

Considerations when Buying Ingredients for On-Farm Mixing

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■ Introduction

During the course of my career, I have seen some truly mind-boggling vacillations in the strategies and mechanics used when making feed for pigs in the United States. Up to and including the 1960s, there were scores of producers and a 200-sow farrow-to-finish operation was considered large. Additionally, swine production generally was one of many enterprises on a diversified farming operation with production of row crops given primary emphasis. Thus, there was little interest among farmers in assuming the added responsibility, and much less the added capital investment, needed to manufacture feed on-farm. So, the model was to buy your feed from a local feed company or the local Co-op.

This bias against on-farm feed manufacturing began to change rapidly in the 1970s as numbers of sows within a swine enterprise began to increase. The general philosophy was that it made good sense to tie swine production with on-farm feed manufacturing. Indeed, it was viewed as poor production strategy to have 200 sows on a farm and not make your own feed! Unfortunately, swine producers in the United States were ill prepared to address the complexities in proper procurement, storage, and processing of ingredients. The struggle to gain maximum nutritional/economic value with on-farm feed manufacturing continues to this day.

In the following pages, I will attempt to update the reader on current thought about on-farm feed manufacturing. It is hoped that the information will be used to build confidence that, in fact, a producer can make excellent feed at the farm level if he/she will just apply the knowledge available today. However, also know that I do not pretend to have the final answers on any of these issues and that our approach to on-farm feed manufacturing a decade from now surely will look different than it does today.

■ Availability and Pricing Issues

As a rule, cost should be of primary importance when selecting ingredients for swine diets. However, there are some practical considerations that always require adjustment in focus. The first of these considerations is ingredient availability. It makes no difference how cheap an ingredient is if you cannot secure an ample supply. The amount that will constitute an “ample supply” is highly dependent on size of the swine operation and may represent one advantage that small to intermediate size operations have over large, integrated systems. It is well understood that our integrated systems in the United States tend to be rigid and inflexible in choice of ingredients because of the volume of EVERYTHING they have to deal with. It simply is not feasible for huge systems to handle a single truckload of a really cheap and locally produced coproduct. These guys must have semi trailer and railcar sized loads of an ingredient to fit their systems. Otherwise, storage space and ingredient control issues become unmanageable.

In conclusion, there is no doubt that availability of ingredients is an issue for all feed manufacturers. However, the flexibility to handle smaller quantities of multiple ingredients does represent a potential advantage for decreasing feed costs for medium to small swine enterprises that elect to engage in on-farm feed manufacturing.

■ Quality Standards

Everyone loves to talk about quality control and implementation of high quality standards. However, there are a few concepts that need to be kept in mind when initiating quality control protocols. The first is that you should set strict standards only for things that matter. This seems intuitive, yet producers spend a great deal of time on things that give little, if any, return on their investment of effort and money. For instance, our data at Kansas State University suggest that the importance of particle size uniformity is overemphasized (i.e., the sgw DOES NOT need to be less than 2.0) while the importance of reducing particle size is underemphasized (i.e., the mean particle size of corn DOES need to be 600 microns or less). The need to maximize mix uniformity is overemphasized (i.e., the CV for most markers DOES NOT need to be 10% or less) while the importance of pellet quality is underemphasized (fines at the feeder DOES need to be less than 25%). The need for high concentrations of vitamins and minerals in late finishing is overemphasized (i.e., we habitually over formulate) while the need for high quality diets in weanling pigs is underemphasized (plasma, milk, and antibiotic products are VERY difficult to replace).

A second consideration when formulating a quality control program is that there are diminishing returns on almost every input in production agriculture. This is

true for the amount of N applied to a corn field and it is true for the standards we set at the feed plant. Everyone knows that overkill is a waste of time and money, so scrutinize your ingredient sampling, laboratory analyses, and milling goals carefully and constantly to ensure that you are not wasting time on things that do not matter and collecting data that are never used.

Finally, I constantly see quality control protocols on farms and in feed plants that are simply ignored. There must be follow-up to ensure that protocols actually are followed by the farm/feedmill workers.

In conclusion, it is outside the length constraints of this paper to go through all possible feed ingredients and milling scenarios and to set quality control standards for each. But a general approach should always be to set strict standards only for things that are relevant, to set standards at levels that matter, and to actually enforce the standards that are put in place. In the real world, none of these is a given.

■ **Storage and Handling Considerations**

Simply put, storage and handling of ingredients can be problematic and the need for a few comments seems obvious at this point. The first relates to moisture. Of all the factors that contribute to loss of value in harvested and stored feedstuffs, excessive moisture is the most important regardless of where you are in the world. Mould growth in cereals, development of rancidity in fat sources, bridging of ingredients, etc., are all encouraged by excessive moisture. To make matters worse, these concerns do not address the reality that it is bad business to pay feedstuff prices for water. So, to avoid storage and handling headaches, moisture content in ingredients is a factor to monitor closely. A program to ensure that ingredients are adequately dry when they go into the bin is essential and management strategies such as aeration, turning stored grain, cooling grain, and constant monitoring for hot spots should be considered if there is any doubt about water activity in stored feedstuffs. But, it should be noted that storage and handling concerns often are time dependent. Thus, if turnover of ingredients is fast enough, potential for development of mould, insect problems, rancidity in fat, loss of vitamin potency, etc., is greatly limited.

■ **Ingredient and Diet Processing**

An important consideration when buying ingredients is to know and accept the processing needs that will ensure optimal nutrient utilization. Proper processing of cereals (to less than 600 microns for corn and wheat and less than 500 microns for barley and sorghum) is well established. Soybean meal is

fairly high in solubility and, thus, unless particle size of this protein meal is extremely large, there will be no need for additional grinding. My point is that the processing requirements for these types of feedstuffs are known and accepted and, thus, pose no need for constraints on the purchase of these ingredients.

However, some alternative ingredients do require special attention. Particularly when mixing the diet, attention should be given to such fibrous ingredients as soybean hulls, wheat midds, and beet pulp to ensure uniform distribution throughout the blend. Other ingredients do not lend themselves to on-farm mixing because they are floury (e.g., hominy feed) or sugary (bakery waste) and do not flow well through a feed plant or feeders if the diet is not pelleted. The decision to use of these types of ingredients is a question of whether there is a great enough buying opportunity to offset the extra inputs needed to use, store and process them. The answer often is YES.

■ Feed Additives

A final consideration in on-farm feed manufacturing is the use of non-nutritive feed additives. For instance, there is no doubt that use of sub-therapeutic additions of antibiotics to the diets of weanling pigs has been a great contributor to our ability to wean pigs at younger and younger ages. It is not uncommon to see a 10 to 20% increase in feed intake and rate of gain when antibiotics are added to diets of pigs weaned into facilities with an average environment and average herd health status. However, there currently is a great deal of political pressure on the livestock industry to minimize use of feed-grade antibiotics. With this pressure, has come the ever increasing demands by government agencies to document use of these products and from a feed manufacturing standpoint, it has become increasingly important to store these types of ingredients in secure areas and to carefully record their use/disappearance.

To avoid the scrutiny (and outright criticism) from those opposed to the use of antibiotics in animal feeding, the swine industry in the United States is scrambling to identify effective alternatives to antibiotics for growth promotion. Alternatives that are worthy of consideration begin with key mineral salts. As far back as the 1960s, mega-dosing with copper sulphate was proven effective for the prevention of enteric disorders and for increasing growth performance in pigs. During the 1990s, mega-dosing with zinc oxide in the first couple diets after weaning and following that with copper sulphate was proven to be an even more effective strategy than using copper alone. The return on investment with copper sulphate and zinc oxide still makes these ingredients very attractive for use in weanling diets, but they also raise concern about potential impact of intensive pig rearing on the environment.

In the midst of drug resistance and environmental concerns in the United States, we are seeing a resurgence of interest in direct-fed microbials, enzymes, and other alternative treatments to aid in the prevention of enteric disease and non-specific growth promotion in pigs. To this date, our data at KSU suggest that preparations of lactobacillus, streptococcus, and bacillus organisms are not terribly effective substitutes for feed-grade antibiotics. Alternatively, we have found that some yeast products and mannanoligosaccharides increase growth performance in weanling pigs but to only about half that achieved with antibiotic feeding.

The bottom line seems to be that if we do not have access to antibiotics for non-specific growth promotion in pigs, there are feed additives that will help to protect their health. But, in terms of maximum growth performance and return on investment, at present it seems unlikely that we can replace use of sub-therapeutic concentrations of antibiotics in pig diets. The trick then becomes learning to handle antibiotics in on-farm feedmills in a manner that complies with the demands of regulatory agencies.

■ Conclusion

On-farm feed manufacturing represents an opportunity to control and drive down production costs that few other endeavours can offer. With careful consideration given to procurement, storage and handling, quality control, ingredient processing, and recordkeeping, on-farm feed manufacturing will continue to complement swine production well into the foreseeable future.