

# Small intestinal utilization of branched chain amino acids (BCAA) in market weight pigs

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The BCAA [isoleucine(ILE), leucine(LEU) and valine(VAL)] are dietary essential amino acids. BCAA are known to be extensively involved in regulating protein synthesis and energy metabolism in muscle. We previously discovered that BCAA are metabolized in the pig gut (*Advances in Pork Production 12:A26, 2001*). However, their role in the pig gut is unknown.

**Study Design and Results:** Catabolism of the BCAA is initiated by a reversible transamination reaction catalyzed by branched chain amino transferase (BCAT) to form the ketoacids followed by irreversible oxidative decarboxylation. Mitochondria were obtained from enterocytes (intestinal cells), liver and heart of 120kg pigs. BCAT activity and BCAA oxidation studies were conducted in-vitro using 1- <sup>14</sup>C-labeled LEU, VAL, ILE and KIC (ketoacid of LEU) in liver and enterocytes. Enterocyte BCAT activity was highest in heart (2.55 ± 0.11 µmol /min/mg protein). Enterocytes and liver showed 20 and 60%, respectively, of heart mitochondrial BCAT activity. Oxidation of <sup>14</sup>C-LEU and <sup>14</sup>C-KIC were significantly higher than <sup>14</sup>C-VAL and <sup>14</sup>C-ILE in enterocytes;

Tissue	ILE	VAL	LEU	KIC
nmol/mg protein/hr				
Enterocyte	0.4±0.2	0.6±0.2	4.3±2.2	3.9±1.7
Liver mito	4.6±2.3	5.9±2.4	17.9±4.8	43.9±20.2

**Implications:** A significant proportion of whole body catabolism of BCAA, particularly of LEU and KIC, takes place in the small intestine in finishing pigs. LEU is probably providing a significant source of intracellular energy to the gut cells. In gut stressed pigs, supplementation of BCAA in swine diets may be of benefit in maintaining and improving gut health.

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