



BUL 1136

Management and Nutrition of Market Swine Projects in Idaho

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Contents

- 1 Introduction
- 1 Selecting a Swine Project
- 2 Housing and Animal Care
- 3 Swine Nutrition and Feeding Practices
- 5 Summary
- 5 Further Reading

Introduction

THE UNITED STATES RANKS THIRD in pork production globally, following China and the European Union (United States Department of Agriculture 2025). This is significant because pork is one of the most consumed meats worldwide, with global consumption increasing from 63.5 million tons in 1990 to 113 million tons in 2022 (Kim et al. 2024). It provides essential nutrients, including high-quality protein, thiamin, niacin, vitamin B6, riboflavin, phosphorus, zinc, and potassium (National Pork Board 2025). In addition to pork's nutritional benefits, swine body parts provide other beneficial health applications, like replacement heart valves and hormone therapy, and convert into useful by-products, including leather and glue (National Pork Board 2025; Woodmansee 2022). Consequently, youth who participate in 4-H and the National FFA Organization (FFA) swine projects participate in a vital livestock industry, making knowledge of swine's proper nutrition, feeding practices, and management essential. From selecting a project to maintaining proper nutrition, this bulletin provides the basic information youth need to know to successfully prepare swine for market as part of a 4-H project.

Selecting a Swine Project

Successful 4-H market swine projects begin with selecting the right animal. Factors such as breed, genetics, conformation, and initial body weight significantly influence growth and project outcomes. Choosing a pig that is too small may result in an underfinished animal by fair time, whereas selecting one that is too large can lead to overfinished carcasses and difficulty meeting county average daily gain (ADG) requirements. To meet market requirements for a fair, swine projects should have an initial starting weight of 80 pounds or higher and be fed a ration that supports an ADG of 1.8 pounds/day or higher.

Conformation and Structural Soundness

Understanding pig anatomy is critical when selecting a project animal. Key external body parts include the shoulder, back, loin, rump, knee, cannon bone, hocks, and pasterns. Desirable pigs exhibit

- Adequate muscle shape and expression
- Structural soundness for ease of movement
- Correctly angled joints that allow flexibility and absorb shock
- A level top and rump, high tail setting, and a sloping shoulder

Selection Considerations

Breeders provide valuable information on parent breeds, offspring performance, and carcass evaluation. First year exhibitors may prioritize a good quality pig at moderate cost. More experienced youth may invest in higher quality genetics, but success depends on combining genetics with proper management and nutrition (Whittemore 2001).

Housing and Animal Care

Proper housing is essential for pig health, welfare, and growth. Provide at least ten square feet per pig and ensure that each shelter is clean and dry to protect against temperature extremes and damp conditions (Fournier and Hines 2026). Indeed, swine are extremely sensitive to environmental conditions and have a narrow **thermoneutral zone**, the temperature range in which they do not need to use extra energy to stay warm or cool. For most growing pigs, this range is 60°F–75°F, though it varies depending on age and size (Hines 2023).

When temperatures rise above swine's comfort range, they experience heat stress and lessen their feed intake to lower metabolic heat production. Because they do not sweat effectively, pigs rely on reduced activity, faster breathing, and lower feed consumption to cool themselves. Even a few degrees above their comfort zone can decrease ADG and feed efficiency. In contrast, when pigs are too cold, they must burn additional energy to maintain body heat, leading to higher feed use but lower growth efficiency since they are using up more calories (Hines 2023).

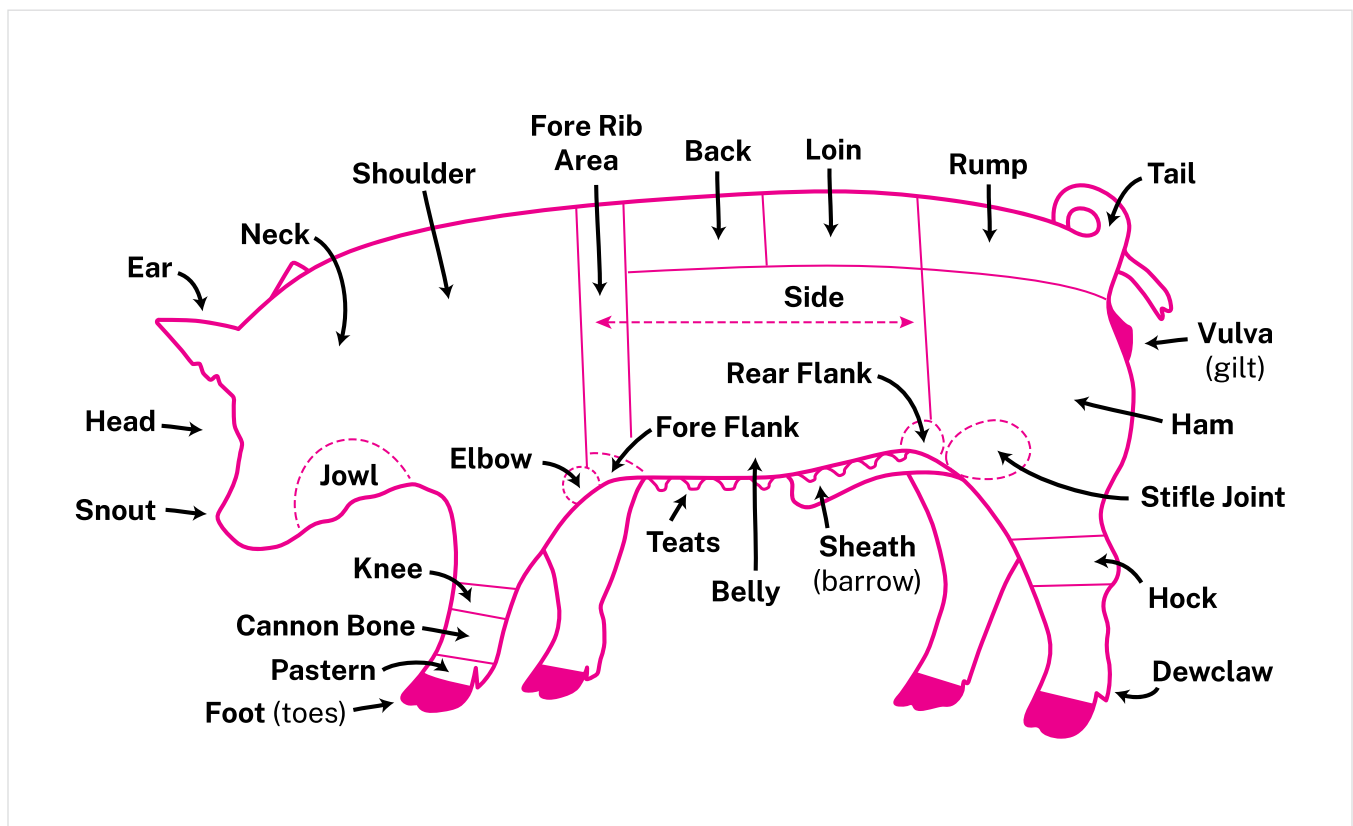


Figure 1. External parts of a pig.

Maintaining comfortable housing through proper ventilation, insulation, and bedding and access to shade or cooling systems is critical to keep pigs within their thermoneutral zone. Comfortable pigs eat more consistently, use nutrients more efficiently, and achieve higher daily weight gains while maintaining strong immune function and overall well-being.

Swine Nutrition and Feeding Practices

Digestive System and Nutrient Requirements

Swine are monogastric animals, meaning they have a single-chamber stomach and must receive certain essential amino acids and vitamins through their diet. Digestion begins in the mouth, where enzymes start to break down the feed. Food then passes through the esophagus to the stomach, where acid and enzymes further digest it, before it moves to the small intestine, where most nutrient absorption occurs. Remaining feed enters the large intestine, where water is absorbed before excretion.

Understanding swine digestion is key to designing feeding programs that promote growth, feed efficiency, and overall health (Hines 2023).

Nutrients are the basic components of feed that provide essential nourishment for maintenance, growth, and reproduction. They are divided into five categories: water, protein, energy (carbohydrates and fats), vitamins, and minerals (National Research Council [NRC] 2012).

Except for water, all nutrients are supplied through feedstuffs, whose nutrient composition varies by ingredient type, quality, and processing method (Johnson 2025). Nutrient needs change as pigs grow and are dependent on their sex and stage of production (Menegat et al. 2019a). Young, growing animals require more protein and energy for tissue development, while pregnant and lactating breeding stock experience increased nutrient demands to support fetal growth and milk production (NRC 2012).

Balancing nutrient intake for each life stage is essential for maintaining optimal growth, reproduction, and animal health.

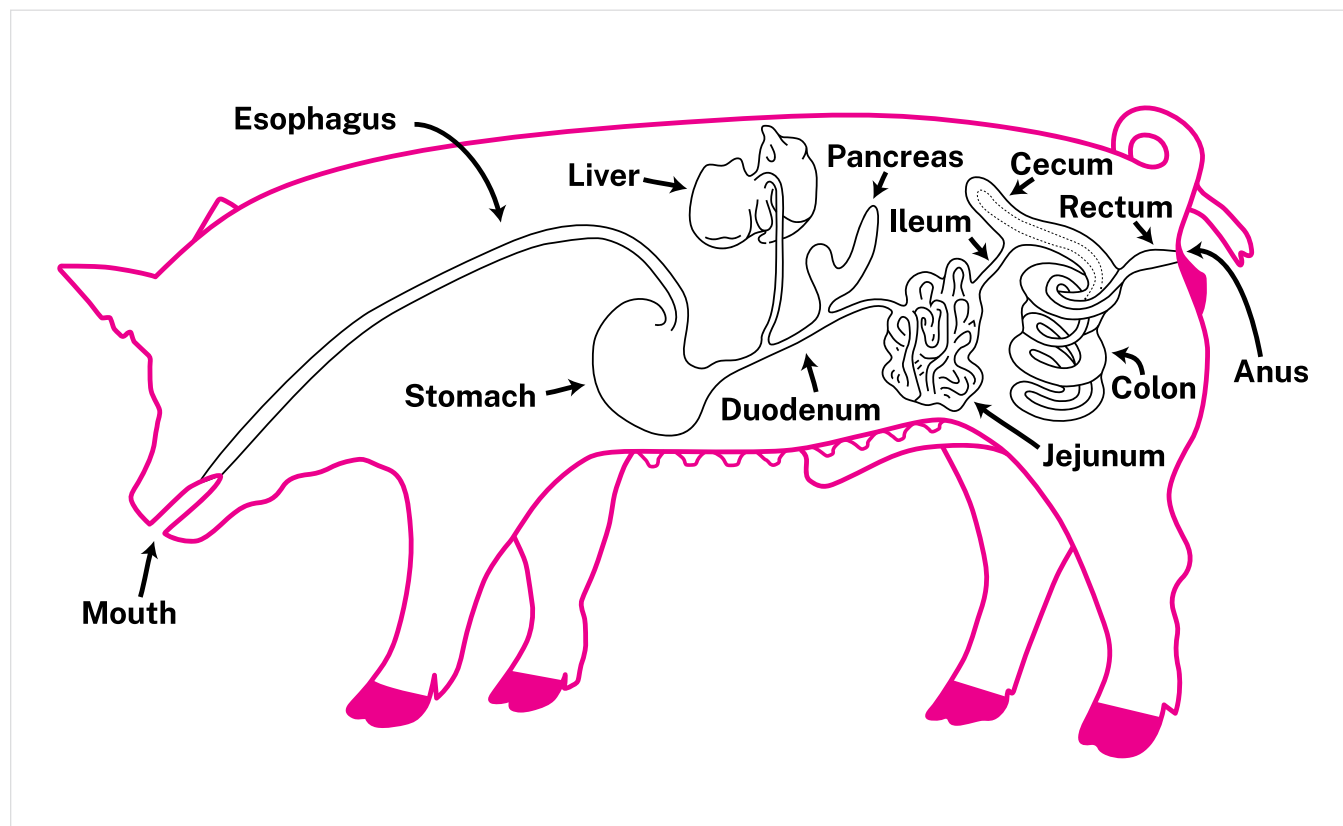


Figure 2. Digestive system of a pig.

Nutrient Categories

- 1. Water:** Water is critical for nutrient transport, temperature regulation, and waste removal. Pigs typically consume approximately three pounds of water per pound of feed (Augenstein et al. 2024).
- 2. Protein and Amino Acids:** Proteins are composed of building blocks called amino acids, which support muscle growth, enzyme production, hormone function, and tissue repair (NRC 2012). Some amino acids are essential and must be provided in the diet. If even one essential amino acid is lacking, protein synthesis slows, leading to a **reduction in growth performance**, often described as the “rain barrel” concept (Menegat et al. 2019d). For example, corn-based swine diets are often low in lysine, an essential amino acid. Pig farmers who rely on corn to feed their herds must supplement the foodstuff they provide, commonly through soybean meal or synthetic amino acids (Cromwell 2009).
- 3. Energy (Carbohydrates and Fats):** Energy fuels growth and maintenance. Common sources include corn, sorghum, and wheat. Fat provides approximately 2.25 times more energy than carbohydrates. Excess energy is stored as body fat, which affects carcass composition. Although protein can supply energy, it is less economical

than grain or fat sources. Diets should meet, but not exceed, energy requirements to promote efficient growth (NRC 2012).

- 4. Vitamins and Minerals:** Vitamins support metabolism, immunity, reproduction, and tissue health. Fat-soluble vitamins (A, D, E, K) can be stored in the body, while water-soluble vitamins must be supplied regularly (Menegat et al. 2019b). Minerals are divided into macro minerals (calcium, phosphorus, sodium) and micro minerals (iron, copper, zinc, manganese, iodine, selenium). These nutrients support skeletal developments and metabolic functions. Grain-based diets are naturally low in several minerals and some vitamins. A complete commercial feed typically meets these requirements. However, when mixing rations at home, appropriate vitamin and mineral supplementation is necessary to prevent deficiencies and support proper growth (Menegat et al. 2019b, 2019c).

Feeding Management

Feed Types

- **Complete feeds** provide all required nutrients and are convenient for most youth projects.
- **Formulated diets** are customized by weight and growth stage and may require additional supplementation.

Feeding Strategies

- **Free Choice (starter/grower phases):** Feed is always available; young growing pigs may consume up to 5% of body weight in feed. Clean feeders frequently and remove fine feed dust to maintain intake.
- **Hand Feeding (finishing phase):** Controlled feeding (approximately 3% of body weight for a 220 pound pig) helps manage growth rate and carcass composition. Offering 4–6 smaller meals per day may improve intake.

Weighing and Separating Pigs

Regular weighing allows exhibitors to monitor ADG and adjust feeding programs as needed. Separating pigs by size or gender reduces competition. **Gilts** (a young female swine) typically require slightly higher amino acid levels to support lean growth, while **barrows** (a male hog castrated before sexual maturity) often consume more feed and deposit fat more readily.

Table 1. Selected nutrient requirements for grower-finisher pigs.

Nutrient (% or unit/kg of diet, 90% dry matter)	Pig Weight (lb)			
	55–110	110–165	165–220	220–300
Crude Protein, %	19.3	17.1	15.2	13.4
Lysine, %	1.12	0.97	0.84	0.71
Calcium, %	0.66	0.52	0.47	0.43
Phosphorus, total (%)	0.56	0.52	0.47	0.43
Potassium, %	0.23	0.19	0.17	0.17
Sodium, %	0.10	0.10	0.10	0.10
Copper, mg/kg (ppm)	4.00	35.0	3.00	3.00
Zinc, mg/kg (ppm)	60	50	50	50

Adapted from the “Dietary Nutrient Requirements of Growing Pigs Allowed Ad Lib Feed (90% dry matter)” table (NRC. 2012. *Nutrient Requirements of Swine*. 11th ed. Washington, DC: National Academies Press).

Table 2. Minimum feed recommendations for pig maintenance.

Body Weight Range (lb)	Amount of Feed Per Day (lb)
25–56	2.10
56–168	3.5–5.0
168–224	5.81
224–302	6.47

Adapted from the “Dietary Nutrient Requirements of Growing Pigs Allowed Ad Lib Feed (90% dry matter)” table (NRC. 2012. *Nutrient Requirements of Swine*. 11th ed. Washington, DC: National Academies Press).

Table 2 lists the minimum amount of feed required to meet the maintenance requirements of swine. Feeding below these levels may prevent pigs from meeting basic nutrient needs. Additional feed above maintenance is required to support proper growth and finishing.

Summary

Successful 4-H and FFA market swine projects rely on sound nutrition, appropriate housing, and consistent management. Providing fresh water, high-quality feed, and comfortable environmental conditions allows pigs to reach market weight efficiently and healthily.

Understanding nutrient requirements, particularly proper protein balance, adequate energy intake, and sufficient vitamin and mineral supplementation support optimal growth and lean muscle development. Youth exhibitors, parents, and leaders are encouraged to consult their local Extension educator or feed nutrition specialists when designing feeding programs.

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