

Comparison of bioavailability of methionine-hydroxy analogue versus DL-methionine

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Methionine (MET) is supplemented in swine diets using DL-methionine (DLM) or methionine-hydroxy analogue free acid (MHA-FA). The bioavailability of MHA-FA is under debate. The objective of this experiment was to determine the bioavailability of MHA-FA for protein synthesis, relative to DLM, using the indicator amino acid oxidation technique (IAAO) in a slope-ratio assay.

Six barrows (BW 21.1 kg) received each of the 7 diets in random order. The base diet contained corn (58%), soybean meal (5%), peas (5%), whey (10%) and spray-dried plasma (5%) and provided, by total amino acid analysis, 1.21% lysine, 0.20% MET and 0.31% cysteine. Using the base diet, 6 diets were formulated containing added DLM (0.03, 0.05 and 0.07%) or MHA-FA (0.029, 0.058 or 0.107%) as analyzed. Diets were offered at 95g/kg^{0.75} BW. IAAO was determined during 4-h studies, after 3 d adaptation to each diet, where pigs were fed ½-hourly meals equal to 1/32 of their daily feed allowance. Each meal was mixed with 258.7 kBq ±2.6 of L-[1-¹⁴C]phenylalanine with a prime of 3.5 times the 1/2-hourly dose added to the first meal. Bioavailability was calculated as change in the rate of indicator oxidation for MHA-FA divided by that for DLM. Added MHA-FA initially supported a decrease in IAAO similar to DLM, but was less effective at greater levels of supplementation. The decrease in IAAO was greater ($P = 0.012$) for DLM (1.488 ±0.215% per mmol) than for MHA-FA (1.107 ±0.152% per mmol) added to the base diet. The ratio of these slopes resulted in a bioavailability of 74.4% for MHA-FA, relative to DLM on an equimolar basis. When expressed on a product basis (MHA-FA at 88% dry matter, DLM at 99% purity), DLM supported a greater response in IAAO than MHA-FA ($P = 0.004$). The ratio of slopes resulted in a bioavailability of MHA-FA, relative to DLM of 65.7% on a product basis.

Implications: These results indicate a lower bioavailability of MHA-FA for protein synthesis in growing pigs compared to that of DLM on both an equimolar and a product basis. (Supported by Degussa AG.)