EYE (IN OVO) ADMINISTRATION OF PROBIOTICS TO PROMOTE GROWTH IN CHICKEN

Abstract

Increasing concerns over antibiotic use in food animals and the emergence of antibiotic-resistant pathogens resulted in the U.S. Food and Drug Administration directive curbing the use of antibiotic growth promoters (AGPs) in poultry production. This has led to an urgent need for safe and natural alternatives to AGPs in promoting poultry health and performance. In this regard, several researchers have demonstrated the efficacy of probiotic supplementation to day-old chicks in improving performance in market birds. However, the period of embryonic growth and immediate post-hatch development are critical to the quality and performance of a layer. Therefore, the present study investigated the potential use of probiotics to promote embryonic growth and post-hatch development in layer chicken.

Embryonated White Leghorn (N=440) eggs were sprayed with phosphate buffered saline (control) or probiotics (Lactobacillus paracasei DUP 13076 and L. ammonius NRRL B 442) on days 0, 5, 10, 14, and 18 of incubation. The eggs were incubated in a hatcher with automatic turning and embryos were sampled at regular intervals for growth and weight measurements. On day 18, eggs were set in the hatcher for 3 days. Following hatch, birds were raised on feed with or without probiotics (+9 log CFU/g of feed) until the end of the study (6 weeks). Chicks were sacrificed once weekly and morphometric parameters were recorded. The experiments were set as a completely randomised design with stratified sampling, and data were analyzed using Proc GLIMMIX and Proc PLM of SAS.

In-ovo probiotic application significantly improved hatchability, crown rump length and embryonic weight when compared to the control (p<0.05). Further, this improved embryonic development was associated with a concomitant increase in post-hatch growth. Specifically, chicks raised from EPPF eggs had a significantly improved crown rump length and body weight. However, the most effective treatment scheme when compared to control, FC and EPPF was EPPF. Overall, early and sustained probiotic supplementation (EPPF) led to 12.1 and 14.7% increase in crown-rump length and chick weight, respectively, at the end of the study. Additionally, the increase in body weight was correlated with an improvement in FCR. Therefore, in-ovo and in-feed supplementation of probiotics in layer embryos and chicks could be employed as a potential and effective alternative to AGPs to promote growth and development in chickens.

Materials and Methods

### Treatment Groups

- **Pre-hatch**
  - Control: No treatment applied
  - FC: Probiotic cocktail applied in feed only
  - EpF: Probiotic cocktail applied in-ovo only
  - EPPF: Probiotic cocktail applied both in feed and in-ovo

- **Post-hatch**
  - Control
  - Probiotic

### Post-hatch Results

<table>
<thead>
<tr>
<th>Treatment groups</th>
<th>Hatchability</th>
<th>Feed Conversion ratio of chicken</th>
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</thead>
<tbody>
<tr>
<td>Control</td>
<td>74.55%</td>
<td>5.5</td>
</tr>
<tr>
<td>Probiotic</td>
<td>78.50%</td>
<td>4.8</td>
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Pre-hatch Results

- **Morphometric Parameters on the day of hatch**
  - Third Dig Length: **+9%**
  - Crown-Rump Length: **+7%**
  - Leg Length: **+7%**
  - Breast Weight: **+14%**

Conclusion

- In-ovo probiotic supplementation significantly improved hatchability (p<0.05).
- Significant improvement in embryo and chick weight was observed with in-ovo probiotic supplementation alone (p<0.05).
- Overall, early (in-ovo) and sustained (in-feed) supplementation of probiotics was observed to be most effective in significantly improving embryonic growth and post-hatch development (p<0.05).