Determining the effects of full versus limit on pig perform

Feeding a little less in the pig's growing phase can stimulate quick gain in the finishing period – and provide other benefits

by TREENA HEIN

Most on-farm feeding systems try to maximize feed intake during the growing and finishing periods. By doing so, swine producers are able to maximize pig growth rates to their genetic potential.

However, limit feeding – giving less feed than the pig would normally consume – has been shown to stimulate compensatory gain during the finishing period. Previous research has also indicated improved feed digestibility, efficiency of protein (meat) synthesis and measurements of meat quality when pigs were limit-fed during the growing period.

To investigate further, University of Guelph researchers Phil McEwen (Livestock Research Specialist, Ridgetown Campus), Dr. Ira Mandell (Department of Animal and Poultry Science) and Dr. Peter Purslow (Department of Food Science) conducted recent investigations into the performance and economic ramifications of limit feeding during the growing phase. Carcass and meat quality parameters were also examined to determine if limit feeding improved meat tenderness, while maintaining or reducing external fat deposition.

"We wanted to determine the effects of feeding strategy (full versus limit feeding) on pig performance, feed intake and efficiency, carcass and meat characteristics and economic returns," says McEwen. "We also wanted to determine if feeding strategy results were similar for both barrows and gilts."

The first trial involved 108 feeder pigs with average initial weights of 33 kilograms each. One diet which met or exceeded National Research Council recommendations for essential amino acids, minerals and vitamins was fed to all pigs for the duration of the experiment. The control group was full fed until the pigs were marketed at approximately 110 kilograms. The limit-fed groups were given 85 and 70 per cent of that consumed by the control group until the pigs weighed 60 kilograms. Thereafter, both groups were fed ad libitum until they reached market weight.

"Weight gain and feed intake measurements were recorded weekly," says McEwen. "Differences in growth performance (gains, dry matter intake and efficiency), carcass and meat quality characteristics were evaluated, and a detailed cost analysis was also completed to determine the economic ramifications of each feeding strategy."

After reaching market weight, the pigs were shipped to an abattoir and processed. Hot carcass weights were recorded prior to overnight chilling at 1 C. Estimates of carcass lean content were then taken, and an experienced evaluator measured fat and muscle depth, loin eye area, marbling and colour. Factors such as pH, intramuscular fat content and shear force were subsequently analyzed.

During the second and third experiments, one level of limit feeding was investigated – 70 per cent of full feed intake on a percentage of body weight basis. The level of restriction was increased with gender feed intake differences considered. A more conventional finisher diet was fed to the control and to one limit-fed group, while the remaining pigs were fed a high-lysine diet after reaching 60 kilograms body weight. Similar performance, carcass and meat quality measurements were again recorded.

During the three trials, the researchers found an overall improvement in feed efficiency of 0.2 kilograms when pigs were limit fed during the growing period followed by ad libitum intake. "As a result, a $3 cost savings (feed + housing) per pig marketed was achieved in trial one," says McEwen, "while total costs were similar for limit fed pigs (30 to 60 kilograms) during the other experiments." Similar days–to-market were observed during the first trial, while limit fed pigs were marketed a week later during the final two experiments, negating the feed cost savings.

Carcass fat depth was similar to control pigs during the final two trials while fat depth was increased during the first experiment. "Our results contradict previous findings where leaner carcasses were reported," says McEwen. "Compensatory fat deposition was observed during our studies as limit fed pigs were consistently leaner before full feeding was initiated."

Most meat quality measurements were unaffected by feeding strategy. A reduced shear force (more tender) measurement was observed for limit-fed pigs during the first trial only.

"As described by other researchers several years ago," concludes McEwen, "we found that the length of time on full feed intake, in the final two experiments, was probably not sufficient to maximize muscle protein degradation and improve meat tenderness for the limit-fed pigs."

Future investigations are needed to indicate how both length and level of restrictive feeding are best used to optimize profit for pork farmers.

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Phil McEwen

by TREENA HEIN

This year, Phil McEwen celebrates 15 years of research and instruction at the University of Guelph's Ridgetown Campus (formerly Ridgetown College of Agricultural Technology). He is currently a College Academic Research Group professor, with teaching responsibilities in the areas of Animal Science, Beef Production and Dairy Production. McEwen has also worked at Kemptville College and Centralia College.

After obtaining an Agricultural Diploma from Kemptville College, McEwen pursued his undergraduate degree in Agriculture (Major in Animal Science, Minor in Agricultural Business) and his Master's degree, both at the University of Guelph.

McEwen's research interests include evaluating the feeding value of ethanol-manufactured co-products, such as dried distiller grains, for feeder pig and ruminant diets. "Since the level of co-product will increase greatly, there is a great potential to reduce feed costs while maintaining pork quality," he says.

McEwen also continues to focus on feeding strategies to reduce feed costs and improve production efficiency for grower/finisher pigs.

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Phil McEwen