

## FEED UTILIZATION AND GUT BARRIER FUNCTION OF BROILER CHICKENS FED RYE-BASED DIETS SUPPLEMENTED WITH FUNGAL FERMENTATION PRODUCT

Daniel Berghaus<sup>1</sup>, Nicole Lau<sup>1</sup>, Patrick Steuer<sup>2</sup> and Karoline Reckmann<sup>3</sup>

<sup>1</sup> ISF GmbH, Wahlstedt, DE <sup>2</sup> Senzyme GmbH, Troisdorf, DE <sup>3</sup> Provita Supplements GmbH, Pinneberg, DE

### BACKGROUND AND OBJECTIVES

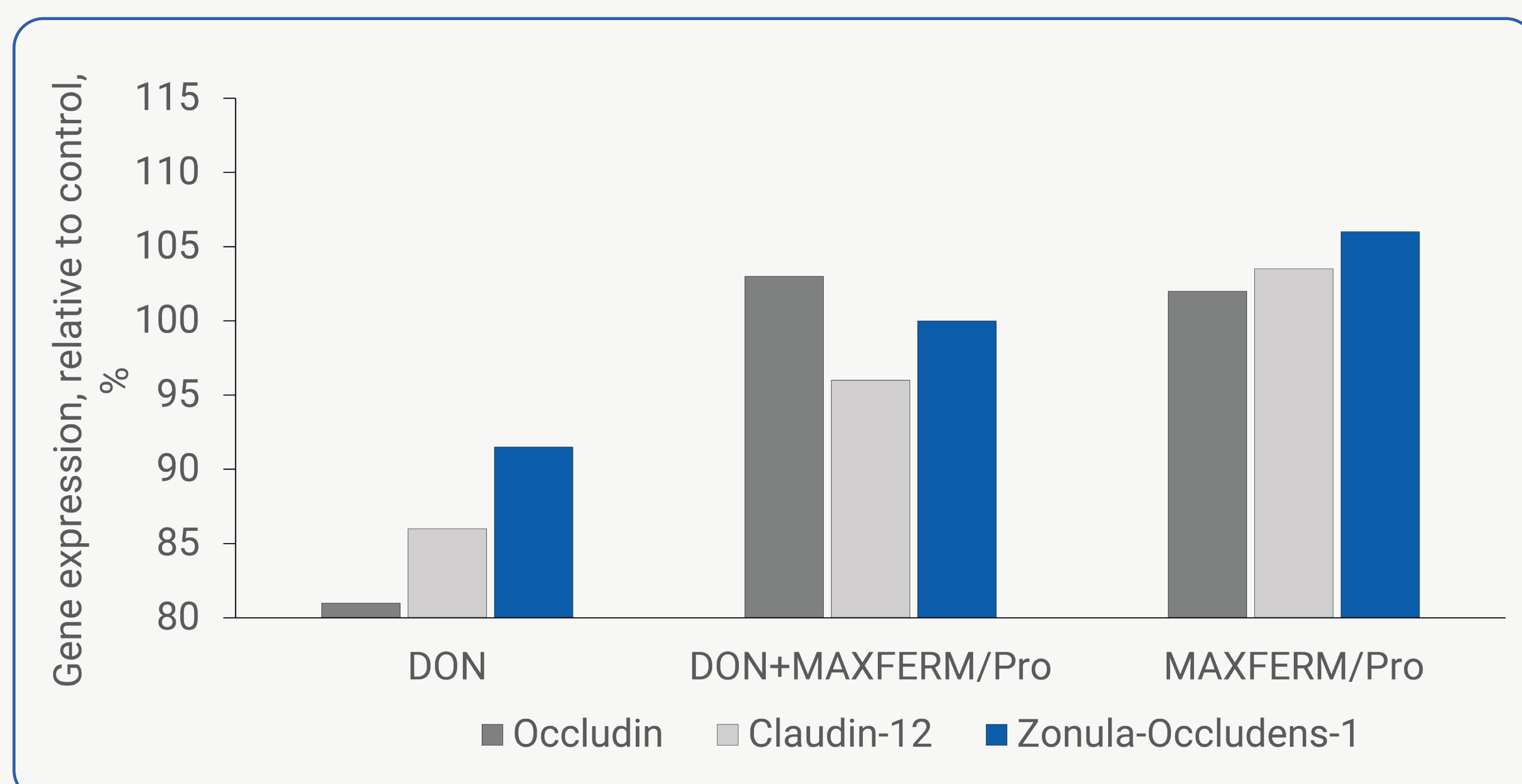
- In the context of climate change, alternative feedstuffs need to be incorporated into broiler diets while maximizing protein utilization
- Rye cultivation has many agronomic advantages, but the high amount of non-starch polysaccharides impairs nutrient availability and gut integrity
- Aim: to investigate whether a fungal fermentation product (MAXFERM/Pro) can mitigate the negative effect of rye inclusion in crude protein (CP) reduced diets and whether it has an influence on tight-junction protein expression.

**Table.** Effect of dietary treatments on the broiler's growth performance (d 1 – 35)

		ADG (g/d)	FCR (g/g)	Final BW (g)
Trial 1	PC	52.8 <sup>a</sup>	1.64 <sup>c</sup>	1898 <sup>a</sup>
	NC	44.4 <sup>c</sup>	1.84 <sup>a</sup>	1607 <sup>c</sup>
	MP	49.3 <sup>b</sup>	1.69 <sup>b</sup>	1777 <sup>b</sup>
	pooled SEM	0.44	0.02	15.4
	P-value	< 0.001	< 0.001	< 0.001
Trial 2	PC	57.3 <sup>a</sup>	1.74 <sup>b</sup>	2060 <sup>a</sup>
	NC	47.0 <sup>b</sup>	1.87 <sup>a</sup>	1697 <sup>c</sup>
	MP	54.8 <sup>b</sup>	1.73 <sup>b</sup>	1972 <sup>b</sup>
	pooled SEM	0.45	0.02	15.8
	P-value	< 0.001	0.019	< 0.001

### RESULTS

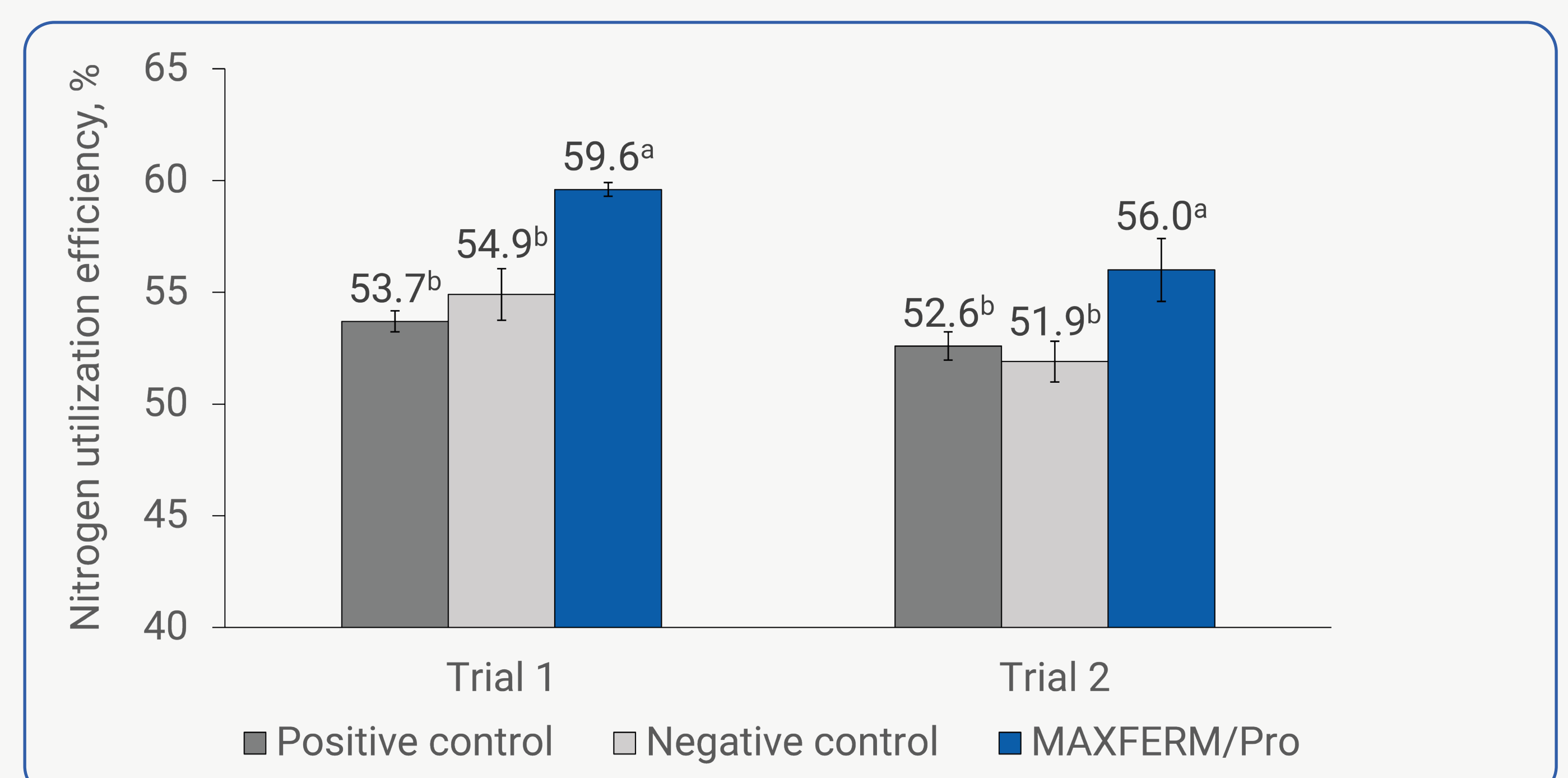
- Supplementation of MAXFERM/Pro alleviated the negative effect of dietary rye inclusion on ADG and FCR (P < 0.001; Table)
- Despite dietary CP reduction similar FCR in MP treatment compared to PC treatment resulted in improved NUE (P < 0.001; Figure 1) and 13% less soybean meal consumption
- In-vitro tight-junction protein expression was upregulated following MAXFERM/Pro treatment both during and without DON-challenge (Figure 2)



**Figure 2.** Effect of MAXFERM/Pro on tight-junction protein expression in an IPEC-J2 cell culture

### MATERIAL & METHODS

- 2 feeding trials with each 360 unsexed Ross 308 broilers
- 2-phase feeding: starter phase (d 1 – 14) and grower phase (d 14 – 35)
- 3 isoenergetic dietary treatments with six replicates each:
  - positive control (PC, corn-soy based diet; 23% CP in starter and 21% CP in grower phase)
  - negative control (NC, 1.5%-point CP reduction + replacement of 15% corn with rye in starter and 30% in grower phase)
  - MAXFERM/Pro (MP; NC-diet + 500 mg MAXFERM/Pro per kg of feed)
- Parameters: average daily gain (ADG), feed conversion ratio (FCR), and nitrogen utilization efficiency (NUE) assuming 30 g nitrogen retention per kg body weight (BW) gain
- qPCR measurement of tight-junction protein expression (claudin-12, occludin, and zonula occludens-1) in-vitro using an IPEC-J2 model with deoxynivalenol (DON) challenge



**Figure 1.** Effect of dietary treatments on the broiler's nitrogen utilization efficiency (d 1 – 35; error bars represent SEM; P < 0.05)

### CONCLUSION

#### Supplementation of MAXFERM/Pro:

- compensated for the negative effect of dietary rye inclusion on nutrient availability and growth performance
- allows lowering dietary CP content and consequently nitrogen excretion
- offers flexibility in broiler diet formulation regarding the inclusion of alternative feedstuffs
- improves intestinal barrier function through enhanced expression of tight-junction proteins

PERFECT COMPONENTS. MAXIMUM RESULTS.

