PS3-021

HOW A NOVEL PROBIOTIC AFFECTS THE GUT MICROBIOME – INITIAL INSIGHTS

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Introduction

Antibiotic use reduction is imperative for the long-term sustainability of human health, animal health and meat production. Probiotics have already been proven to be a valuable tool to do so. Spore-forming *Bacillus* spp. are common animal probiotics since they have a measurable positive effect as well as other beneficial properties such as surviving the pelleting process and long shelf life. During the development process of a new triple-strain probiotic (*Bacillus* spp. ATCC PTA-6737; ATCC PTA-127114; ATCC PTA-127113), the effects of the probiotic on the gut microbiome were tested in two broiler trials.

Trial 1 – IRTA (Institute of Agrifood Research and Technology), Spain

- ✓Significantly increased α-diversity in cecum.
- ✓Significantly lower relative abundance of *Lactobacillus* in ileum, numerical increase in *Lactobacillus* in the cecum.
- ✓Numerical increase in Lachnospiraceae, *Ruminococcus* torques and *Akkermansia* in the cecum, which might be linked with improved broiler performance and protection from intestinal mucosa damage.

- 390 male Ross 308 broilers: 2 groups x 13 pens x 15 birds
- Duration: 35 days
- Challenge: high amount of NSP: wheat, rye, high protein
- Measurements: performance (FCR control: 1,420; probiotic: 1,408), 16S rRNA sequencing ileum and cecum at day 35 (1 animal/pen)

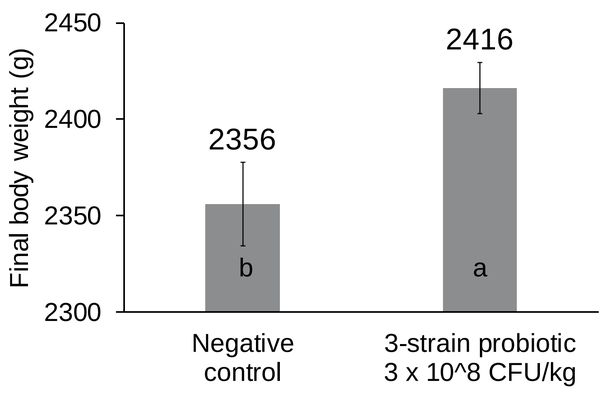

Fig. 1. Effect of probiotic on final body weight (35d). Error bars indicate the SEM, different letters indicate significant differences (p<0.05).

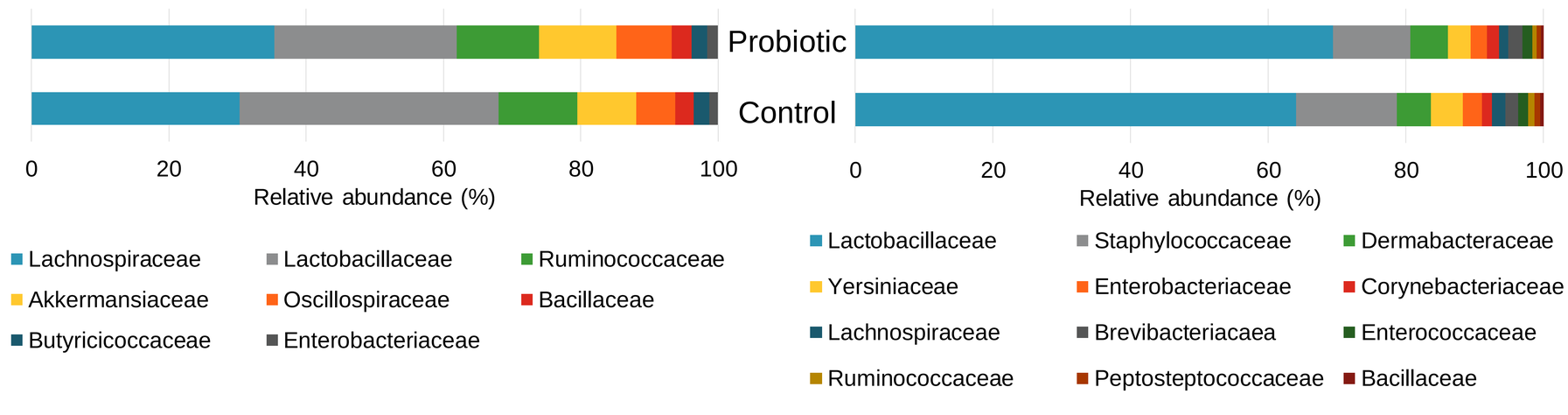

Fig. 2. Effect of probiotic on **ileal** microbial composition (family level)(35d).

Fig. 3. Effect of probiotic on **cecal** microbial composition (family level)(35d).

Trial 2 - University of Jordan, Poultry Research Facility, Amman

- ✓Significantly increased α-diversity in cecum ($p < 0.05$) and ileum ($p<0.10$) at 14 days.
- ✓Significant increase in the relative abundance of Firmicutes and *Lachnospiraceae* in the cecum at 14 days, which might be linked with improved broiler performance.
- ✓Higher uniformity in the ileal composition at 35 days of age.
- ✓Increase in the Firmicutes:Proteobacteria ratio in ileum (35 days) and cecum (14 and 35 days).

- 520 female Ross 308 broilers
- 2 groups x 13 pens x 20 birds
- Duration: 35 days
- Challenge: high amount of NSP: wheat, rye, high protein
- Measurements: performance (FCR control: 1,805; probiotic: 1,573), carcass traits and gut health scoring (2 animals/pen), 16S rRNA sequencing ileum and cecum at day 14 and 35 (1 animal/pen)

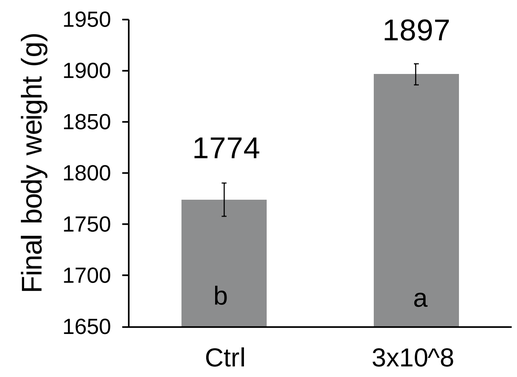

Fig. 4. Effect of the triple-strain probiotic on final body weight (35d). Error bars indicate the SEM, different letters indicate significant differences (p<0.05).

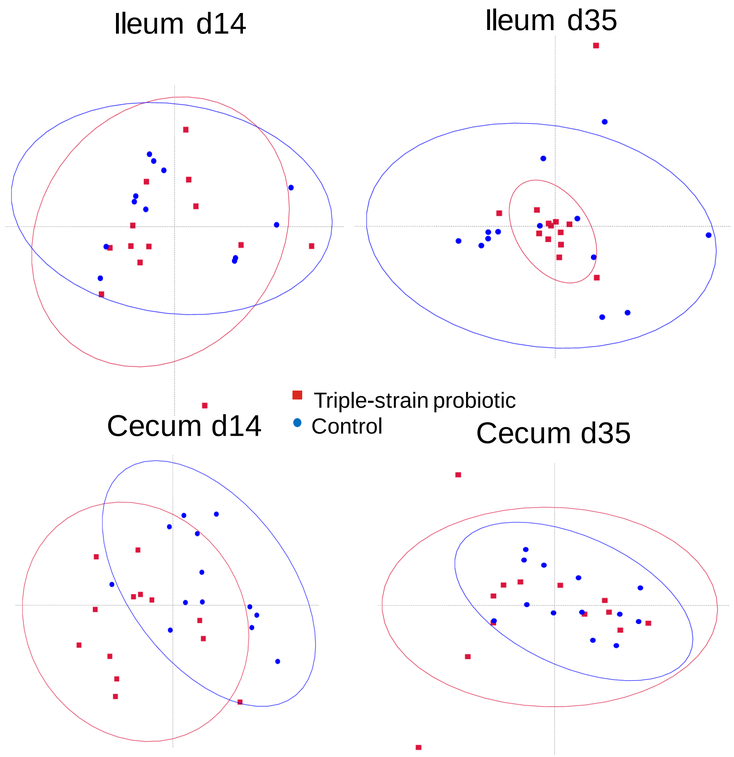

Fig. 5. PCoA plots for the effect of probiotic on the microbiota composition on different timepoints.

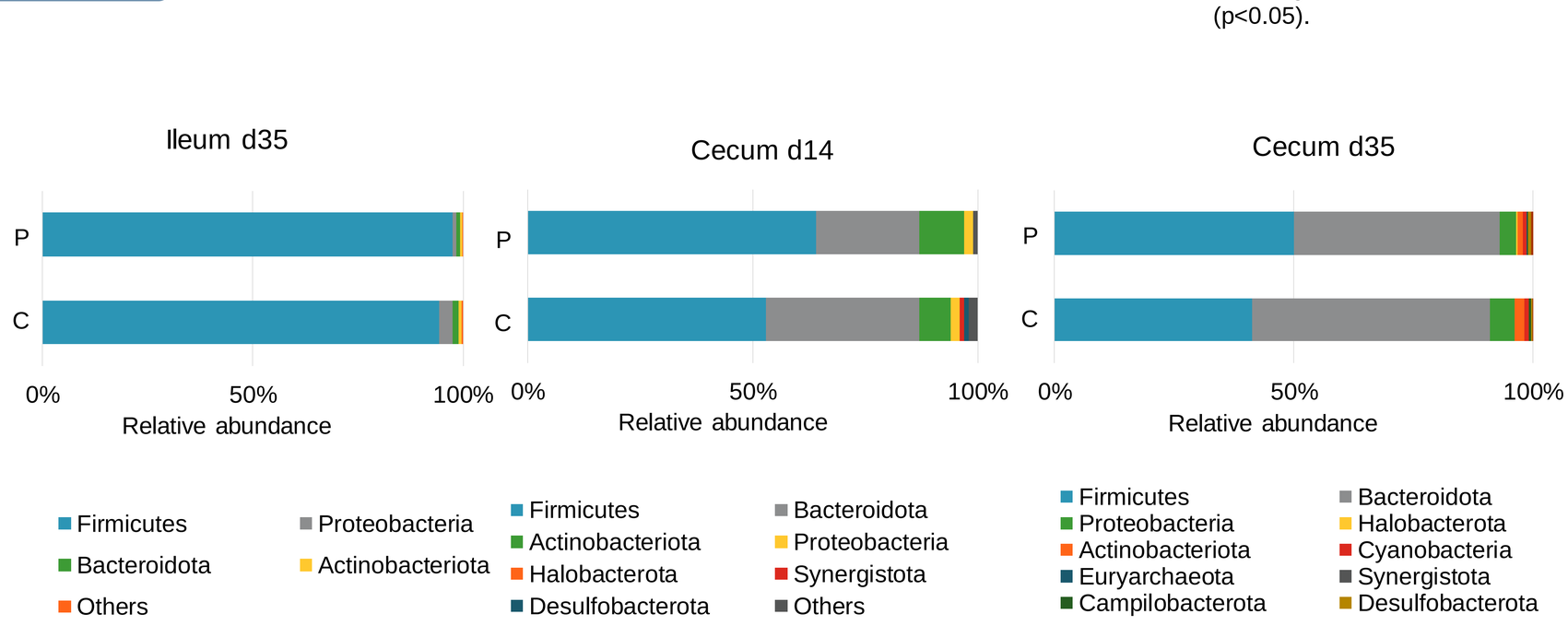

Fig. 6. Effect of the tiple strain probiotic (p) on **ileal and cecal** microbial composition at 14 and 35 days (phylum level).