

Consequences of genetic improvements and nutrient quality on production performance in swine



Conference Report

Achieving high performance and superior meat quality with preferably low investment – and here, we speak about feed costs, which account for up to 70% of the total costs – is a considerable challenge for pig producers. The following will focus on the effects of genetic enhancements and nutrient quality on overall pig performance.

Effect of body weight and gender on protein deposition

Based on Schothorst Feed Research recommendations for tailoring nutritional strategies to enhance feed efficiency and overall productivity, the following facts must be considered:

- Castrates, boars, and gilts have significantly different nutritional requirements due to variations in growth rates, body composition, and hormonal influences. For instance, testosterone significantly impacts muscle development and protein metabolism, increasing muscle mass in

males. In contrast, ovarian hormones may inhibit muscle protein synthesis in females, contributing to differences in overall protein deposition. Boars, therefore, require higher protein levels to support muscle growth. Castrates typically have a higher FCR compared to gilts and boars due to higher feed intake. Split-sex feeding allows for diet adjustments to optimize growth rates and reduce feed costs per kilogram gained.

- Different body weight ranges: because puberty is delayed in modern genetics, we can produce heavier pigs without compromising carcass quality. Given that a finisher pig with 80-120 kg bodyweight consumes about half of the total feed of that pig, Dr. Fledderus concluded that extra profit could be realized with an extra feed phase diet for heavy pigs. Implementing multiple finisher diets can help reduce feed costs by allowing for lower nutrient concentrations, such as reducing the net energy and standardized ileal digestible lysine in later phases, without compromising performance.

Decision-making according to feedstuff prices

Least cost formulation is commonly used by nutritionists to formulate feeds for the lowest costs possible while meeting all nutrient requirements and feedstuff restrictions at the actual market prices of feedstuffs. However, diet optimization is more complex. The real question is, "How do you formulate diets for the lowest cost per kilogram of body weight gain?" You must always consider your specific situation, as economic results vary greatly and depend mainly on the prices of pork and feed and pig growth performance (e.g., feed efficiency, slaughter weight, and lean percentage).

How can you optimize your feeding strategy? Reducing net energy (NE) value will result in more fiber entering the diet. This makes sense if fiber by-products are cheaper than cereals. In contrast, an increase in the NE value will increase the inclusion of high-quality proteins and synthetic amino acids. It will use more energy from fat and less from carbohydrates.

The effects of diet composition on meat quality and fat composition also need to be considered.

How can nutrition improve meat quality?

Nutritional strategies not only improve the sensory attributes of pork but also enhance its shelf life, ultimately leading to higher consumer satisfaction and better marketability. Some of the factors Dr Fledderus considered included:

Improving fat quality



The source of dietary fat significantly impacts the quality of pork fat. Saturated fats tend to produce firmer fat, while unsaturated fats can lead to softer, less stable fat deposits. Diets high in unsaturated fats are more prone to lipid oxidation, negatively affecting shelf life and overall meat quality. The deposition of polyunsaturated fatty acids is only from dietary fat. Saturated fats in pork, partly originates from dietary fat and are also synthesized de novo. So, the amount of polyunsaturated fatty acids in pork depends on the content and composition of dietary fat, which can negatively affect the shelf life and perception of pork meat.

The iodine value (IV) is a measure of the degree of unsaturation in fats. A higher IV indicates a higher proportion of unsaturated fatty acids, leading to softer fat. Pork fat with an IV lower than 70 is considered high quality, as it tends to be firmer and more desirable for processing.

As per the American Oil Chemists Society, IV is calculated as:

$$IV = [C16:1] \times 0.95 + [C18:1] \times 0.86 + [C18:2] \times 1.732 + [C18:3] \times 2.616 + [C20:1] \times 0.785 + [C22:1] \times 0.723$$

(brackets indicate concentration (%) of C16:1 palmitoleic acid, C18:1 oleic acid, C18:2 linoleic acid, C18:3 α -linoleic acid, C20:1 eicosenoic acid, C22:1 erucic acid per crude fat)

Implications

Dr. Fledderus concluded that the pigs' nutritional requirements are dynamic and influenced by factors such as required meat and fat quality, heat stress, slaughter weight, and genetic developments. Tailoring diets based on gender and body weight is crucial for optimizing protein deposition. Accurate information is essential to formulate diets that achieve optimum economic results, not just the least cost.

Continuous monitoring of feedstuff prices and nutritional content allows for timely adjustments in diet formulations, ensuring that producers capitalize on cost-effective ingredients while maintaining nutritional quality.

EW Nutrition's Swine Academy took place in Ho Chi Minh City and Bangkok in October 2024. Dr. Jan Fledderus, Product Manager and Consultant at the S&C team at Schothorst Feed Research, with a strong focus on continuously improving the price/quality ratio of the diets for a competitive pig sector and one of the founders of the Advanced Feed Package, was a reputable guest speaker in these events.