

THE EFFECT OF CITRUS EXTRACT PREBIOTIC AND PROBIOTIC COMBINATIONS ON BROILER CHICKENS' PERFORMANCES

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Resumo: The effect of a symbiotic combination of a probiotic and a citrus prebiotic on broiler chickens has been investigated. 540 broiler chickens (ARBOR ACRES) were randomly selected and divided into 3 groups: a control group (CTL group) with a standard diet, a probiotic group (PRO Group) supplemented with 200 ppm of a commercial probiotic and a symbiotic group (SYM Group) supplemented with 200 ppm of a citrus extract prebiotic and 100 ppm of the same commercial probiotic used in the PRO group. The animals were supplemented from day 1 to day 46. From day 26 to day 30, birds were put under a thermic stress at 30°C for 4 hours. Zootechnical performances of each group were monitored at day 1, day 10, day 21, day 28, day 35, day 42 and day 46. Results showed that chicken from SYM group have a higher weight and a better average daily gain (ADG) than chicken from other groups. The Feed conversion ratio (FCR) from SYM group was lower than the FCR from CTL and PRO group. These results demonstrate that an association between prebiotics and probiotics could have a better impact on chicken zootechnical performances than a probiotic alone. This association could be a good solution to replace antibiotic growth promoters with the aim to improving chicken zootechnical performances.

Palavras Chave: Aditivos alimentares, prebióticos, probióticos, frango de cortes, alimentação animal

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Abstract: The effect of a symbiotic combination of a probiotic and a citrus prebiotic on broiler chickens has been investigated. 540 broiler chickens (ARBOR ACRES) were randomly selected and divided into 3 groups: a control group (CTL group) with a standard diet, a probiotic group (PRO Group) supplemented with 200 ppm of a commercial probiotic and a symbiotic group (SYM Group) supplemented with 200 ppm of a citrus extract prebiotic and 100 ppm of the same commercial probiotic used in the PRO group. The animals were supplemented from day 1 to day 46. From day 26 to day 30, birds were put under a thermic stress at 30°C for 4 hours. Zootechnical performances of each group were monitored at day 1, day 10, day 21, day 28, day 35, day 42 and day 46. Results showed that chicken from SYM group have a higher weight and a better average daily gain (ADG) than chicken from other groups. The Feed conversion ratio (FCR) from SYM group was lower than the FCR from CTL and PRO group. These results demonstrate that an association between prebiotics and probiotics could have a better impact on chicken zootechnical performances than a probiotic alone. This association could be a good solution to replace antibiotic growth promoters with the aim to improving chicken zootechnical performances.

Keywords: Feed additives, prebiotic, probiotic, poultry, animal feed

Introdução: For a long time, antibiotics have been used as growth promoters for preventing diseases and improving zootechnical performances. Nonetheless, due to the development of resistance to antimicrobials, this application has been banned in Europe, giving way to alternative options. Among solutions, prebiotics seem to be key ingredient. Defined as substrates that are selectively used by host microorganisms conferring a health benefit, some of them have shown beneficial effects on broiler performances (Benarbia, 2015) and intestinal microbiota (Djezzar et al, 2017). Probiotics and symbiotics have also demonstrated a positive impact on broiler (Mookiah et al, 2014). However, some studies have not shown any differences on performances between broilers fed with a standard diet, probiotics, prebiotics and symbiotics (Sarangi et al, 2016). This study aims to evaluate the interest of a combination between a citrus prebiotic and a probiotic in order to increase zootechnical performances of broilers.

Material e Métodos: The trial took place in an experimental farm in Algeria. 540 Arbor Acres one day old birds were divided into 3 groups. Each group contained 6 replicates of 30 birds each.

- Group 1: CTL group: a standard diet without supplementation;
- Group 2: PRO group: supplemented with the recommended dose by producer of a commercial probiotic (200 ppm), added to water and fed with a standard diet;
- Group 3: SYM group: a standard diet supplemented with 80% of recommended dose of prebiotic (200 ppm) and 50% of recommended dose of the same probiotic used in PRO group (100 ppm).

The standard diet was composed of a mixture of corn, soya, and wheat bran (Table 1). Birds were reared until day 46 and were put under thermic stress at 30°C for 4 h per day, from day 26 to day 30. Weight, feed intake and mortality from each replicate were recorded weekly. The FCR and the average daily gain (ADG) was also determined. Statistical analyses were performed by analysis of variance (ANOVA) using GRAPHPAD software. Statistical significance was considered at $p < 0.05$.

Resultado e Discussão: As shown in Figure 1, the final live weight of broiler chicken from the SYM group was significantly higher (p value < 0.05 , ANOVA) than broiler chickens from CTL group. No significant difference was observed between the FCR of birds from CTL group compared to birds from PRO group (Fig 2). However,

broiler chickens from SYM group have a lower FCR than chickens from PRO group ($p < 0.05$, ANOVA) and CTL group ($p < 0.01$, ANOVA).

The average daily gain of birds from SYM group was higher than the ADG from birds supplemented with the commercial probiotics (Figure 3). However, the difference is not significant. No statistical difference was observed between birds' mortality from the 3 groups (Figure 4). In other study, feed supplementation with symbiotics has already been displayed to affect zootechnical performances of broilers (Cheng et al, 2016; Mookiah et al, 2014). As with us, Falaki et al showed that broiler chickens fed with a mixture of probiotics and prebiotics have a better weight than those supplemented with prebiotics and probiotics alone (Falaki et al, 2010).

Table 1: Composition of the standard diet fed to broiler chickens

Raw material	Weight	%
Corn	600	60
Soya meal	330	33
Wheat bran	25	2.5
Phosphate	20	2
Carbonate	10	1
premix 1% ¹	10	1
Oil	5	0.5

¹ Vitamin and mineral premix supplied per kilogram of diet: Amino acids: methionine 180 000 mg, Vitamins: vitamin A: 1 000 000 IU, Vitamin D3: 200 000 IU, Vitamin E: 2000 mg, Vitamin B2: 500 mg, Vitamin B1: 150 mg, Vitamin B6: 300 mg, Vitamin B3: 200 mg, Micronutrient: Calcium: 6000 mg, Copper: 750 mg, Manganese: 10 500 mg, Zinc: 6 000 mg, Iodine: 150 mg, Cobalt: 60 mg and Selenium: 30mg, Choline chloride 35 000 mg, Minerals: 300 000 mg

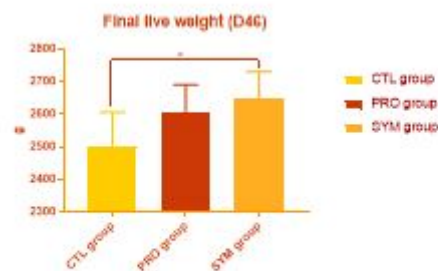


Figure 1: Final live weight at 46 days. *results are significantly different (p value < 0.05 , ANOVA)

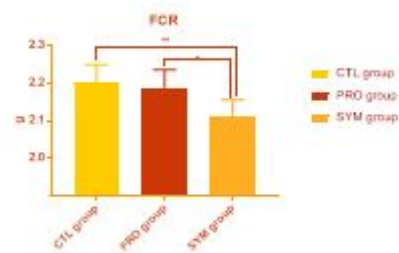


Figure 2: Feed Conversion ratio at day 46. *results are significantly different (p value < 0.05 , ANOVA) **results are significantly different (p value < 0.01 , ANOVA).

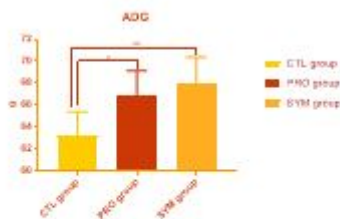


Figure 3: Average daily gain of birds at day 46. *results are significantly different (p value < 0.05 , ANOVA) **results are significantly different (p value < 0.01 , ANOVA).

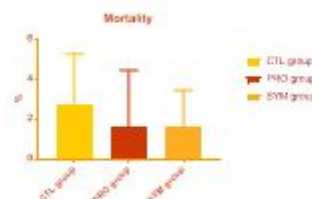


Figure 4: Birds' mortality percentage at day 46

Conclusão: Results showed that supplementing broiler chickens with a combination of citrus prebiotics and probiotics have additive benefits in performances than probiotic supplementation alone. According to this data, combining prebiotics and probiotics could be a good way to optimize broiler chickens' zootechnical performances.

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