Effect of enzymatically treated soybean meal and conventional soybean meal on oxidative status in piglets

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Background and objectives: SBM is an important protein source but contains anti-nutritional factors (ANF) limiting its use in young animals. Advanced processing, such as enzymatic treatment, can reduce these ANFs. Weaning is known to result in oxidative stress and increased blood concentrations of acute phase proteins (1). Soy antigens like beta-conglycinin in feed material additionally contribute to these problems (2). We hypothesized that feeding enzymatically treated SBM (ESBM) to weaned piglets would reduce oxidative stress and inflammatory processes when compared to diets containing untreated SBM.

Material and Methods: 128 weaned piglets (Danbred x Pietrain, average weight 7.5 kg, kept in 32 pens) were fed either a commercial SBM-based diet or a diet containing 136 g/kg of ESBM (HP300, Hamlet Protein, Horsens, DK) instead of SBM from day 1-21 after weaning (phase 1). Thereafter, all pigs were fed a commercial SBM based diet (phase 2, day 22-42). Diets were balanced for amino acids and energy. Feed and water were available *ad libitum*. Average daily gain and feed intake were determined per pen at day 7, 14, 21 and 42. Blood samples were taken on day 21 from 10 piglets per treatment from the *V. jugularis externa* and analyzed for haptoglobin (Hp), dROM (Derivatives of Reactive Oxygen Metabolites), TBARS (ThioBarbituric Acid-Reactive Substances), AOPP (Advanced Oxidized Protein Products) and alpha-tocopherol. Analysis of variance (ANOVA) was performed using IBM SPSS Statistics for Windows (Version 21.0).

Results: Feeding ESBM resulted in a trend (P=0.08) for improved average daily gain in phase 2 compared to SBM (542 g vs. 505 g). Daily weight gain during the whole trial period was not different between groups (376 g in ESBM and 358 g in SBM, P=0.28). Values for dROMS and TBARS did not differ between groups but AOPP, a measure for oxidative protein damage, was lower in the ESBM group (62.3 mg/L vs. 85.5 mg/L, P=0.012). Similarly, the acute phase protein Hp, an inflammation marker, was lower in ESBM than in SBM fed piglets (1.00 mg/L vs. 1.74 mg/L, P=0.028). The lower concentrations of Hp and AOPP in ESBM-fed versus SBM-fed piglets indicate that using ESBM may reduce proinflammatory and protein oxidizing reactions. In view of the competition between growth and immune defense for energy and amino acids (3), ESBM-fed piglets may thus have more nutrients available for growth, explaining the improved weight gain in ESBM fed piglets even though not significant.

Variable	SBM	ESBM	SEM	P-value
dROM (µg/mL H_2O_2)	169	170	10.56	0.948
TBARS (nM)	300	287	9.76	0.523
α-tocopherol (mg/L)	2.49	3.01	0.188	0.168
AOPP (mg/L)	85.5[a]	62.3[b]	6.875	0.012
Haptoglobin (mg/mL)	1.74[a]	1.00[b]	0.172	0.028

[a,b] Values without common superscript letters are different (P≤0.05).

Conclusion and discussion: The inclusion of ESBM instead of SBM in diets for weaning pigs can be a suitable method to reduce oxidative stress and inflammatory processes and related performance losses in weaning pigs. However, the mode of action has to be clarified in further studies.

References:

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