Comparative efficacy of L-methionine and DL-methionine in piglets

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Effect of feed form and particle size on diet digestibility in pigs

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The effect of feed form and particle size on diet digestibility in pigs was investigated. Thirty two pigs were offered one of four dietary treatments. All diets were the same and based on barley, wheat and soya with 13.6 MJ/kg digestible energy (DE), 167 g/kg crude protein (CP) and 9.5 g/kg Lysine. In a 2×2 factorial design diets were in either meal or steam pellet form and were ground to attain a fine (13% 1.4-2.0 mm, 59% 0.5-1.4 mm, 28% <0.5 mm) or coarse (34% 1.4-2.0 mm, 41% 0.5-1.4 mm, 18% <0.5 mm) particle size profile. The average start weight of pigs was 44.8 kg and they were housed in metabolism crates for 14 days (7 days pre-feed + 7 days total collection period of faeces). Diet and faeces samples were analysed for digestibility of dry matter (DM), CP, ash and energy. Proximate analyses used the methods outlined by the Association of Official Analytical Chemists. Gross energy was determined using a bomb calorimeter. Data was analysed according to the experimental design using Analysis of Variance in Genstat V 10. There was no interaction (P>0.05) between particle size and feed form. Pelleting of the diet improved DM digestibility (85.1%) and DE content (15.4 MJ/kg DM) (both P<0.05) compared with feed in meal form (84.2% and 15.2 MJ/kg DM, respectively). CP digestibility was improved (P<0.05) when the diet with a fine particle size profile was offered (84.0%) compared with the coarse particle size diet (81.5%). DM digestibility (P=0.051) and DE content (P=0.094) also tended to be improved when the diet with a fine particle size profile was offered (85.1% and 15.4 MJ/kg DM respectively) compared with the coarse particle size diet (84.2% and 15.2 MJ/kg respectively). The cumulative effect of pelleting and fine grinding improved diet DE content by 0.4 MJ/kg DM compared to the same diet in meal form with a coarse particle size profile.

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Methionine (Met) is an essential amino acid and a component of structural and functional body proteins. As a sulfur-containing amino acid, Met can transfer its sulfur group to serine to synthesize cysteine. Methionine is also implicated in methylation reactions. Methionine can be provided by dietary protein or by isomers (DL-Met) or analogues (DL-HMB) of L-Met. D-Met and DL-HMB have to be converted by the animal to L-Met to be biologically active. Although a large number of studies have been carried out comparing the efficiencies of DL-Met and DL-HMB, little information is available on the efficiency of L-Met. The objective of this study was to compare the efficiency of L-Met (obtained by fermentation) relative to that of DL-Met (obtained by chemical synthesis) in 77 individually-housed 12-25 kg piglets. The study was carried out with 7 treatments including a basal diet deficient in Met (based on barley, corn and pea protein) and 3 diets with 3 levels of additional L-Met or DL-Met. The standardized ileal digestible Met:Lys levels ranged from 20 to 35% and the (Met+Cys):Lys levels from 42 to 57%; the Lys supply was sublimiting (1.0%). Feed intake, daily gain and feed efficiency were used as response criteria. They increased curvilinearly with increasing levels of both sources of Met and attained a plateau at the highest levels of supplementation with no effect of the source of Met. A bent-stick model was used to estimate the efficiency of L-Met utilization. The model was parameterized to allow for different response trajectories between L-Met and DL-Met. The estimated efficiencies of L-Met relative to that of DL-Met were 1.15±0.12, 1.12±0.09 and 0.99±0.12 for feed intake, daily gain and feed efficiency, respectively. None of these values differed significantly from 1, indicating L-Met and DL-Met can be used equally efficiently as a Met source for growth in piglets.