

EARLY (*IN OVO*) ADMINISTRATION OF PROBIOTICS TO PROMOTE GROWTH IN CHICKEN

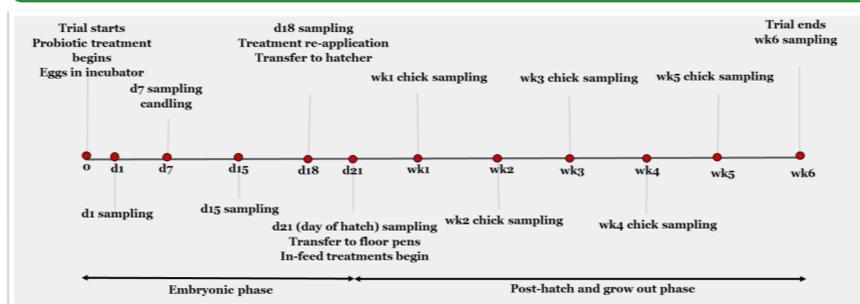
Abstract

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. rhamnosus* 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 out as a completely randomized design with stratified sampling, and data were analyzed using Proc GLIMMIX and Proc PLM of SAS.

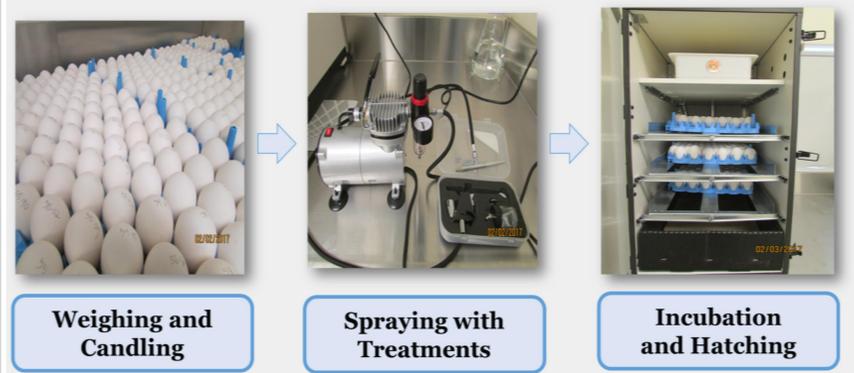
In-ovo probiotic application significantly improved hatchability, crown rump length and embryo weight when compared to the control ($p < 0.05$). Further, this improved embryonic development was associated with a concomitant increase in post-hatch growth. Specifically, chicks raised from EPF eggs had a significantly improved crown rump length and body weight. However, the most effective treatment scheme when compared to control, FC and EPF was EPFP. Overall, early and sustained probiotic supplementation (EPFP) led to 12.1 and 14.7% increase in crown-rump length and chick weight, respectively, at the end of the study. Additionally, this 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 chicken.

Project Timeline

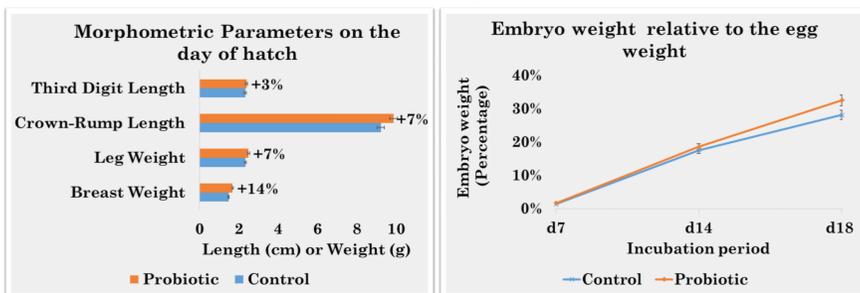


Materials and Methods

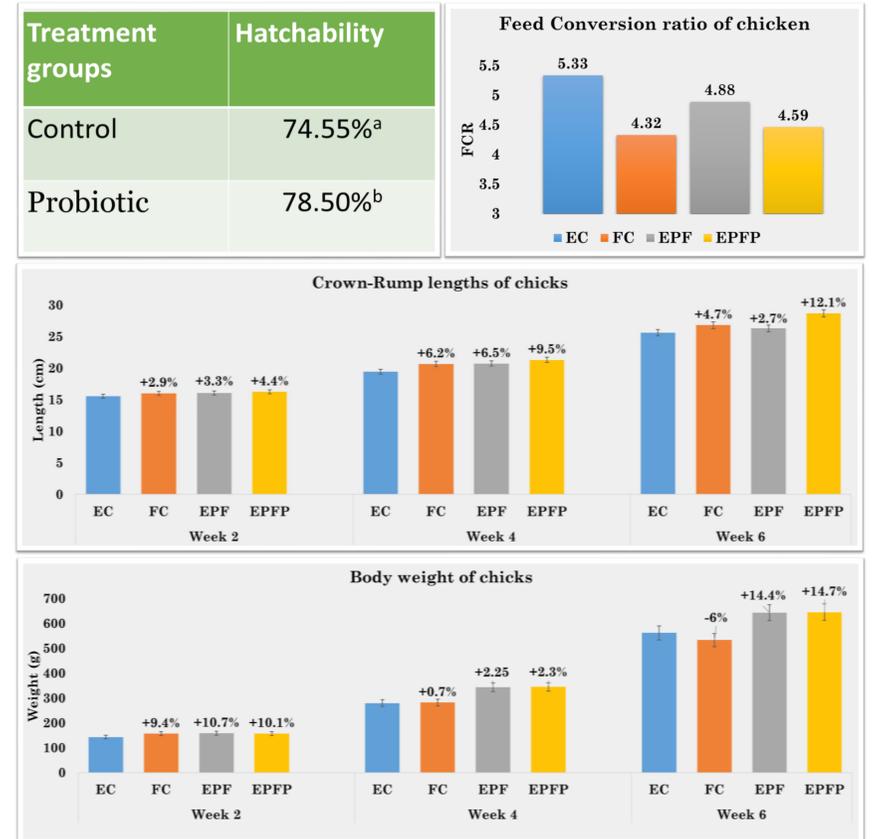
Treatment groups (Pre-hatch)	Treatment groups (Post-hatch)	Description
Control	EC	No treatment applied
	FC	Probiotic cocktail applied in feed only
Probiotic	EPF	Probiotic cocktail applied in-ovo only
	EPFP	Probiotic cocktail applied both in feed and in-ovo



Pre-hatch Results



Post-hatch Results



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 ($p < 0.05$).