 3.35 | 49.50*± 2.15 | 30.77*± 0.32 |
| 4.0% Bile | 15.58*± 0.38 | 29.29*± 2.43 | 47.89*± 2.18 | 30.92*± 0.66 |
| | | Body Weight, g ±SE | | |
| 0.0% Bile | 139.51 ±0.82 | 308.39 ± 4.14 | 627.36 ± 5.13 | |
| 2.0% Bile | 143.92* ±0.59 | 343.63*±11.33 | 677.62*±15.86 | |
| 4.0% Bile | 153.18**±1.49 | 358.17**±7.13 | 693.40**±7.97 | |
| | | Mean Feed Conversion Ratio, g/b/d ±SE | | |
| 0.0% Bile | 1.44 ± 0.05 | 1.72 ± 0.12 | 1.64 ± 0.03 | 1.60 ± 0.07 |
| 2.0% Bile | 1.37*± 0.03 | 1.44** ± 0.19 | 1.56± 0.05 | 1.46*± 0.07 |
| 4.0% Bile | 1.32*± 0.02 | 1.38** ± 0.09 | 1.50**±0.04 | 1.40*± 0.04 |

Each treatment consisted of 4 replicates of 30 birds per replicate. 2-* (P<.05) . **(P<.01) .

## Discussion

The earliest time at which heavy breed chicks were shown to benefit less than maximum amount of dietary lipid was at 1 to 4 weeks of age (4). According to (10), maximum absorption for saturated-type fats may not be attainted until chicks are over 3 weeks of age, where for unsaturated-type fats were found to be maximally absorbed as early as 2 weeks of age.

In this study of three weeks duration, employing fresh bile liquid to the basal starter diet, which contained 3% vegetable ghee, at 2.0 and 4.0% levels certainly affected overall performance traits. Birds raised on the same isocaloric-isonitrogenous diet but free of bile liquid were inferior in their performance, compared with the other two groups. Analyzing the data from-causes and effects-stand point, the cholic and taurochlic acids were the main constituents of the bovine bile liquid used in this study. They appeared to be effective elements in enhancing the absorption of unsaturated fatty acids available in the vegetable ghee, which in turn, improved the overall performance traits. Under this study, the level of improvement in performance traits due to employing bile liquid in the diets was almost linearly, and proportional to the levels of bile liquid added to the diets. These findings come in a good agreement with those reported by (4, 9 and 11) . In raising heavy breed chicks, daily growth rate is the most important genetic entity to be considered. By securing maximum growth rate correlated with rational range of feed consumption, best feed conversion ratio is secured and thus some economic benefits can be obtained. The data of this study emphasized the reflection of feed components and bird ability in better feed utilization phenomenon, where maximum FCR was noticed in the groups raised on bile liquid contained diets compared with control group, knowing that the three groups of birds ate almost the same amount of feed.

In conclusion, results of data from this experiment would indicate that inclusion bile salts in the starter diets of the young heavy breed chicks is a necessary approach in feeding principles for raising boiler hybrid chickens.

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