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SWINE NEWSLETTER

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By-Product Ingredients for Swine Diets

Introduction. Reductions in the cost of complete feeds continue to be a primary objective for swine producers. In parts of the US, corn and soybean meal (SBM) are the lowest cost ingredients available. In other regions, a variety of by-product ingredients are available that may be used to decrease the cost of swine diets. By-products should be evaluated carefully for nutritional and cost-effectiveness before inclusion in swine feeds.

Wheat Midds. Wheat midds are a by-product of the flour milling industry. Feeding value is related to how much flour is removed from the wheat during milling. Midds higher in flour have a higher feeding value compared to midds where almost all of the flour has been removed. Midds are low in bulk density and can be hard to handle. The optimum inclusion rate of wheat midds depends on feed form (meal vs. pellets) and ingredient costs. Wheat midds contain 15 to 17% crude protein (CP), 0.49 to 0.56% available lysine, 0.36% available phosphorus (P), 8.5% crude fiber, 35% neutral detergent fiber (NDF), and 4% fat. Metabolizable energy (ME) value of midds averages 1335 kcal/lb, which is 89% the ME value of corn. Because of its low bulk density and high fiber content, midds inclusion in meal feeds is often limited to 7.5% in the grower phase, and 15 to 20% in finisher diets, depending on corn particle size and energy density of the diet. Midds are well utilized by sows and may be included in gestation diets (meal) at 15 to 20%. Higher levels of midds (30%) can be used in pelleted feeds. One note of caution: midds can be a significant source of mold and mycotoxin, especially vomitoxin. If mycotoxin contamination is suspected, midds use should be limited in swine feeds. The value equivalency of wheat midds is determined as follows:

(1) 2000 lb midds = 1854 lb corn + 228 lb SBM (48%) + 33 lb dical – 115 lb fat (assuming a P source is added to the diet separately)
(2) 2000 lb midds = 1912 lb corn + 225 lb SBM (48%) – 137 lb fat (assuming a base mix is used to manufacture complete feeds)

Bakery By-Products. Bakery is a by-product of the baking and cereal industries. Bakery varies in nutrient profile depending on source (i.e., cookies, pasta, cereal fines, etc.), so nutrient analyses are necessary to optimize use in feed formulation. Bakery by-products should be as fresh as possible, a challenge since bakery is manufactured from products designated as either off spec or “not fresh.” Most bakery by-products are high in fat and subject to oxidative rancidity. They can also become moldy if stored too long or not dried properly. Over-drying may decrease lysine availability. Typical bakery by-products average 11% CP, 0.24% available lysine, 10% fat, and 1600 kcal/lb ME, making it worth 107% of corn on an ME basis. The sodium content of bakery as well as feed form (pellets vs. meal) dictates bakery inclusion rate, which is normally maximized at 400 lb/ton in grow-finish feeds. Sodium can vary considerably by bakery source, but typically averages 0.8%. Salt added to diets with bakery by-products must

be adjusted taking into account the sodium contribution of bakery. Bakery (0.24% available lysine, 10% fat, 0.8% sodium) value equivalency is determined as follows:

(3) 2000 lb bakery = 1794 lb corn + 114 lb fat + 52 lb SBM (48%) + 40 lb salt

Hominy. Hominy is a by-product of the grits manufacturing process. Grits are made from corn and resulting hominy can be either low or high in fat depending on processing method. Hominy can replace 50 to 100% of the corn in grow-finish and gestation feeds. Hominy typically averages 10% CP, 0.31% available lysine, 0.17% P, 6% fat, and 1525 kcal/lb ME. Hominy value equivalency is determined as follows:

(4) 2000 lb hominy = 1854 lb corn + 98 lb fat + 34 lb SBM (48%) + 14 lb dical (assuming a P source is added to the diet separately)
(5) 2000 lb hominy = 1878 lb corn + 96 lb fat + 26 lb SBM (48%) (assuming a base mix is used to manufacture complete feeds)

Distillers Dried Grains with Solubles (DDGS). DDGS was discussed in detail in a previous Akey Swine Newsletter (April 2002). To summarize, DDGS is a by-product of the brewing and ethanol industries. Demand for ethanol as a gasoline additive has resulted in construction of new generation ethanol plants. DDGS from these new plants is higher in fat and ME than DDGS from the brewing industry. Ethanol DDGS average 26% CP, 0.75% lysine (0.39% available lysine), 9.6% fat, 37% NDF, and 1300 kcal/lb ME. Fat content of DDGS varies depending on source, so product nutrient analysis on a periodic basis is needed to ensure accuracy of nutrient profiles used in formulation. DDGS also contains high levels of available P, methionine, and threonine. With higher threonine and methionine levels, more crystalline lysine can be added to grow-finish diets formulated with 10% DDGS. One caution about DDGS: it can be quite high in mycotoxins if the source corn was contaminated. DDGS value equivalency is determined as follows:

(6) 2000 lb DDGS = 1613 lb corn + 470.7 lb SBM (48%) + 52 lb dical – 125 lb fat – 10.7 lb L-lysine (assuming a P source and amino acids can be added to the diet separately)
(7) 2000 lb DDGS = 2035 lb corn + 134 lb SBM (48%) – 169 lb fat (assuming a base mix is used to manufacture complete feeds)

Meat and Bone Meal (MBM). MBM has a long tradition of use in animal feeds. Current feed regulations prohibit feeding ruminant MBM back to ruminants, so MBM is separated according to source as either ruminant or nonruminant. Many mills that manufacture feed for both ruminants and nonruminants no longer use MBM from either source. Thus, price for MBM can be attractive for use in nonruminant diets. Inclusion MBM is often limited to 50 lb/ton because of variable nutrient profile and lack of palatability for swine. MBM is more economical if its high P content can be utilized (i.e., in diets where a P source is added separately). Ruminant MBM typically contains 50% CP, 9% calcium, 4.4% available P, 2.08 % available lysine, and 1060 kcal/lb ME. MBM value equivalency is determined as follows:

(8) 2000 lb MBM = 1535 lb SBM (48%) + 426 lb dical + 231 lb calcium + 92 lb fat - 284 lb corn

Liquid Whey (LW). Liquid whey is a by-product of cheese production. Many factors (not just cost of LW) need to be considered when evaluating LW as an ingredient in a swine-feeding program. LW is very corrosive, difficult to handle, and must be stored in a specialized holding tank. When fed through water lines, LW etches concrete under nipple waterers and corrodes galvanized water lines, resulting in plugged nipple waterers. Concrete maintenance and PVC water lines are required, resulting in substantial start-up and ongoing costs when feeding LW. Nutrient and dry matter (DM) content of LW varies and must be monitored carefully. LW is typically 6% DM, but wash water addition can easily reduce the DM content (and feeding value) of LW by 50%. Due to strict environmental laws in some parts of the US, there is incentive to add wash water to LW. In other parts of the country, LW is more concentrated (>20% DM) and must be diluted before feeding or its high mineral content will result in pig death when no other source of water is available. When fed as the sole source of water, LW (6% DM) will typically provide 20% of the daily DM intake for growing-finishing pigs. LW is a good source of calcium and P, but is high in sodium. Thus, a specialized dry diet must be formulated for pigs fed LW. The value equivalency of LW is determined as follows:

(9) 2000 lb of LW (6% DM) = 96 lb corn + 31 lb SBM (48%) + 3 lb dical + 3 lb salt

Summary. By-product ingredients offer opportunities to reduce total feed costs. Using current ingredient costs ($/lb) and the value equivalency equations given above, breakeven prices can be calculated for various by-products. For example, using Equation 9, LW is worth $8.35/ton when corn, 48% SBM, dical 18.5%, and salt are worth $0.05, $0.10, $0.12, and $0.03 per lb, respectively. The breakeven or equivalency value is the maximum amount that can be paid for the ingredient based on its nutritional value. Transportation costs and storage and handling concerns as well as long-term availability should also be considered before making the final decision to use a by-product. If you have questions on these or other by-products, please contact the Akey Nutritional Staff for assistance.