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Application of low crude protein concept in common Hungarian broiler diets

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Feeding broilers with low protein diets supplemented with amino acids may reduce feed cost and allow using alternative feed ingredients. High crude protein (CP) levels increase the nitrogen and water excretion, which can reduce litter quality and may elevate the incidence of footpad lesions. High CP level is also reported as a predisposing cause for necrotic enteritis. The aim of the trial was to analyze the possibility of lowering the CP levels using by-products and amino acids without impairing the birds' performance. A total of 576 one-day-old male broilers (Ross 308) were randomly distributed to 3 dietary treatments consisting of 8 replicates with 24 birds each. Three diets were fed: basal diet (control) and two experimental diets with 2% less CP: LPSB (soybean meal as main protein source) and LPBP (soybean meal, corn DDGS and sunflower meal). The highest values for body weight (BW) were achieved in group LPSB (2,992 g), followed by LPBP with 2,925 g. Control group showed the lowest BW (2,833 g). Feed conversion rate (FCR) in control group amounted to 1.57 kg/kg and was significantly higher than for LPSP (1.52 kg/kg) and LPBP (1.53 kg/kg). The difference in FCR between LPSP and LPBP was not significant. Reduction of dietary CP with the help of supplemented amino acids and usage of alternative ingredients such as DDGS and sunflower meal, improved core performance parameters. Earnings (per 100 birds) after feed and **day-old** chick costs amounted to 83.5 EUR in control group, 107.8 EUR in LPSP group, and 100.7 EUR in LPBP group, respectively.

Feeding (*Bacillus amyloliquefaciens* CECT 5940) improves performance of broiler chickens

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Based on the potential of probiotic to improve intestinal microbial balance, it was hypothesized that *Bacillus amyloliquefaciens* CECT 5940 (Ecobiol®) can improve the performance of broilers when added in the feed. The objective of the trial was to determine the efficacy of feeding Ecobiol® on broiler performance under European feeding conditions. 300 Ross 308 male day-old chicks with an initial body weight (BW) of 42 ± 3 g were randomly distributed in two dietary treatments, each with 25 replicates and 6 birds per pen. Dietary treatments included a basal control diet and a basal diet supplemented with 1.0×10^6 cfu of *B. amyloliquefaciens* CECT 5940 per g of feed. Diets were formulated according to Ross 308 guidelines and fed in mash form. Due to the extremely controlled sanitary conditions in the trial facility, diets did not contain coccidiostats, no vaccination was conducted in the flock and no medication was administered. The ceca from probiotic-supplemented group had a 68% lower coliform count (4.25×10^8 cfu vs. 1.37×10^8 cfu) and a 79% lower *E. coli* count (3.6×10^8 vs 7.61×10^7) than in control group. Final BW at day 35 was numerically higher in the probiotic group (2.114 g) compared to the control group (2.086 g). Feed conversion ratio (FCR) was significantly lower in the probiotic group at 20 days of age (1.344 vs. 1.316) and at 35 days of age (1.533 vs. 1.508). Larger difference in the FCR at day 20 implies that feeding Ecobiol® improves performance when the gut-challenges are higher during the grower phase. Overall, results of this study demonstrate that *B. amyloliquefaciens* CECT 5940 is able to improve broiler performances even when the performances of the animals are close or equal to genetic potential of the breed.

Effect of increasing standardized ileal digestible threonine to lysine ratios on growth performance and intestinal health parameters of coccidiosis-challenged broilers

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Coccidiosis is a poultry disease affecting intestinal morphology and nutrient utilization, potentially increasing requirements for functional amino acids such as Threonine (Thr). Thr is the third limiting amino acid in broiler diets, essential for growth and immune responses. Two simultaneous studies were conducted to determine the optimal standardized ileal digestible (SID) Thr:Lysine (Lys) ratio for 10-24d broilers under non-challenged and coccidiosis-challenged conditions. In each study, 480 male, Ross 308 broilers at 10d of age were split into 6 dietary treatments with 8 replicate pens of 10 birds each. Treatments included a positive control with SID Lys at requirement and a SID Thr:Lys of 65% and five treatments with calculated SID Thr:Lys ratios of 57, 61, 65, 69 and 73% with SID Lys at 1% of the diet (90% of the requirement). Experimental diets were pelleted, free from coccidiostats and fed ad lib from 10 to 24d of age. At 14d of age, all birds received an oral dose of distilled water in the unchallenged study and 12x the standard oral dose of a live coccidiosis vaccine in the challenged study. Bird weight and feed consumption were measured at 24d of age. The actual SID Thr:Lys ratios based on analysed diets ranged from 65 to 73% and thus the first 2 levels were not as deficient as planned. Increasing Thr:Lys from 65 to 73%, under non-challenged conditions did not affect ($P > 0.05$) any of the growth performance parameters. Under coccidiosis challenge, FCR was linearly reduced ($P < 0.05$) from 1.377 to 1.261. SID Thr:Lys of 65% was sufficient to optimize growth performance under non-challenged while higher Thr:Lys may be necessary under coccidiosis challenge to optimize FCR. Further research is needed using wider ranges of Thr:Lys ratios under coccidiosis challenge.

Bacillus amyloliquefaciens CECT 5940 improve broiler performance under heat stress

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Environmental conditions and animal characteristics may lead to an imbalance between the animal heat production and its dissipation in the environs, causing heat stress (HS). Although, concentrated feed or additives in the feed and water are used against HS, there is limited information on such strategies. Thus, this study was conducted to delineate the effect of probiotic *Bacillus amyloliquefaciens* CECT 5940 (Pro) on broiler performance under thermo-neutral (TN) and HS conditions. A 2x2 factorial design was used, where HS condition and the Pro supplementation (106 CFU/g feed) were the main factors. Arbor Acres male chicks were allocated to 4 treatments with 14 replicates of 12 birds. Basal diets were formulated to meet the breeder recommendation. The HS group were under continuous high T° from day one (32°C) while the TN group followed the recommendations. Body weight gain (BWG), feed intake (FI), feed conversion (FCR), nitrogen retention (NR), and gut histology were assessed. Blood samples were analysed for immune biomarkers. Data was submitted to ANOVA followed by Duncan test ($\alpha=0.05$). At day 35, HS reduced BWG by 214g, FI by 252g while FCR was increased by 2.7%. On the other hand, Pro improved BWG by 3.7%, increased FI by 2.6 % and improved FCR by 1.2%. The NR retention was 1.5% higher in birds fed Pro compared to HS. Pro resulted in longer crypt depth (CD) in jejunum similar to TN, while HS resulted in lower CD in duodenum and jejunum. The HS decreased the CD4 T-cells and immunoglobulin (IgG) in the blood whereas Pro was able to increase both similar to TN. In this study, HS had a negative impact on the immune system of broilers that resulted in decreased performance and health status, but the addition of the probiotic was able to overcome these effects.

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