

THEME 7 | NONRUMINANT NUTRITION AND PRODUCTION

Lysine, threonine and tryptophan postprandial metabolism in LPS-challenged growing pigs

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Sanitary challenges and/or immune system activation are associated with decreased voluntary feed intake, increased metabolic rate and energy expenditure, and alterations on nutrient utilization in growing pigs. As a consequence, animals weight gain and feed efficiency are negatively impacted in such conditions. The aim of this study was then to evaluate the effects of an inflammatory challenge caused by repeated injections of *Escherichia coli* lipopolysaccharide (LPS) on lysine, threonine and tryptophan postprandial metabolism. Fourteen growing pigs fitted with a jugular catheter were housed in a temperature-controlled room in which ambient temperature was maintained constant at 24°C. The experimental period lasted 17 days that was subdivided in a seven days period before and a 10 days period during the inflammatory challenge that consisted in five repeated injections of LPS at two days intervals. The initial dose of 30 µg/kg of body weight was increased by 12% at each subsequent injection to circumvent adaptive endotoxin resistance to the repeated inflammatory stimuli. Before the LPS- challenge (baseline), and 24h after the second (T1) and the fourth (T2) LPS injections, 300 g of feed was given to pigs previously fasted overnight and serial blood samples were taken over four-hours to measure plasma amino acids concentrations. Amino acids postprandial concentrations were analyzed using the linear MIXED procedure of SAS including the fixed effects of time points (baseline, T1 or T2). Relative to baseline, postprandial concentrations of lysine were lower at T1 and greater at T2. In addition, the LPS-challenge induced a long-lasting (at T1 and T2) reduction in plasma postprandial concentrations of threonine and tryptophan. Firstly, these results suggest a short-term increased utilization of lysine to be used as energy source during the LPS-challenge. Then, lysine demand decreases in association with a lower protein synthesis for growth. Secondly, they evidence an increased threonine and tryptophan metabolic demand to support the requirements of the immune response. For instance, the immune system activation induces the synthesis of acute phase proteins that, in turn, have greater amounts of threonine and tryptophan in their compositions. Finally, our evidences that an inflammatory challenge caused by LPS leads to significant changes on amino acids metabolism and partitioning. induces significant changes in the postprandial metabolism of growing pigs. These findings may contribute to redefine pigs nutritional requirements during inflammatory and/or immune challenges.

Keywords: amino acids, inflammation, metabolism, nutrition, physiology

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