

## Protein (Amino Acids)

Pigs in fact do not specifically need protein, but rather require amino acids for the formation of muscle and other body proteins. Amino acids must be provided in the diet at a precise proportion and are constantly changing in order to meet the pig's requirement for the development of the body proteins. The amino acid lysine is generally the first to be deficient in a cereal grain-soybean meal mixture. Therefore swine diets are formulated to a specific lysine requirement, resulting in the other amino acids being in excess. Supplementing a low-protein combinations and/or "synthetic" diet with amino acids such as lysine HCl (78.8% lysine) is oftentimes more cost effective than using an additional amount of a particular protein source.



## Minerals (Micro and Macro Minerals)

It is essential that the pig's diet be **balanced** using supplemental mineral sources. The macrominerals calcium, phosphorus, and magnesium are involved in bone development and serve in many metabolic functions, mainly energy metabolism. A decreased calcium and phosphorus ratio (<2:1) could lead to rickets in piglets and osteoporosis in adult pigs. Too much calcium interferes with zinc absorption leading to the skin disorder parakeratosis. Macrominerals sodium, potassium, and chloride are involved in nutrient transfer across cell membranes, body pH regulation, water balance, and digestion. If a diet is deficient of sodium, pigs have low performance rates. Generally, magnesium, potassium, and sulfur do not need to be added to swine diets.

The rest of the minerals are required in low concentration and are called trace or micro Minerals. Mineral bioavailability; absorption and transport into the cells is important for the trace mineral sources. Several factors can influence mineral bioavailability; the chemical form of the mineral, the amount provided in the diet, the amount stored in the body, the age and health of the pig, and the concentration of other minerals in the diet. These minerals are often involved in the structure of hormones and metabolic enzymes. Although these trace minerals are present in grains and by-products, iron, zinc, copper, selenium, and iodine need to be supplemented in most pig rations.



To prevent anemia in newborn piglets, an injection or oral iron booster is essential, as the sow's milk is low in iron. Nickel, silicon, vanadium, and arsenic have not been shown to be dietary essentials for the pig, but they are found in the body. The role of chromium as a dietary essential is currently unclear.



## Vitamins (Fat and Water soluble)

Vitamins are required for normal health, growth, reproduction and maintenance. Water soluble vitamins B12, C, riboflavin, niacin, pantothenic acid, choline, folic acid, pyridoxine and thiamin, are generally deficient in a pig's diet. Water soluble vitamins are used for metabolic purposes with the amount needed equal to the amount of feed or energy consumed.

Fat-soluble vitamins K, E, D and A are typically added to the pigs diet. Deficiency of vitamin K can lead to prolonged bleeding, lameness's and listless pigs.

Purchasing a combination vitamin-mineral premix will result in more loss of vitamin activity vs. if the vitamin and mineral premixes were stored separately.



## Water

Decreased water consumption leads to reduced feed consumption, limited growth, decreased feed efficiency and decreased milk production in sows. In younger pigs 70% - 90% of the body weight is water, in adult pigs 55% of body weight is made up of water. An adult pig will drink 2 -5 gallons per 100 lbs. of water a day. The pigs need for water increases if it has diarrhea, fever, is lactating, has increased environmental temperature or high salt intake. Free access to clean water at all times near feeders is the most desirable situation for pigs.

**It is important to feed balanced diet to meet a pig's nutritional requirement. Requirements can vary due to genetics, environment, herd health, management. Feed represents 60 – 75% to the total cost of pork production. Feeding the required and balanced amino acids, carbohydrates, vitamins, minerals and providing fresh water will maximize profit in a pig operation. When creating a balanced feed for your swine operation, consult your professional nutritionist or veterinarian to help you obtain highest quality nutrition for a profitable pig operation.**



### **Energy (Carbohydrates and Fats)**

Energy must be provided above and beyond maintenance levels to achieve optimum growth and reproduction. Energy is released by the metabolism of carbohydrates and fats. The major source of dietary energy for the growing pig is from the carbohydrates of grains or their by-products. Feed such as corn, sorghum, and wheat contain high percentages of carbohydrates. Cereal grains such as barley also contain starch as their predominant energy source, but they also contain higher levels of the complex (fiber) carbohydrates that have a low digestibility. Fats provide 2.25 times more energy than a carbohydrate and are the most concentrated source of dietary energy to the body. The percent of fat in most cereal grains is less than the carbohydrate. Fat sources from soybean oil are an excellent choice, as other choices become rancid easily. Addition of fats to the pig's diet will improve feed conversion and rate gains, but can also add back fat. The presence of fat in the intestinal tract is essential for the absorption of fat-soluble vitamins.



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## General Nutrition for Swine

