Influence of Probiotic (Miaclostat) Supplementation on Carcass Yield, Chemical Composition and Meat Quality of Broiler Chick

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ABSTRACT

The Aim of this study was study the influence of probiotic (MiaClost) supplementation on carcass yield, chemical composition and meat quality of broiler chick. The experiment applied on one week old chicks to the following treatments: Control: (control treatment: 0.00 MiaClost /liter of drinking water), T2: (adding 0.160 gm. MiaClost /liter of drinking water), T3: (adding 0.175 gm. MiaClost /liter of drinking water), T4: (adding 0.190 gm. MiaClost /liter of drinking water). After 42 day of experimental period, the parameters results were, results of live body weight, carcass weight traits showed in significant (p<0.01) differences among treatments, results of chemical composition, showed that supplement of probiotic lead to significant (p<0.01) decrease moisture percentages in breast and thigh meat, significant (p<0.01) increase protein percentages in breast and thigh meat, while in significant (p<0.01) effect in Fat and Ash of two type of meat. For physical traits, the probiotic supplementation not effect on pH of Breast and thigh meat, while lead to significant (p<0.01) increase in water holding capacity percentages in breast and thigh from 2nd treatment and decrease in 3rd treatment group, cooking loss affect significantly (p<0.01) by using probiotic, that breast and thigh meat in 3rd treatment has higher percentages, while the lowest percentages recorded in breast and thigh meat of 2nd treatment.

Keywords: Probiotic (MiaClost), carcass yield, chemical composition, meat quality.

INTRODUCTION

Using of antibiotic lead to residue in poultry meat and eggs may have harm effects on human consumers, and this residues lead to generating flora and pathogenic microbes resistant to antibiotics. Edens (2003) mentioned that with growing attention about antibiotic resistance, and the block on adequate antibiotic usage in Europe and the potential for aprevent in the United States, there is rising concern in finding alternatives to antibiotics for poultry production. The so called probiotics can be listed among these products (Patterson and Burkholder, 2003). According to the Food and Agriculture Organization (FAO) (2002) and the World Health Organization (WHO), probiotics are live microorganisms strains of that give health benefits upon the consumer when used in adequate amounts. For example, Santín et al. (2001) probiotic implementation has been recorded in the poultry industry with an assurance on their impact on the performance of chickens and their meat chemical compositions. modern studies expose that probiotics complement in feed of poultry positive effect on meat pH, colour, water-holding capacity, fatty acid profile and oxidative stability (Saleh, 2014). We hypothesized that probiotics isolated from the intestines of free-range chickens can improve meat composition and promote animal health by modulating gut microbiota. So the aims of this study will Influence of probiotic (MiaClost ) supplementation on carcass yield, chemical composition and meat quality of broiler chick.

MATERIALS AND METHODS

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The experiment applied on one week old chicks to the following treatments: Control: (control treatment: 0.00 MiaClost /liter of drinking water), T2: (Adding 0.160g MiaClost /liter of drinking water), T3: (Adding 0.175g MiaClost /liter of drinking water), T4: (Adding 0.190g MiaClost /liter of drinking water).

The chicks will rearing using three different levels of diets as follows: Starter during the age of 1-11 days including 23% crude protein and 2900 Kcal/kg. Grower during the age of 12-25 days including 21.5% crude protein and 3000 Kcal/kg, and Finisher during the age of 26-42 days including 20% crude protein and 3175 Kcal/kg.

Parameters: The following parameters recorded in the end of experimental period:
- Live weight.
- Carcasses yield
- Chemical composition (Breast and thigh meat)
- Water Holding capacity (Breast and thigh meat)
- pH ((Breast and thigh meat)
- Cooking loss (Breast and thigh meat)

For each treatment, 12 birds were used to calculate the carcass yield, breasts, drumsticks, thighs, and wings. The chickens were slay by split of the jugular vein, and after bleeding and eviscerated and their carcasses were weighed with the aid of a digital balance.

Chemical composition: Moisture content:
Moisture content must determine as weight loss after the samples were dried in a convection oven at 105°C for 16 hr (Kelrich, 1990).

**Protein content**

Protein content was determined according to the method of Kelrich (1990) by using micro Kjeldahl and was calculated as follows:

\[
\text{Protein} \% = \frac{\text{Nitrogen}}{6.25} \times 100
\]

**Fat contents**

The percentage of fat in fish meat samples was estimated by taking a known weight of dried samples and extracted with diethyl ether using the Soxhlet apparatus. The amount of fat was calculated based on the method described in Kelrich (1990).

**Ash content**

Ash content was determined according to the method of Kelrich (1990) by taking a known weight of flesh and placing it in a muffle furnace at 550°C for 16 hrs. The ash percent was determined as follows:

\[
\text{Ash} \% = \frac{W_1}{W_2} \times 100
\]

Where \(W_1\) = weight of ash, and \(W_2\) = initial weight.

**Physic-chemical traits:**

- **pH:**
  
  pH of muscle sample measure according to the method described by Ibrahim et al., (2010). Muscle samples (10gm) homogenize with 100 ml distilled water for 1 min, the pH then measure by a pH meter.

- **Cooking loss:**
  
  Cooking loss determine according to Murphy and Zerby (2004). Muscle samples (20gm) place in an open aluminum boxes and cook for 8.5 min in oven pre-heated to 176°C to an internal temperature of 70°C. After cooking, the samples must dry with a paper towel. Each sample cool for 30 min, cooking weight measure. The cooking loss calculates by the following formula:

\[
\text{Cooking loss} \% = \frac{\text{Raw sample weight} - \text{cooked sample weight}}{\text{Raw sample weight}} \times 100
\]

**Water holding capacity (WHC):**

\[
\text{WHC} \% = \frac{\text{Initial solution weight} - \text{final solution weight}}{\text{Initial solution weight}} \times 100
\]

The results in table 1 showed that live weight of broiler chicks fed on feed supplemented with probiotic (MiaClost) do not differ significantly (P ≤ 0.01) with weight of chick from control groups. The results of carcass weight, Breast weight, Thigh weight, Back weight, Neck weight, Wing weight, Wing weight, Heart weight, Gizzard weight, Liver weight and Spleen weight in broiler chicks recorded that no significant (P ≤ 0.01) different among treatments. Other authors found same our results, that using probiotic not effect on carcass yield (Pelicano et al., 2003; Vargas Jr. et al., 2002), Also Midilli et al. (2008) did not record any significant effect of probiotic and Mannanoligosaccharides on carcass yield and internal organ relative weight in broiler chicks. Some results found by Racevi Stupelien V, (2010), observed non-significant differ in non-carcass component weights between control and treated group except for liver.

### Table 1. Effect of Probiotic (MiaClost) on live weight, carcass weight and traits of broiler chicken

<table>
<thead>
<tr>
<th>Traits</th>
<th>Control</th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
</tr>
</thead>
<tbody>
<tr>
<td>live weight</td>
<td>2.59 ± 0.06a</td>
<td>2.59 ± 0.10a</td>
<td>2.57 ± 0.09a</td>
<td>2.72 ± 0.15a</td>
</tr>
<tr>
<td>Carcass weight</td>
<td>1.79 ± 0.04a</td>
<td>1.87 ± 0.07a</td>
<td>1.84 ± 0.06a</td>
<td>1.94 ± 0.10a</td>
</tr>
<tr>
<td>Breast weight</td>
<td>578.50 ± 27.44a</td>
<td>646.00 ± 28.74a</td>
<td>620.00 ± 30.91</td>
<td>688.00 ± 40.80</td>
</tr>
<tr>
<td>Thigh weight</td>
<td>495.33 ± 3.71a</td>
<td>501.33 ± 21.61a</td>
<td>517.66 ± 24.93a</td>
<td>522.66 ± 24.39a</td>
</tr>
<tr>
<td>Back weight</td>
<td>237.83 ± 11.52a</td>
<td>217.00 ± 11.61a</td>
<td>215.16 ± 15.63a</td>
<td>246.16 ± 24.19a</td>
</tr>
<tr>
<td>Neck weight</td>
<td>240.83 ± 14.80a</td>
<td>243.00 ± 120.3a</td>
<td>233.83 ± 8.93a</td>
<td>239.66 ± 15.54a</td>
</tr>
<tr>
<td>Wing weight</td>
<td>200.00 ± 7.94a</td>
<td>205.00 ± 17.50a</td>
<td>192.83 ± 6.03a</td>
<td>195.16 ± 11.47a</td>
</tr>
<tr>
<td>Heart weight</td>
<td>10.71 ± 7.94a</td>
<td>11.07 ± 7.34a</td>
<td>10.44 ± 0.67a</td>
<td>11.66 ± 0.67a</td>
</tr>
<tr>
<td>Gizzard weight</td>
<td>28.87 ± 1.08a</td>
<td>28.04 ± 1.12a</td>
<td>28.67 ± 2.32a</td>
<td>24.52 ± 0.63a</td>
</tr>
<tr>
<td>Liver weight</td>
<td>61.72 ± 4.92a</td>
<td>60.43 ± 4.32a</td>
<td>66.34 ± 5.63a</td>
<td>67.59 ± 2.45a</td>
</tr>
<tr>
<td>Spleen weight</td>
<td>2.79 ± 0.10a</td>
<td>3.58 ± 0.77a</td>
<td>3.78 ± 0.32a</td>
<td>3.14 ± 0.37a</td>
</tr>
</tbody>
</table>

The different letter in same row means significantly differ (P ≤ 0.01). The results of table 2 and 3 showed that moisture percentages in breast and thigh meat from broiler chicks of control group differ significantly (P ≤ 0.01) from other treatment group, which recorded the highest percentages (76.33 and 76.33%) respectively, while the lowest percentages recorded in breast and thigh meat (73.15 and 73.16%) respectively.

The breast and thigh protein results showed significant differ among treatments after supplement of probiotic (table 2 and 3), the percentages in breast and thigh meat from broiler chicks of T3 and T1 (adding 0.190 and 0.160g MiaClost/liter of drinking water) differ significantly (P ≤ 0.01) with control group and not differ with T2, the highest percentages recorded in T3 and T1 in breast and thigh meat, it were (21.80, 21.77, 21.81 and 21.78%) respectively, while lowest percentages recorded in breast and thigh meat from broiler chicks of control group.

The results of Fat and Ash percentages in breast and thigh meat showed no significant (P ≤ 0.01) differ among treatment after supplement feed with probiotic (Table 2, 3).

Bansal, G. R. (2018). Found that there was no effect of the treatments on moisture, fat and ash content. However, the protein content was increase significantly in
broilers diet containing Probiotics, Tufarelli et al., (2017) found that increased protein percentages after using of probiotic in feed. These labile results of the effect of probiotics may be on account of aspects such as bacteria strains, scale of supplementation, diet composition, feeding management, feed shape and interaction with other dietary additives (Meng et al., 2010). According to the our results, crude protein amount in meat positively affected by using probiotics and same results recorded by Česlovas et al. (2005).

### Table 2. Effect of Probiotic (MiaClost) on chemical composition of broiler chick breast meat

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Moisture</th>
<th>Protein</th>
<th>Ash</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>76.33 ± 0.33a</td>
<td>20.58 ± 0.23b</td>
<td>1.53 ± 0.04a</td>
<td>10.93 ± 0.32a</td>
</tr>
<tr>
<td>T1</td>
<td>74.04 ± 0.54b</td>
<td>21.77 ± 0.33a</td>
<td>1.95 ± 0.54a</td>
<td>13.61 ± 0.14a</td>
</tr>
<tr>
<td>T2</td>
<td>73.90 ± 0.23b</td>
<td>21.17 ± 0.16ab</td>
<td>2.04 ± 0.15a</td>
<td>1.43 ± 0.18a</td>
</tr>
<tr>
<td>T3</td>
<td>73.15 ± 0.33b</td>
<td>21.80 ± 0.32a</td>
<td>1.96 ± 0.31a</td>
<td>1.40 ± 0.05a</td>
</tr>
</tbody>
</table>

The different letter in same column means significantly differ (P ≤ 0.01).

### Table 3. Effect of Probiotic (MiaClost) on chemical composition of broiler chick thigh meat

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Moisture</th>
<th>Protein</th>
<th>Ash</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>76.33 ± 0.48a</td>
<td>20.58 ± 0.23b</td>
<td>1.56 ± 0.32a</td>
<td>1.09 ± 0.02a</td>
</tr>
<tr>
<td>T1</td>
<td>74.04 ± 0.43b</td>
<td>21.78 ± 0.33a</td>
<td>1.95 ± 0.05a</td>
<td>1.37 ± 0.16a</td>
</tr>
<tr>
<td>T2</td>
<td>73.91 ± 0.35b</td>
<td>21.18 ± 0.69ab</td>
<td>2.05 ± 0.18a</td>
<td>1.43 ± 0.21a</td>
</tr>
<tr>
<td>T3</td>
<td>73.16 ± 0.53b</td>
<td>21.81 ± 0.28a</td>
<td>1.97 ± 0.14a</td>
<td>1.40 ± 0.19a</td>
</tr>
</tbody>
</table>

The different letter in same column means significantly differ (P ≤ 0.01).

The results in the table (4) showed the effect of using probiotic (MiaClost) in pH value, the effect was not significant (P ≤ 0.01) and pH value differ not in breast and thigh meat of broiler chicks in all treatment groups.

The results of Water Holding capacity value (WHC) affect significantly (P ≤ 0.01) after using probiotic (MiaClost) (table 4), the WHC value in breast and thigh meat of broiler chicks from T2 (adding 0.175g MiaClost /liter of drinking water) differ significantly with WHC value in breast and thigh meat of broiler from T1 and T3 (adding 0.160 and 0.190g MiaClost /liter of drinking water) groups, and not differ with value of T1 group, the highest value recorded in breast and thigh meat of broiler chicks from T2 group, it were (34.99 and 49.83%) respectively. The data presented here are within these values independently of probiotics utilization. Same results found Quadros et al. (2001). Racevi Stupelien V, (2007) reported that Probiotic preparation positively impact on the water-holding capacity, and no effect in other parameters. The same result findings by Pelicano et al., (2003) and Pelicano et al., (2005). Good water holding capacity is fundamental in protein-based food products (Barbut, 1999, Trout, 1988), decrease weight loss during cutting and storage and improved capacity of the meat to retain water during processing.

### Table 4. Effect of Probiotic (MiaClost) on physico-chemical traits of broiler chick thigh meat

<table>
<thead>
<tr>
<th>Treatments</th>
<th>pH</th>
<th>WHC</th>
<th>CL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>5.58 ± 0.19a</td>
<td>33.34±0.06a</td>
<td>43.33±0.06a</td>
</tr>
<tr>
<td>T1</td>
<td>5.17 ± 0.009a</td>
<td>33.66±4.35c</td>
<td>41.02±0.97b</td>
</tr>
<tr>
<td>T2</td>
<td>5.53 ± 0.02a</td>
<td>49.83±4.95a</td>
<td>36.00±0.70c</td>
</tr>
<tr>
<td>T3</td>
<td>5.59 ± 0.02a</td>
<td>3.04±0.33a</td>
<td>34.75±0.35bc</td>
</tr>
</tbody>
</table>

The different letter in same column means significantly differ (P ≤ 0.01).

**REFERENCES**


Barbut, S. (1999); Determining water and fat holding. Methods of testing protein functionality, 186-225.


