

From Discovery to Development

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animal



Standardized ileal amino acid digestibility of faba bean, dehulled faba bean, peas, rapeseed meal, sunflower meal and three batches of soybean meal fed to growing pigs

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Introduction

There is a growing interest to replace soybean meal with other protein sources in diets for pigs. Rapeseed meal, sunflower meal, faba beans, dehulled faba bean, and peas are available alternatives, that are less extensively studied, compared to soybean meal.

In addition, Danish recommendations of standardized ileal digestible (SID) amino acids (AA) in pig feed are determined in dose-response trials using soybean meal as the primary protein source. As a consequence, inclusion of alternatives requires accurate values of SID AA for both soybean meal and the alternative protein sources to sustain an accurate AA supply and feed conversion rates.

Objective

The objective was to determine SID AA in three batches of soybean meal and alternatives to soybean meal and thereby enable the use of locally grown protein in pig diets without compromising an accurate supply of digestible AA.

Materials and Methods

In each of two experiments (Exp), eleven growing pigs were ileal cannulated at a BW of 33 kg to determine standardized ileal amino acid digestibility of different protein sources.

After surgery and recovery period, the pigs were used in a Youden square design with five groups (diets) and 8 time periods.

In each period, pigs were adapted to the diets for 5 days followed by two days of continuously ileal digesta collection for 9 hours per day.

Pigs were fed a cornstarch-based diets with following ingredients as the sole amino acid (AA) source in the two experiments (Exp-I and Exp-II):

Experiment-I (Exp-I):

- SBM-1:** 32% soybean meal-1
- RSM:** 43% Rapeseed meal
- FB:** 64% Faba bean
- PEA:** 78% Peas

Experiment-II (Exp-II):

- SBM-2:** 35% soybean meal-2
- SBM-3:** 34% Soybean meal-3
- SFM:** 46% Sunflower meal
- DFB:** 60% Dehulled faba bean

The number of replicates were 15 (SBM-1, SBM-3, SFM, FB, DFB, PEA) or 16 (SBM-2, RSM).

Pigs were fed 43 g/kg BW. Yttrium in feed and feces (included in feed as Yttrium oxide at 0.508 g/kg) was used as indigestible marker to calculate apparent ileal digestibility (AID) of AA.

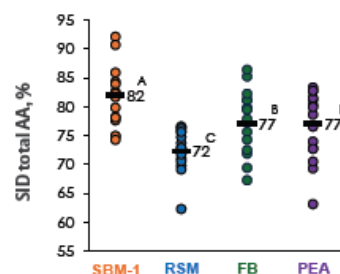


Figure 1. SID total AA for soybean meal (SBM-1), rapeseed meal (RSM), faba beans (FB) and Peas (PEA) determined in Exp-I. Individual measurements of SID total AA are illustrated in colored circles and average values illustrated by black horizontal line for each ingredient. Differences between averages ($P < 0.05$) are indicated with different letters (A, B, C).

Standardized ileal digestibility (SID) of crude protein and amino acids was calculated based on AID and the determined basal endogenous loss (16.2 g total AA/kg DM).

The initial and final BW of pigs was 36 and 57 kg in Exp-I and 38 and 64 kg in Exp-II.

Basal endogenous losses of protein and amino acids were measured using nitrogen-free diets in Exp-I ($n=18$) and in Exp-II ($n=20$).

Statistical analysis was conducted including dietary group and body weight within dietary group as fixed effects and the pig and period as random effects.

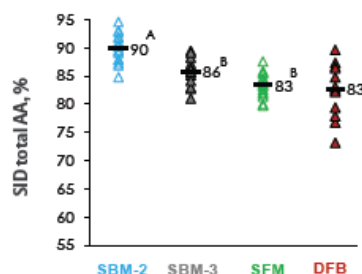


Figure 2. SID total AA for soybean meal (SBM-2 and SBM-3), sunflower meal (SFM) and dehulled faba beans (DFB) in Exp-II. Individual measurements of SID total AA are illustrated in colored triangles and average values illustrated by black horizontal line for each ingredient. Differences between averages ($P < 0.05$) are indicated with different letters (A, B, C).

Results

In Exp-I, SID of total AA was greatest ($P < 0.05$) for SBM-1 (82%), intermediate for PEA (77%) and FB (77%) and lowest for RSM (72%).

In Exp-II, SID of total AA was greater in SBM-2 (90%) than in the remaining ingredients ($P < 0.05$), where SID of total AA was 86% for SBM-3, 83% for DFB, and 83% for SFM.

Discussion

The observed variation in SID total AA between batches of soybean meal may be an effect of variation in processing.

Dehulling of faba beans appears to improve SID total AA by approx. 5 %-units.

Conclusion

In conclusion, SID of total AA of the three studied batches of SBM varied from 82% to 90%.

SID of total AA of FB was 77% and 83% in DFB.



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