

6A-102: Influence of nutrient asynchrony on finisher growth performance and feed efficiency

Project Leader Dr Cherie Collins

Project Participants Jae Cheol Kim², Peter Sopade³, M.J. Gidley³, Hugh Payne², Bruce Mullan², and David Henman¹.

¹Rivalea (Australia) Pty Ltd; ²Department of Agriculture and Food of Western Australia; ³Queensland Alliance for Agriculture and Food Innovation, Centre for Nutrition & Food Sciences, University of Queensland

Aims and Objectives

Maximising the efficiency for which pigs utilise nutrients for weight gain is critical for profitable pork production. There is evidence that the asynchronous supply of amino acids and glucose in the small intestine may reduce protein utilisation and therefore the efficiency for which feed nutrients are utilised for lean tissue deposition. The aim of this investigation was to determine if finisher feed efficiency could be altered by selecting ingredients with differing rates of starch and protein digestion resulting in diets with synchronous or asynchronous nutrient supply

Key Findings

An initial screening study was undertaken to select ingredients that differed markedly in their starch and protein digestion rates. Based on these results, combinations of three starch sources (slowly digestible starch (SDS, sorghum), moderately digestible starch (MDS, wheat) and fast digestible starch (FDS, barley)) and two amino acid sources (highly digestible amino acids (HDAA, casein) and moderately digestible amino acids (MDAA, vegetable protein - soyabean/canola meal)) were used to create 6 diets differing in their synchrony of glucose and amino acid supply to the small intestine.

A nitrogen balance study was conducted to determine the influence of nutrient synchrony on nitrogen retention rate, with the results indicating a combination of fast digestible starch and highly digestible amino acids improved nitrogen retention rate compared with the combination of slowly digestible starch and moderately digestible amino acids.

A follow up study investigated the impact of these diets on finisher performance. Pigs were individually housed and the diets offered in two meals per day to 95 % of *ad libitum* intakes. Growth performance and feed efficiency were improved when pigs were offered the moderately digestible starch/ highly digestible amino acid diet (wheat/casein based diet). The most commercially relevant combinations of fast- moderate- or slowly digestible starch with moderately digestible amino acids (soyabean/canola meal) revealed that rate of gain, feed efficiency and change in P2 back fat was numerically superior (not significant) when pigs were offered the MDS +MDAA diet.

Application to Industry

The combination of fast digestible starch and highly digestible amino acids improved nitrogen retention rate compared with the combination of slowly digestible starch and moderately digestible amino acids. However, superior growth performance and feed efficiency outcomes were obtained with the use of moderately digestible starch (wheat) with either the highly digestible amino acids (casein) or the moderately digestible amino acids (canola meal/soyabean meal).

Based on these results and the unlikely commercial use of casein in finisher pig diets, the MDS+MDAA diet combination is recommended to minimize any negative effects of nutrient asynchrony on the performance of finisher pigs. It is also recognised that the effects of asynchronous nutrient supply is likely much less in animals that are offered feed *ad libitum* and graze continually throughout the day.