Abstract #279

Amino acid digestibility of a modified corn byproduct (Gold Pro™) with and without a multi-enzyme supplement (CORE™) when fed to weanling pigs

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ABSTRACT

Gold Pro is a corn and protein yeast ingredient that has shown in previous studies to be an alternative to traditional protein ingredients in nursery swine diets, with further benefits on health. To further improve the use of this ingredient an experiment was conducted to determine the apparent ileal digestibility (AID) and standardized ileal digestibility (SID) of CP and AA in Gold Pro with or without a multi-enzyme blend (CORE – containing α-amylase, α-glucanase, phytase, cellulase, xylanase, and protease). Nine weanling barrows (initial BW: 13.7±1.1 kg) were surgically fitted with T-cannulas at the terminal ileum. Each was randomly allotted to 3 dietary treatments in a triplicated 3 × 3 Latin Square design with 3 periods. Each period lasted 7 d with the initial 5 d being an adaptation period to the diet, and d 6 and 7 being the ileal digesta collection phase. Treatments were diets with 30% Gold Pro as the only protein source without (GP) or with (GP+CORE) the CORE enzyme blend; an N-free diet was used to determine the basal endogenous loss of CP and AA. All diets contained 0.4% chromic oxide as an inert marker. Ileal digesta samples were collected for AA analysis to calculate AID and SID. In the GP+CORE, AID of Cys was significantly greater ($P<0.05$) and marginally greater ($P<0.10$) for Lys and Met compared to GP. For AID of CP and all other AA, no significant differences between diets were observed. However, there was a consistent numeric increase in both AID and SID of CP and AA in Gold Pro when CORE was added. For SID of CP and AA, no significant differences were observed between diets without or with CORE, but there was a tendency ($P = 0.066$ and $P = 0.102$) for a greater SID of Lys and Cys, respectively, in the GP+CORE diet compared with the GP diet. In conclusion, this information can be used to formulate more accurately with Gold Pro in starter pig rations, and CORE tended to increase the digestibility of AA in Gold Pro specifically Lys, Met, and Cys.

BACKGROUND

Gold Pro is a corn and protein yeast ingredient while CORE is a product containing multiple enzymes including phytase, amylase, cellulase, xylanase, beta-glucanase, and protease plus probiotics, Bacillus subtilis and Bacillus licheniformis. Both products have been shown in previous trials to improve pig performance.

OBJECTIVES

The objective of this experiment was to determine the apparent ileal digestibility (AID) and standardized ileal digestibility (SID) of CP and AA in Gold Pro yeast protein in the absence or the presence of the CORE enzyme blend.

MATERIALS & METHODS

Experimental Design

- 9 weaned barrows (initial BW = 13.7 ± 1.1 kg) surgically fitted with T-cannulas in the distal ileum
- Pigs were allotted to 3 treatments over 3 periods (3 x 3 Latin square)
- Each period lasted for 7 days: first 5 d was adaptation period to the diet and ileal digesta were collected for 8 h on d 6 and 7.
- Housed individually in metabolism pens (1.2 m x 1.5 m)
- Feed supplied each day was calculated as 3 times the required energy for maintenance (i.e., 197 kcal ME per kg BW0.60; NRC, 2012) and the daily allotment of feed was provided at 0800 h each day.
- All diets contained 0.4% chromic oxide (Cr_2O_3) as an indigestible index for the calculation of digestibility.

Dietary Treatments

- 30% Gold Pro
- 30% Gold Pro + CORE
- N-free diet

Ileal Digesta Collection

- Digesta were collected using a 225-mL plastic bag attached to the cannula barrel using a zip tie.
- Bags were removed whenever they were filled with digesta or at least once every 30 min.
- Samples were stored at –20°C to prevent bacterial degradation of AA in the digesta.

Chemical Analysis

- Samples of Gold Pro, diets, and ileal digesta were analyzed in duplicate for DM, CP, and AA concentration.

Calculations and Statistical Analysis

- Values for AID, endogenous losses, and SID of CP and AA in the diets containing Gold Pro were calculated (Stein et al., 2007).
- Data were analyzed by ANOVA using the MIXED procedure of SAS (SAS Inst. Inc., Cary, NC).

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DIETS

Table 1. Ingredient composition of experimental diets, as-fed basis

Item, %	CORE		N-free
	Yes	No	
Gold Pro	30.00	30.00	-
Core Enzyme Blend	-	0.30	-
Cornstarch	34.70	34.40	52.80
Lactose	20.00	20.00	20.00
Sucrose	10.00	10.00	15.00
Solca floc1	-	-	4.00
Soybean oil	2.00	2.00	4.00
Ground limestone	0.80	0.80	0.45
Diaclcium phosphate	1.40	1.40	2.15
Magnesium oxide	-	-	0.10
Potassium carbonate	-	-	0.40
Sodium chloride	0.40	0.40	0.40
Chromic oxide	0.40	0.40	0.40
Vit-mineral premix2	0.30	0.30	0.30

CONCLUSIONS

There were no differences between diets without or with CORE™, but there was **a tendency** ($P = 0.066$ and $P = 0.102$) **for a greater SID of Lys and Cys**, respectively, in the GP+CORE diet compared with the GP diet. In conclusion, this information can be used to formulate more accurately with Gold Pro™ in starter pig rations, and **CORE™ tended to increase the digestibility of AA** in Gold Pro™ specifically Lys, Met, and Cys.

RESULTS

Table 2.
Analyzed nutrient composition (as-fed)

Item	Diet			
	Gold Pro	No CORE	CORE	N-free
DM	95.9	95.2	94.8	94.0
CP	48.4	14.0	14.2	0.1
Indispensable AA				
Arg	2.32	0.65	0.67	0.01
His	1.35	0.39	0.40	0.01
Ile	2.19	0.64	0.65	0.02
Leu	5.47	1.60	1.63	0.04
Lys	2.16	0.63	0.65	0.02
Met	1.00	0.27	0.29	0.01
Phe	2.51	0.72	0.74	0.02
Thr	1.87	0.55	0.57	0.02
Trp	0.49	0.16	0.17	0.02
Dispensable AA				
Ala	3.35	0.99	1.01	0.02
Asp	3.45	1.02	1.08	0.03
Cys	0.97	0.27	0.29	0.01
Glu	7.21	2.22	2.26	0.05
Gly	2.02	0.58	0.60	0.02
Pro	3.51	1.13	1.14	0.07
Ser	1.86	0.56	0.57	0.01
Tyr	1.87	0.49	0.50	0.00

Table 3.
AID of CP and AA in Gold Pro1

Item	CORE			
	No	Yes	SEM	*P*-value
CP	57.0	57.8	3.6	0.858
Indspensable AA				
Arg	63.0	66.2	4.3	0.574
His	72.3	74.1	1.6	0.251
Ile	69.5	70.5	1.8	0.500
Leu	81.4	82.3	1.1	0.391
Lys	53.7	59.2	2.8	0.055
Met	78.7	81.2	1.4	0.092
Phe	76.4	77.7	1.4	0.305
Thr	60.2	62.0	1.9	0.307
Trp	72.6	74.2	1.7	0.263
Val	69.6	71.3	1.7	0.279
Dispensable AA				
Ala	71.0	71.2	2.5	0.970
Asp	61.2	63.4	2.0	0.237
Cys	66.8b	70.5a	1.6	0.045
Glu	79.8	80.4	1.3	0.592
Gly	25.0	24.5	8.9	0.968
Pro	-16.9	-16.9	22.9	1.000
Ser	67.2	69.0	1.8	0.335
Tyr	78.1	79.0	1.3	0.439

[1] Each least square mean represents 9 observations.

Table 4.
SID of CP and AA in Gold Pro1

Item	CORE			
	No	Yes	SEM	*P*-value
CP	77.0	77.5	3.6	0.909
Indspensable AA				
Arg	80.2	83.0	4.3	0.635
His	80.1	81.8	1.6	0.297
Ile	77.2	78.1	1.8	0.547
Leu	86.4	87.2	1.1	0.436
Lys	65.9	71.0	2.8	0.066
Met	83.2	85.4	1.4	0.119
Phe	82.9	84.0	1.4	0.368
Thr	75.3	76.6	1.9	0.451
Trp	74.4	75.9	1.7	0.293
Val	77.7	79.1	1.7	0.357
Dispensable AA				
Ala	80.7	80.7	2.5	0.979
Asp	72.6	74.2	2.0	0.378
Cys	81.1	83.8	1.6	0.102
Glu	85.9	86.4	1.3	0.658
Gly	73.1	71.0	8.9	0.858
Pro	68.7	68.0	22.9	0.982
Ser	79.5	81.1	1.8	0.389
Tyr	84.4	85.2	1.3	0.502

[1] Each least square mean represents 9 observations.

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