# EVALUATION OF A GLOBAL ENZYME SOLUTION ON GROWTH PERFORMANCE AND CARCASS CHARACTERISTICS OF BROILERS FED CORN-WHEAT-SOYBEAN BASED DIETS REDUCED IN METABOLIZABLE ENERGY AND NUTRIENTS

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## Introduction

Commercial broiler diets constitute of over 99% of ingredient sources of metabolizable energy (ME), digestible amino acids, phosphorus (P), and calcium (Ca; Corzo et al 2011). Ability to significantly reduce the dietary levels of ME, dAA, available P (avP), and Ca without detrimental effects on growth performance and yield of broilers through market age would imply increase in nutrient efficiency. Efficiencies of carbohydrases to hydrolyse non-starch polysaccharides and increase ME and AA digestibility (Cozannet et al., 2017) and phytase to dephosphorylate phytate and increase P and Ca availability (Amerah et al., 2014) have been validated. Hence, a global enzyme solution, which consists of a multi-carbohydrase and phytase complex (MCPC) is proposed to be able to allow significant reductions in dietary energy and nutrients.

## Objective

To evaluate effects of global enzyme solution in commercial broiler diets reduced in ME, dAA, avP, and Ca on performance and carcass yield of broilers through market age.

## Materials & Methods

- 1,020 day-old male Cobb 500 chicks were randomly assigned to 60 floor pens (5 diets × 12 replicates) with 17 birds/pen.
- Birds were fed a common starter diet from 1 to 10 d and one of 5 experimental diets from 11 to 42 d. Dietary treatments were ME- and nutrient-adequate positive control (PC) or either of 2 negative control (NC) diets with fixed reductions in avP and Ca by 0.18% and 0.16% units, respectively, and sequential reductions in each of ME and dAA by 5% (NC1) or 7% (NC2) vs the PC diet without or with MCPC (at 1,250 xylanase U, 860 betaglucase U, 4,600 arabinofuranosidase U, and 1,000 FTU per kg of diet).
- Performance traits: BW and feed in and out were measured at each phases for d 11 to 42 mortality-corrected BW gain, feed intake, and feed conversion ratio calculations. At 42 days of age, 8 birds per pen (n = 480) were used for carcass yield measurements.
- Statistical analyses handled with Proc. Mixed of SAS 9.4. Effects considered significant at P≤0.05.

**TABLE 1:** Ingredients % and nutrient composition, % as-feed

| | Starter (d1-10) | Grower (10-28) | | | Grower (28-42) | | |
|---|---|---|---|---|---|---|---|
| | | PC | NC1 | NC2 | PC | NC1 | NC2 |
| Composition, % | | | | | | | |
| Corn | 39.47 | 39.28 | 39.72 | 39.38 | 50.21 | 50.05 | 49.50 |
| Soybean meal | 34.89 | 35.44 | 32.64 | 31.51 | 21.11 | 19.41 | 18.58 |
| Wheat | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 | 15.00 |
| Soy hulls | 2.00 | 2.00 | 5.50 | 6.60 | 4.75 | 8.73 | 9.58 |
| Rice bran | 1.00 | 1.00 | 2.20 | 3.00 | 2.00 | 2.05 | 3.10 |
| Soy oil | 3.34 | 3.97 | 2.53 | 2.08 | 4.00 | 2.74 | 2.22 |
| Monocalcium phosphate | 1.45 | 0.97 | 0.12 | 0.13 | 0.84 | - | - |
| Calcium carbonate | 1.60 | 1.38 | 1.32 | 1.33 | 1.11 | 1.05 | 1.05 |
| DL-Methionine 99 | 0.44 | 0.31 | 0.30 | 0.29 | 0.22 | 0.21 | 0.21 |
| L-Lysine HCl 98 | 0.16 | 0.06 | 0.07 | 0.08 | 0.15 | 0.16 | 0.16 |
| L-Threonine | 0.12 | 0.06 | 0.06 | 0.06 | 0.07 | 0.07 | 0.07 |
| Vitamin and mineral premix | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 |
| Salt | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 |
| Salinomycin (CQR) | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 |
| Nutrients, % | | | | | | | |
| ME, kcal/kg | 3050 | 3100 | 2945 | 2883 | 3150 | 2993 | 2930 |
| Dig. Lys | 1.18 | 1.11 | 1.06 | 1.03 | 0.83 | 0.79 | 0.77 |
| Dig. Met | 0.72 | 0.59 | 0.56 | 0.55 | 0.43 | 0.41 | 0.4 |
| Dig. M+C | 0.98 | 0.86 | 0.82 | 0.8 | 0.64 | 0.61 | 0.6 |
| Dig. Thr | 0.77 | 0.72 | 0.68 | 0.67 | 0.54 | 0.51 | 0.5 |
| Dig. Trp | 0.23 | 0.23 | 0.22 | 0.21 | 0.16 | 0.15 | 0.15 |
| Dig. Val | 0.89 | 0.9 | 0.86 | 0.84 | 0.67 | 0.64 | 0.63 |
| Calcium | 0.9 | 0.75 | 0.59 | 0.59 | 0.6 | 0.44 | 0.44 |
| Total Phosphorus | 0.69 | 0.59 | 0.42 | 0.42 | 0.52 | 0.34 | 0.35 |
| Available Phosphorus | 0.45 | 0.35 | 0.17 | 0.17 | 0.3 | 0.12 | 0.12 |
| Sodium (g/kg) | 1.43 | 1.43 | 1.43 | 1.43 | 1.4 | 1.39 | 1.4 |
| Complet diet price, euro/ton | | 268.2 | 250.6 | 243.8 | 240.3 | 225.8 | 220.0 |

**FIGURE 1:** Effects of MCPC supplementation on growth performance and feed efficiency of broilers from 10 to 42 d

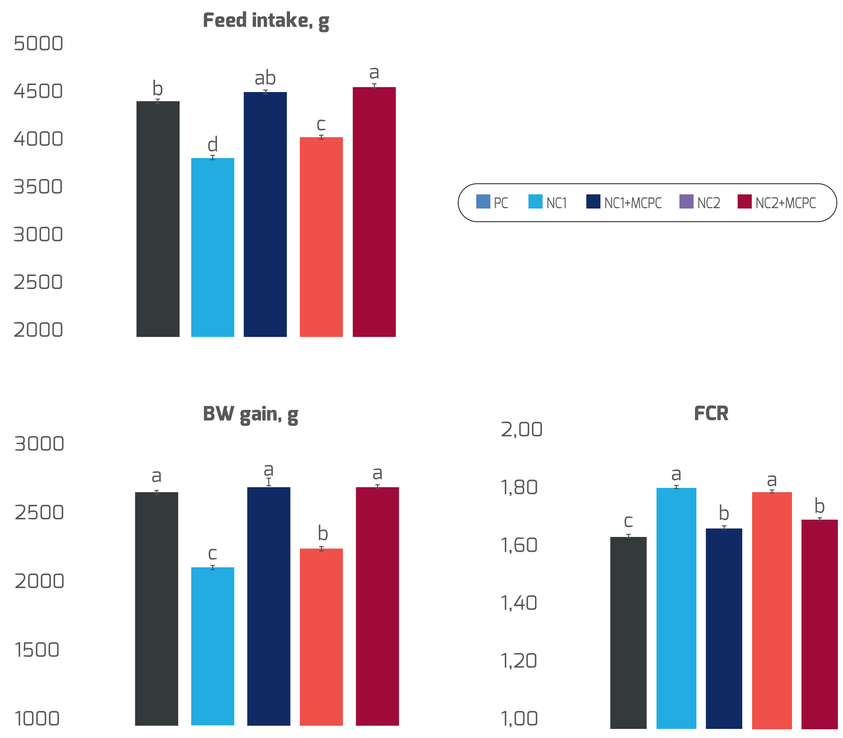
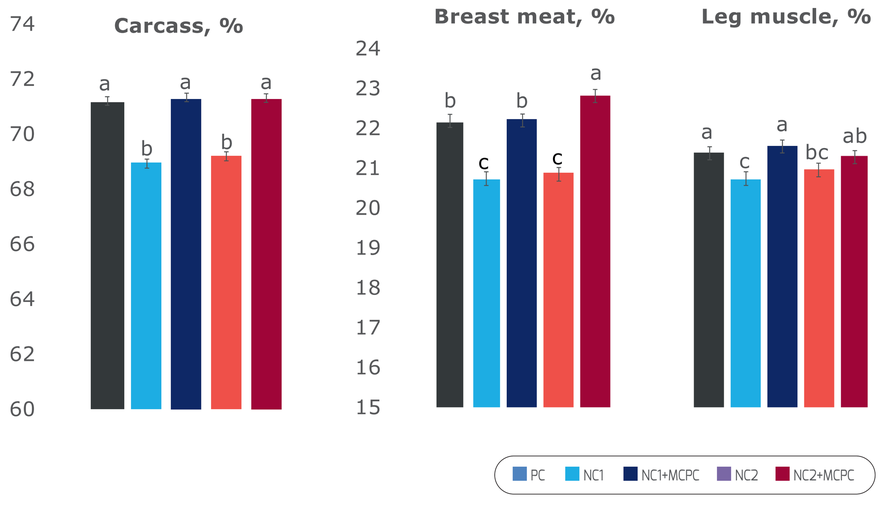



**FIGURE 2:** Effects of MCPC usage on carcass yield as a percentage of live BW in 42 d broilers




## Results

The NC1 and NC2 (reduced in ME, dAA, avP, and Ca relative to PC) respectively worsened (P<0.001) BW gain by 21.1 and 15.8%, FCR by 10 and 9.2%, to also decrease carcass by 22.2 and 16.9%, breast meat by 24.8 and 18.8%, and leg by 22 and 15.9% yields. The use of MCPC in each of NC1 or NC2 restored the performance, carcass, breast and leg yields to the same levels as the broilers fed PC diet.

**CONCLUSION: THIS FINDINGS IMPLY THAT ABILITY OF THE GLOBAL ENZYME SOLUTION (MCPC) TO ALLEVIATE ADVERSE EFFECTS OF 7% ME, 7% DAA, 0.18% UNIT AVP, AND 0.16% UNIT CA DEFICIENCIES ON BROILERS PERFORMANCE AND CARCASS YIELD ALLOWS FOR SIGNIFICANT REDUCTION IN DIETARY NUTRIENT VALUE WITH INCREASE IN OVERALL FEED EFFICIENCY TO DECREASE FEED COST.**

**References**

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