

Grain and plant protein types fed to weaned piglets influence the apparent digestibility of carbohydrates and crude protein when measured at the terminal ileum

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Diets based on cooked white rice fed to weaned piglets have a higher apparent ileal digestibility of starch than diets based on wheat (Pluske *et al.*, 2007). The diets based on cooked white rice have used predominately animal sources of protein, however in Europe these are banned or excluded by retailer's specifications (except for milk proteins), and plant proteins are widely used instead. This study examined the interactive effects of cereal types and plant protein types on the apparent ileal digestibility of protein and carbohydrates to test the proposition that suitable sources of plant protein could ensure high digestibility coefficients in the small intestine.

Sixteen post-weaned pigs were surgically fitted with a post-valve T-caecum cannula on day 12 after weaning and allowed to recover in individual cages. Four non-medicated diets based on ingredients available in France were examined in a 2x2 factorial arrangement to assess the apparent ileal digestibility (AID) of carbohydrates and crude protein (CP). Diets differed according to grain source (GS) - extruded rice in a wheat and barley-based (RWB) diet compared to wheat and barley alone (WB) and protein sources (PS) - diversified refined protein concentrates from soybean, potato and fishmeal (DIV_{prot}) compared to soybean meal and full-fat extruded soybeans (SB_{prot}). Digesta collection commenced 12 days after surgery. Diets were fed for a four day adaptation period followed by a three day collection period for 12 hours per day. Diets included 0.2% chromic oxide as an indigestible marker. Total carbohydrate (CHO) was calculated by subtracting CP and fat to organic matter. Data were first analyzed including the effect of diet, series of collection and their interaction. As the latter was not significant, data were reanalyzed using repeated measures analysis of variance with GS and PS as main effects, and their interaction.

There was a trend (P=0.07) for the AID of CP to be higher in pigs fed DIV_{prot} than SB_{prot} (Table 1). Both the GS and PS influenced the AID of CHO (P<0.001). Pigs fed extruded rice at the expense of some wheat and barley (diet RWB) showed a higher (P<0.001) AID of CHO, and the use of DIV_{prot} rather than SB_{prot} showed a higher AID (P<0.001). Pigs fed the DIV_{prot} showed a greater AID of sugars (P=0.07). Our data show that grain types and plant protein sources fed to weaned piglets alter the flow of CHO and CP into the large intestine. This, in turn, might have ramifications for the expression of post-weaning colibacillosis in diets not containing antimicrobials (Heo *et al.*, 2007).

Table 1. Influence of protein source (PS) and grain source (GS) on apparent ileal digestibility (AID) of crude protein (CP) and total carbohydrates (CHO) after weaning

PS	DIV _{prot}		SB _{prot}		RSD ¹	Significance ²
	RWB	WB	RWB	WB		
Piglet BW, kg	14.0	13.5	14.5	13.7	2.0	-
AID CP, %	81.2	80.9	78.0	77.1	5.6	PS (P=0.07)
AID CHO, %	81.1	76.5	75.9	70.3	2.2	GS***, PS***
AID starch, %	99.7	99.4	99.5	99.3	2.3	GS (P=0.07), PS (P=0.14)
AID sugars, %	71.6	72.2	56.1	53.8	7.7	PS***

¹RSD: residual standard deviation; ²***P<0.001.

References

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