Nat. Volatiles & Essent. Oils, 2021; 8(6): 2438-2446

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Natural Volatiles &
Essential Oils

# Study Different Fermented Periods Of Addition Dried Yoghurt In Ration On Growth, Physiological Blood Parameter And Intestinal Villi In Broilers

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**Abstract**

Effects of dried yoghurt as fermented material on growth performance, blood parameters and efficiency of intestinal villi were evaluated. When the 28-day period comes to an end, 146 Ross broiler chicks, one-day old had been reared. Individually weighted four equal-sized groupings of chicks were formed, each with three replicates. The starter and finisher diets were not supplemented with dried yoghurt for the chicks in Group 1 (control group). At three different times (one, two, and three days), the chicks in groups 2, 3, and 4 were fed the control starter and finisher diets supplemented with 1g of dry yoghurt /kg feed. Body weight, feed consumption, and feed conversion were measured at 14 and 28 days. At 28 days of age, blood parameters such as packed cell volume (PCV), haemoglobin (Hb), red blood cells (RBC), and white blood cells (WBC) were measured. All of the birds were kept in the same area, under the same management, and with the same hygienic conditions. The current study's findings demonstrated that there was a significant difference in RBC, Hb, and PCV concentrations across all treatments when compared to the control therapy at all times investigated. Supplementing broiler chicks with dried yoghurt dramatically enhanced their body weight and daily weight gain at late ages (14 - 28 days) were very clear in thired treatment( 1 gm / kg of feed about three days of fermentation with dried yoghurt) compared with control , second and third treatments. Also, the birds fed diet fermented with dried yoghurt in long periods (3 days). At 28 days of life, the chicken treatments had a higher body weight. At the same period, birds fed a meal enriched with dried yoghurt showed improved feed conversion. There was significant difference in villi length, crypt and ratio in second, third and fourth treatments compared with control treatment. We concluded that use of fermented food with dried yoghurt resulted in improved performance, blood parameters and intestinal villi of digestive system of broilers at 28 days of raising.

**Key word:** broiler, production performance, blood parameters and intestinal villi.

## Introduction

Broiler feeding expenditures can account for up to 70% of overall production costs in commercial poultry. Furthermore, with rising Feed costs throughout the world, it is critical to investigate alternate Using novel feed additives in order to produce chickens at a low cost [1]. Unusual feed, on the other hand, has a high fiber and low protein content, as well as antinutritional elements (ANF), make their utilization in chicken fed a significant difficulty. The fermented products are microbial solid-state fermentation (SSF) products in generally, made from microorganisms that are widely considered to be safe. Various probiotic feed additives and microbial enzymes are well-known products of the SSF

method, which has a higher yield than liquid state fermentation (nee'Nigam and Pandey, 2009). Fermented was linked to a high concentration of organic acids, a low pH, and a large number of lactic acid bacteria (LAB), in addition to better nutritional characteristics (Ghasemi-Sadabadi et al., 2019). These latter characteristics, alone or in combination, have been proven to avoid pathogen contamination in the feed before it is fed (Niba et al., 2009), improve chicken gastrointestinal health and enhance chicken growth and development (Missotten et al., 2013., Xie et al., 2016). For many years, pig nutritionists have routinely fed fermented items to their pigs (Canibe and Jensen, 2012). However, there is growing interest in adding fermented feed into broiler rations to benefit from its beneficial effects, especially on gut health and production factors (Zhang et al., 2016). Due to a lack of endogenous hydrolysing enzymes, non-starch polysaccharides (NSP) found in feed items such as wheat, soybean, barley, and rapeseed cannot be digested by chickens. For example, rapeseed meal/cake is high in protein, with up to 400 g/kg crude protein (Jakobsen et al., 2015). However, the high NSP content of this feedstuff (approximately 187 to 235 g/kg) as a feed item for monogastric animals, such as chickens, is a significant disadvantage (Jakobsen et al., 2015). In the chicken small intestine, soluble non starch polysaccharide elevated digesta viscosity with lowers nutritional digestibility (Choct, 1997). Feeding trials using rapeseed meal fermented with Lactobacillus fermentum and Bacillus subtilis resulted in higher weight gain and feed conversion ratio (FCR) in broiler chickens (Ashayerizadeh et al., 2019).

**Material and Methods**

**Experimental Design:** Between October 2 to November 8, 2020, this experiment was done in the Poultry Research Unit of the Animal Production Department, College of Agriculture, University of Basra (Iraq). There were 146 day-old broiler chicks in total (Ross 308) weighing (40 g/chick) on an average were divided into four experimental groups (n=36) at random. There were three replicates in each group (12 birds per replicate).

**Supplements:** The yoghurt powder (YP) utilized in this study was manufactured in the Microbiology Laboratory of the College of Agriculture's Animal Production Department and introduced into broiler basal diets. The powder yogurt was added to the basal diet at level 1gm/ kg of diet then fermented in three periods, the first period was one day, second period was two day and third period was three day. Then, fermented diet with yogurt was added to the broilers.

The first group (G1) was fed on basal diet without any supplementation (control). The second group (G2) was fed on basal diet supplemented with fermented diet with yoghurt at one day (first period). The third group (G3) was given a standard diet supplemented with a fermented yoghurt meal for two days (second period). The fourth group (G4) received a standard diet. Supplemented with fermented diet with yoghurt at three day (third period).

Basal diet (Table-1) the nutrient requirements of commercial broilers throughout the starting stage (1-21 days) and finisher stage (22-35 days) were developed and compounded as stated in Table.

**Observations:** Birds were weighted at two periods at 14 days and 28 days of chicken's age. Feed intake and body weight gain were recorded at same periods. Feed conversion ratio (g feed: g gain) was calculated.

**Statistical analysis:** Analysis of variance was performed on data using Completely Randomized Design (CRD) according to SPSS Software (2013). Means were compared by Duncan**,** s (1955) Multiple Range Test ($p \leq 0.05$).

**Table-1: Ingredients and nutrient composition of starter and finisher diets.**

| Ingredient % | Starter diet ( 1- 21d) | Finisher diet ( 21 – 28 d) |
|---|---|---|
| Yellow corn | 56 | 60 |
| Wheat bran | 9 | 0 |
| Wheat | 0 | 12 |
| Soybean meal (44%) | 24 | 22 |
| Concentrated protein | 10 | 5 |
| limestone | 0.50 | 0.50 |
| Common salt | 0.25 | 0.25 |
| Premix | 0.25 | 0.25 |
| Total | 100 | 100 |
| Calculated composition | | |
| *ME (kcal/kg) | 2952 | 3119 |
| Crud protein% | 22 | 19 |
| Calorie: protein | 134:18 | 164:16 |
| Lysine% | 1.24 | 1.16 |
| Calcium (%) | 0.93 | 0.99 |
| Phosphorus available (%) | 0.42 | 0.51 |
| Methionine and cysteine% | 0.92 | 0.78 |

*ME: Metabolizable energy

**Result and Discussion**

The feed additives that were examined in this study were from three separate periods: one day, two days, and three days with dried yoghurt. We couldn't discover any prior research which showed an impacts of these 3 phases in broiler in the literature. The finding revealed that chickens were fed diets enriched with dried yoghurt at one, two, and three days (1gm/ kg of broiler food) had different growth performance features. Yogurt is considered probiotic since it composed of Lactobacilli as the main bacterial species, as previously stated. Table (1) shows the impact of food mixed with powder of yoghurt on broiler growth performance after 14 days. The nutritional additives examined had no influence($P > 0.05$) on the poultry' ending BW (body weight), BWG (body weight again) and FCR (food conversion rate) in T1,T2 but the yoghurt treatments tend to be much higher BW in T3 (524.66) , T4 (511.0) and BWG T3 (486.66) and T4 (486.66) compared with control and other treatments, in other hand , the treatments which supplemented with yoghurt was showed increased significantly in feed intake compared with control treatment. Our results correlate with Mansoub (2011) found that regular intake with 1% probiotic (L. acidophilus and L. casei) 1–28 and 5 g/kg yoghurt improved FCR and overall BW more than the control group. This improvement of broiler performance in this period may be due to Beneficial effect of yoghurt and acidifiers in poultry diets as growth promoters Yogurt is thought to be a good probiotic since it includes lactobacilli, a type of bacteria that helps with digestion and inhibits harmful germs Khaliq and Ebrahimnezhad (2016) .

**Table(2): At 14 days of age, the effects of adding dry yoghurt to broiler meals three times on body weight, weight gain, feed conversion rate, and feed intake.**

| Treatments | Body weight | Weight gain | FCR | Feed intake |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| T1 | 480.33±13.69[b] | 442.33± 13.69[b] | 1.02 ± 0.024 | 456.0 ± 15.52[b] |
| T2 | 499.0 ± 9.81[b] | 461.0 ± 12.81[b] | 1.09 ± 0.003 | 506.66 ± 10.83[ab] |
| T3 | 524.66 ± 10.72[a] | 486.66± 10.72[a] | 1.08 ± 0.024 | 526.66 ± 22.30[a] |
| T4 | 511.0 ± 14.36[a] | 486.66± 14.67[a] | 1.10 ± 0.026 | 523.33 ± 10.59[a] |
| significance | S | S | N.S | S |

T1: control treatment, T2: diet fermented with dried yoghurt (1gm/kg of diet) at one day period, T3: diet fermented with dried yoghurt (1gm/kg of diet) at two day period, T4: diet fermented with dried yoghurt (1gm/kg of diet) at three day period.

The findings revealed that broiler fed diets supplemented with yoghurt had improved growth performance features were showed in table (3) during twenty eight days of broiler raising .The increment in weight of body, weight gain and feed conversion rate at finisher period.

**Table (3): Effect of supplementing dried yoghurt in broiler diets in three time on body weight, weight gain, feed conversion rate and feed intake at 28 days of age**

| Treatments | Body weight | Weight gain | FCR | Feed intake |
|---|---|---|---|---|
| T1 | 1365.33 ± 29.90[b] | 1327.33± 29.90[b] | 0.96 ± 0.02[b] | 1282.66±14.22[a] |
| T2 | 1447.0 ± 43.13[ab] | 1409.0 ± 43.13[b] | 0.86 ± 0.33[a] | 1210.66±15.40[c] |
| T3 | 1424.33± 33.51[ab] | 1386.33 ± 33.51[b] | 0.90± 0.012[ab] | 1256.0±14.16[b] |
| T4 | 1493.33± 13.86[a] | 1455.33± 13.86[a] | 0.84± 0.009[a] | 1223.66± 15.60[b] |
| significance | S | S | S | S |

T1: control treatment, T2: diet fermented with dried yoghurt (1gm/kg of diet) at one day period, T3: diet fermented with dried yoghurt (1gm/kg of diet) at two day period, T4: diet fermented with dried yoghurt (1gm/kg of diet) at three day period.

Using 1gm of yoghurt / kg of diets in the daily broiler feed during three periods (one, two, and three days after fermentation) resulted in dependent impacts on production characteristics. In this table noticed positive effect in T4 in all productive characteristic's (BW, WG, FCR and FI) compared with control and other treatments.

The highest BW, WG and improvement in FCR were achieved with chicks fed a diet supplemented with yoghurt-fermented feed in 3 days period at 28 days of broiler raising compared with other treatment were supplemented with diet fermented by yoghurt in 1 and 2 days respectively as well as control group which received basal diets, These findings imply that utilizing yoghurt as a probiotic for a lengthy period of time may lead to a stronger response in growth of broiler. Furthermore, some probiotics tend to increase growth in the early (starting) phase (Bai et al. 2013), while others enhanced FCR and growth during the grower and finisher stages (Chawla et al., 2013), while others reported improvements throughout the broiler production cycle (Attia et al., 2016).

In addition, our findings were consistent with those of Boostani et al. (2013) and Khan et al. (2011), who found that adding yogurt to water increased the BWG, FI, and FCR of broiler chicks. According to Sultan et al. (2006), adding 5mL of yogurt to water raised BWG when compared to a control group with low yogurt levels. According to Boostani et al. (2013), a greater Lactobacillus population in yogurt causes an increase in BWG and FI in broiler chicks. Furthermore, the elevated BWG of broilers fed yogurt was linked to the lactobacilli population in yogurt, according to this researcher. Probiotics can also improve growth performance by boosting gut bacteria balance (Bhogoju et al., 2021).

The effects of different periods of diets fermented with 1gm of yogurt supplemented to the broiler on blood hematological parameters at 28 days are found in Table (4) analyzing the outcomes of different periods of fermentation diet with yoghurt can be concluded that the use of this material in broiler diet led to increment significantly affect on, PCV, Hb and total RBC count at the final of the study but did not positive effect on WBC counts at same experimental period.

**Table (4): The effects of using diets fermented with yogurt at three different period on hematological parameters broiler chickens at 28 days.**

| Treatments | RBC cell/mlm$^3$ | Hb gm/ 100 ml | PCV% | WBC cell/mlm$^3$ |
|---|---|---|---|---|
| T1 | 2.87±0.12 b | 10.33± 0.37 $^b$ | 28.8± 1.19b | 22.88± 0.33 |
| T2 | 3.99±0.11 a | 12.73 ± 0.60 a | 32.00± 0.75a | 22.53± 1.8 |
| T3 | 3.70 ±0.08 a | 12.81± 0.56 a | 33.36 ± 1.32a | 23.83 ± 3.5 |
| T4 | 3.88 ±0.09 a | 12.86± 0.68a | 34.76± 0.95a | 22.37 ± 1.30 |
| Significance | S | S | S | N.S |

T1: control treatment, T2: diet fermented with dried yoghurt (1gm/kg of diet) at one day period, T3: diet fermented with dried yoghurt (1gm/kg of diet) at two day period, T4: diet fermented with dried yoghurt (1gm/kg of diet) at three day period.

The findings of this study resembled those of other researchers (Cho et al., 2013; Al-Saad et al., 2014; Khan et al., 2011) in statically of white blood cells counts but did not agreement in other parameters such as Hb, PCV and RBC counts were affected by adminstration of yoghurt powder, the all treatments which supplemented with yoghurt was showed improvement significantly in blood parameter compared with control treatment. On the other hand, this is in agreement with of ÇEtin et al. (2005) findings, who observed that the probiotic supplementation caused statistically significant increase in the erythrocyte count, haemoglobin concentration and haematocrit values of Turkeys. The differences may be attributed to type and number of species of bacteria present in probiotics. However, the yoghurt regard as probiotic.

The findings, on the other hand, contradict those of Djouvinov et al. (2005), who discovered that probiotic supplementation had no effect on blood constituents such as haemoglobin concentrations.

In the table (5), Dietary treatment (T2, T3 and T4) in the jejunum, there was a significant increase (P0.05) in villus height, crypt depth, and villus height to crypt depth ratio compared with control treatments.

**Table (5): In the duodenum of broilers, the influence of fermented feed with yoghurt on villus height, crypt depth (m), and the ratio of villus height to crypt depth**.

| Treatments | Villi length (µm) | Villi height (µm) | Villi length / villi height |
|---|---|---|---|
| T1 | 663 ± 5.28 b | 148.10± 2.45a | 4.61 ± 0.22 b |
| T2 | 748 ± 4.77 a | 135.1 ± 3.60 b | 5.48 ± 0.88a |
| T3 | 743± 4.64 a | 134.14 ± 3.22 b | 5.33 ± 0.37a |
| T4 | 741 ± 5.21 a | 133.13 ± 2.23 b | 5.42 ± 0.31a |
| Significance | S | S | S |

T1: control treatment, T2: diet fermented with dried yoghurt (1gm/kg of diet) at one day period, T3: diet fermented with dried yoghurt (1gm/kg of diet) at two day period, T4: diet fermented with dried yoghurt (1gm/kg of diet) at three day period.

The histological properties of the intestinal duct components were enhanced in poultry chicks fed fermented diet (three periods 1, 2, and 3 days with dry yoghurt) compared to broilers fed a control diet in the current study. These findings are comparable to those of Chaing et al. (2010) and Xu et al. (2012). The height of the villus in relation to the depth of the crypt ratio is an excellent way to determine the small intestine's absorption capacity. As the villus height to crypt depth ratio grew, it is thought that maximum digestion and absorption occurred (Chaing et al., 2010). Toxins can also be detected by alterations in the gastrointestinal tract shape, like lower height of villus with a depth of crypt (Xu et al., 2003).

In the current study, broilers fed fermented feed had higher villus height to crypt depth ratio than those fed unfermented feed. The increasing quantity of beneficial bacteria such as Lactobacilli, Bifidobacterium, Bacillus subtilis, and Sacchromyces cervisia could be linked to the crypt depth ratio (Naji and Al-Mosawi, 2014). Cutlure et al, (2005) classified fermented feed as having a large amount from bacteria of lactic acid (Log 9-10 cfu/ g feed) and a pH of 4.5-5.0. The villus height and villus height to crypt depth ratios have both increased resulted in structure of intestine that was more orientated to digestion, with better hydrolysis and absorptive capability, and fewer nutrients required for intestinal maintenance. As a result, the jejunum, duodenum, and ileum are extra beneficial intestinal structures for the chickens, which can assist in understanding why feed conversion and weight have improved (Feng et al., 2007).

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