Processed animal proteins can replace soybean meal in broiler diets

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Background

- A drastic increase in food production is predicted (FAO, 2009)
- In particular, the demand for animal products will increase
- Feed production needs to increase as well
- EU has a low rate of protein self-sufficiency (42%)
- Processed animal proteins (PAPs) may be needed to reduce EU dependency on imported soybean meal (SBM)

Objective

- Determine the precaecal and total tract nutrient digestibility of porcine protein meal
- Determine the effect of these porcine meal on performance, litter quality, bone quality and gut health in male broilers

Results

Composition of PAPs

Tested PAPs differed in processing method (intensive and mild), ash (121 and 233 g/kg) and fat content (144 and 101 g/kg). Ca and P content correlated with ash content (Table 1).

Table 1. Analysed chemical composition of the tested PAPs

	Unit	PAP_1	PAP_2
Processing method		(1/pressure & sterilisation)	(7/mild method)
Dry matter	g/kg	946	948
Ash	g/kg	121	233
Phosphorus	g/kg	19.3	41.9
Calcium	g/kg	28.3	78.0
Crude fibre	g/kg	40	16
Crude protein	g/kg	609	601
Crude fat	g/kg	144	101

Precaecal P- and Ca-digestibility of PAP_1 were 56.4% and 48.8%, respectively, where AME content was 9.6 MJ/kg. Precaecal P- and Ca-digestibility of PAP_2 were 49.9% and 40.3%, respectively, where AME content was 7.4 MJ/kg (Table 2).

Table 2. Precaecal and total tract nutrient digestibility (%) and AME (MJ/kg) of the tested PAPs, based on 6 replicate pens per treatment, and titanium oxide as indigestible marker

Nutrient	PAP_1	PAP_2	P-value
Precaecal			
Dry matter	60.9	76.6	0.004
Phosphorus	56.4	49.9	0.020
Calcium	48.8	40.3	0.030
Crude protein	60.9	68.8	0.036
Amino Acids (total)	63.6	68.1	0.332
Total tract			
Dry matter	54.5	65.6	0.008
Organic matter	55.0	67.1	0.007
Ash	51.3	58.7	0.022
Crude protein	47.1	51.4	0.037
Crude fat	79.6	47.2	<.001
AME (MJ/kg)	9.6	7.4	<.001

Method of performance experiment

- Isocaloric and isonitrogenious diets
- Nutrient digestibility of PAPs based on table values
- 8 Replicate pens per treatment with 10 Ross 308 birds per pen
- Dietary PAP inclusion level ranged from 6 to 9% (SBM replacement: 40% in starter, 30% in grower, and 20% in finisher diets)
- Growth performance, welfare scores, blood parameters, gut integrity and bone quality were assessed

Table 3. Technical performance over the whole growth period (0 – 42 day of age)

	Control	PAP_1	PAP_2	P-value
Body weight D0 (g)	40	40	40	0.903
Body weight D42 (g)	3823 (b)	3918 (a)	3826 (b)	0.074
Body weight gain (g/d)	90.1 (b)	92.3 (a)	90.1 (b)	0.074
Mortality (%)	4.3	3.6	0.0	0.364
Feed conversion ratio (g/g)	1.381 [b]	1.411 [a]	1.406 [a]	0.034
Feed intake (g/d)	124.4 [b]	130.2 [a]	126.7 [a]	0.008
Water/feed ratio	1.88	1.83	1.83	0.269
Water intake (ml/d)	233.6	238.6	232.0	0.255
FCR 3850g[1]	1.389	1.390	1.413	0.374

Technical performance (Table 3)

Compared to birds on control diet:

- Higher feed intake and body weight gain in PAP_1 fed birds
- Higher FCR in PAP_1 birds; similar FCR corrected to 3850 g BW
- Higher FCR in PAP_2 birds; similar FCR corrected to 3850 g BW

Results of other parameters

- No effects of PAPs on litter quality, footpad lesions and gait score
- No effects of PAPs on villus height, crypt depth, and nr. of goblet cells
- No effects of PAPs on Ca, P, alkaline phosphatase and 1,25 Vit. D_3 in blood. Increased PTH level in PAP_2 fed birds
- No effects on tibia quality at 42 d of age, but at day 28 thicker and stronger tibia in PAP_1 fed birds

Conclusions

- Differences in processing method affected nutritional value of PAPs
- Replacement of SBM by PAPs (40% in starter, 30% in grower and 20% in finisher phase) is possible without compromising performance, visual litter quality, footpad lesions, gait score, blood parameters, gut integrity, and bone quality

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