

The role of feed in sustainable pork production: How feeding programs affect environmental impacts of pork production - Part 1

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Key Points:

- In part 1 of these science pages, we will go over the background of the impact of livestock feed on environment
- Precision diet formulation and feeding programs have been shown to reduce cost of production as well as environmental impact of pork production
- In part 2 we will share results of experiments to determine the environmental impacts of grower-finisher feeding programs, tune in next week

Nitrogen (protein) and phosphorus are the second and third most expensive components of swine diets after energy. However, the cost of these essential nutrients is much greater because only 10 to 44% of N and 34% of P in swine diets is converted into boneless edible lean pork¹. Similar inefficiencies also apply toward products from other food producing animals, and are the main reason why the global livestock and poultry industries contribute about 1/3 of total human-induced N emissions². The earth's planetary boundaries for N³ and P⁴ waste and recovery have been exceeded, which requires implementing practices that improve N² and P⁵ utilization efficiency and reduce the carbon footprint of animal production systems¹.

About 68% of N emissions² and 47% of greenhouse gas (GHG) emissions⁶, which include carbon dioxide, methane, and nitrous oxide from livestock farms are associated with feed production. Traditional swine diet formulation approaches have focused on minimizing cost while meeting energy and nutrient requirements to achieve acceptable growth performance and carcass characteristics but often with little regard toward minimizing environmental impacts.

Soybean meal continues to be an excellent dietary protein source for swine because of its complementary amino acid profile with corn and high digestible amino acid concentrations, but there are several formulation practices that can partially replace soybean meal in swine diets. Corn distillers dried grains with solubles (DDGS) is produced in large quantities and often less expensive than corn and soybean meal, and is commonly added at levels up to 30% in growing-finishing swine diets. However, high inclusion of DDGS in swine diets can result in suboptimal growth performance and carcass composition if diet formulation adjustments are not made to overcome digestible amino acid imbalances. Also, the addition of relatively high amounts of crystalline amino acids to reduced crude protein in swine diets is becoming a popular strategy to reduce the amount of soybean meal used and diet cost, but this strategy can also result in suboptimal growth performance and carcass composition.

Types and sources of feed ingredients, diet formulation approaches, and feeding practices not only affect lean gain efficiency, but also the environmental impacts of pork production. Precision diet formulation and feeding programs have been shown to reduce cost of production by more than 8%, protein and phosphorus intake by 25% and excretion by 40%, and GHG emissions by 6% through improved nutrient utilization efficiency⁷ in commercial pork production systems.

In next week's science page, we will share a series of studies (funded by the United Soybean Board) conducted to determine the N (and P) utilization efficiency and other environmental impacts of grower-finisher feeding programs containing variable amounts of soybean meal as the primary protein source, with and without 30% DDGS, crystalline amino acids, and phytase.

Stay tuned next week for Part 2

References

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