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Porcine digestible peptides improve feed intake and performance of weaning pigs

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SUMMARY – A trial was conducted in order to evaluate porcine digestible peptides (PDP; Palbio PDP®; Bioibérica, Spain) as a protein source for weaning pigs. A total of 180 19-day old piglets distributed in 15 pens were used. The animals were offered, during the pre-starter period (0-13 days post-weaning), one of three experimental treatments with iso-nutritional amounts of either PDP, blood plasma or fishmeal. During the starter period (14-41 days post-weaning), all the animals were offered a common diet. In the pre-starter period fishmeal showed the lowest feed intake followed by plasma (+15 g/d) and PDP (+21 g/d), although these differences were not statistically significant. Weight gain during this period was identical for PDP and plasma pigs whereas that of fishmeal pigs tended to be lower (-17 g/d). During the common starter period, the tendencies observed with the previous diets persisted and pigs on the fishmeal diet showed the slowest average daily gain, followed by pigs on the plasma group (+17 g/d; not significant) and pigs on the PDP group (+26 g/d; $P < 0.05$). At the end of the trial, pigs offered the PDP diet had a final body weight 1 kg higher than fishmeal pigs ($P < 0.05$) and 0.4 kg higher than plasma pigs (not significant). It can be concluded that PDP are an excellent protein source for weaning piglets, with better quality and palatability than fishmeal, and comparable to well contrasted protein sources like blood plasma.

Key words: Porcine digestible peptides, piglets, weaning, feed intake.

RESUME – "Les peptides porcins digestibles améliorent l'ingestion d'aliment et les performances de porcelets en sevrage". Un essai a été mené afin d'évaluer les peptides porcins digestibles (PDP ; Palbio PDP® ; Bioibérica, Espagne) comme source de protéines pour des porcelets en sevrage. Un total de 180 porcelets âgés de 19 jours ont été distribués en 15 lots. Les animaux recevaient, pendant la période pré-démarrage (0-13 jours post-sevrage), un des trois régimes expérimentaux avec des quantités iso-nutritionnelles soit de PDP, de plasma sanguin ou de farine de poisson. Pendant la période de démarrage (14-41 jours post-sevrage), tous les animaux recevaient un régime commun. Pendant la période pré-démarrage, la farine de poisson a montré l'ingestion alimentaire la plus faible, suivie par le plasma (+15g/j) et PDP (+21g/j), bien que ces différences ne soient pas statistiquement différentes. Le gain de poids pendant cette période a été identique pour les porcelets recevant PDP et plasma tandis que les porcelets recevant la farine de poisson tendaient à avoir des résultats plus faibles (-17g/j). Pendant la période de démarrage commune, les tendances observées avec les régimes précédents ont persisté et les porcelets à régime de farine de poisson ont montré le gain moyen quotidien le plus faible, suivis par les porcelets du groupe de plasma (+17g/j ; non significatif) et les porcelets du groupe PDP (+26g/j ; $P < 0,05$). A la fin de l'essai, les porcelets recevant le régime PDP avaient un poids corporel final plus élevé d'1 kg par rapport aux porcelets à farine de poisson ($P < 0,05$) et 0,4 kg de plus que les porcelets du régime à plasma (non significatif). On peut en conclure que les PDP sont une excellente source de protéines pour les porcelets en sevrage, avec une meilleure qualité et palatabilité que la farine de poisson, et comparables aux sources de protéines bien contrastées comme le plasma sanguin.

Mots-clés : Peptides porcins digestibles, porcelets, sevrage, ingestion alimentaire.

Introduction

Porcine digestible peptides (PDP) is a protein source obtained by spray-drying hydrolysed porcine intestinal mucosa resulting from the manufacturing process of pharmaceutical heparin.

The amino acids in PDP are found mainly in free or peptide form (65 and 35% respectively), and therefore PDP is a product of high protein digestibility. Therefore, due to its nature, it should be an excellent source of protein for very young piglets (with an immature digestive system) after weaning.

The present work describes an experiment performed to test PDP (Palbio PDP®; Bioibérica, Spain) as a protein source for weaning pigs, as compared to other high quality animal protein sources like blood plasma and fishmeal.

Material and methods

Animals and housing

One hundred and eighty 19 day-old piglets [(*Landrace* x *Large White*) x *Pietrain*] weighing 5.6 kg were used. They were housed in a commercial farm provided with automatic climate control, in fifteen (2.2 x 2.5 m) pens with 12 animals each.

At the beginning of the trial the animals were distributed according to their live body weight, sex and litter origin. Feed was provided *ad libitum* in feed hoppers and water was continuously available.

Diets

During the pre-starter period (0-13 days) three different experimental diets were tested: T-1 (plasma diet), T-2 (fishmeal diet) and T-3 (PDP diet). During the starter period (14-41 days) all the animals received a common diet. The ingredient composition of the diets at their estimated nutrient content are shown in Table 1.

Table 1. Composition of the diets

	Pre-starter			Starter
	T-1	T-2	T-3	
Ingredients (g/kg)				
Extruded wheat	350	350	350	-
Extruded maize	197	194	192	-
Wheat	-	-	-	350
Maize	-	-	-	284
Fishmeal 70%	80	120	80	40
Extruded soybean	80	80	80	100
Soybean meal 44%	-	-	-	124
Lard	54.7	58.5	59.4	23.8
Sweet whey	171	171	171	43
Blood plasma	40	-	-	-
Porcine digestible peptides	-	-	40	-
Feed flavour	0.3	0.3	0.3	0.3
Ca carbonate	11	10.2	10.3	10.4
Di-Ca phosphate	2.3	-	3.1	11.5
Vit-Min premix	4	4	4	4
DL-Methionine	1.6	1.9	1.6	1.3
L-Lysine	3.9	4.8	3.3	3.9
L-Tryptophan	0.4	0.7	0.7	0.2
L-Threonine	1.8	2.6	2.3	1.6
Premix	2	2	2	2
Estimated nutrient composition (g/kg)				
Crude protein	196.2	194.5	193.7	190.0
Fat	92.3	99.1	96.1	65.5
Crude fibre	17.6	17.9	17.5	27.0
Lactose	120.0	120.0	120.0	30.0
Sodium	3.3	2.3	3.9	1.5
Lysine	15.0	15.0	15.0	13.0
Methionine + cystine	9.0	9.0	9.0	7.8
Tryptophan	2.7	2.7	2.7	2.3
Threonine	10.0	10.0	10.0	8.4
Energy (kcal ME)	3500	3500	3500	3300

The three experimental diets used in the pre-starter period were formulated to provide equal amounts of energy, lysine, threonine, sulphur amino acids and tryptophan.

Measurements

Feed and pigs were weighed at the start, on day 13 and at the end of the experiment. Average daily gain, average feed intake and feed to gain ratio during the pre-starter period were measured for each treatment and compared statistically. The effect of the experimental diets on the posterior starter period during which a common diet was used was also analysed statistically. For the statistical analysis initial body weight of the piglets was used as covariable.

Results and discussion

The performance results of the trial are shown in Table 2. The inclusion of PDP in the pre-starter diet of the piglets resulted in the highest feed intake followed by plasma (6 g/d less) and fishmeal (21 g/d less). These differences however, were not statistically significant. During this period weight gain of pigs offered PDP or plasma was identical whereas pig on fishmeal tended to grow at a slightly lower rate (17 g/d less).

At the end of the starter period (in which a common diet was used), pigs that had been offered the PDP diet on the pre-starter period showed a higher final body weight (1 kg more) than pigs from the fishmeal group ($P<0.05$). Pigs from the plasma group had an intermediate final body weight (0.4 kg less), but they were not statistically different from the other two treatments.

Overall (0-41 days), pigs on the PDP diet showed a higher average daily gain (26 g/day more) than pigs from the fishmeal group ($P<0.05$). Pigs from the plasma group had an intermediate weight gain that was not statically different from the other two treatments (9 g/d kg less than PDP).

Table 2. Weight gain, feed intake and feed to gain ratio of 19 day-old weaning pigs fed on pre-starter diets with plasma, fishmeal or porcine digestible peptides 41 days ($n = 5$)

	T-1	T-2	T-3	Standard error
0-13 days (pre-starter)				
Weight day 0 (kg)	5.6	5.6	5.6	0.81
Weight day 13 (kg)	7.5	7.3	7.5	0.69
ADG (g/d)	147	130	147	53.0
ADFI (g/d)	210	195	216	13.7
Feed:Gain	1.50	1.51	1.49	0.13
14-41 days (starter)				
Weight day 41 (kg)	20.8 ^{AB}	20.2 ^B	21.2 ^A	2.57
ADG (g/d)	477	459	487	79.0
ADFI (g/d)	626	612	654	44.0
Feed:Gain	1.27	1.33	1.30	0.05
0-41 days (overall)				
ADG (g/d)	372 ^{AB}	355 ^B	381 ^A	62.8
ADFI (g/d)	494	480	515	37.7
Feed:Gain	1.29	1.35	1.31	0.07

^{A,B} Values in the same row with different superscript are significantly different ($P<0.05$).

Conclusions

From the results presented it can be concluded that PDP is an excellent protein source for weaning piglets, with better quality and palatability than fishmeal, and comparable to well

contrasted protein sources like blood plasma.

The positive response found with the inclusion of PDP in the pre-starter diet, persisted during the starter period, even though all pigs were consuming a common diet.

Additional research should be conducted to confirm these results and to further investigate the possible mechanisms by which PDP improve performance.