

## FEEDING SOWS FOR OPTIMAL PERFORMANCE

WILLIAM C. WELDON

The sow herd is the starting point for profitable pork production. Feeding the sow herd correctly provides a basis for efficient and consistent production. During this presentation several factors relating to feeding the breeding herd will be discussed. These topics will include specific philosophies on sow feeding during gestation and lactation. It will relate directly to today's production systems, including short lactation lengths and sows that produce lean market hogs.

### *The Situation*

Emphasis on lean production has shifted the type of sow that is currently being used in pork production. Sows are leaner and are asked to reproduce at a higher plane. These requirements reduce the flexibility of the sow to remain productive under changing environmental or nutritional challenges. This has increased the information we have on the nutrient needs of specific types of pigs. This has improved the accuracy with which we can predict the nutrient requirements of sows. In reality all farms and feeding situations are different, and require that individuals monitor and change their feeding programs to achieve their desired goal.

### *The Big Picture*

In the past we as researchers spent a great deal of time trying to break the reproductive cycle up and understand the components of sow feeding. This approach does not fit with our production systems or with the end goal that we have for sow productivity, consistently high levels of production. To be most effective we need to view the entire reproductive cycle with a central goal of maintaining a consistent body condition over the sow's productive life. To accomplish this goal it is not possible to focus only on gestation or lactation feeding. We must understand the nutrient needs in gestation and lactation as well as how our programs in one stage may affect performance in the other.

### *Inventory Control*

It is useful to consider sow feeding as a simple inventory control process. In this process there is a central theme of balancing the amount of nutrients coming in with the amount that is being deposited as pigs or in the milk to support pigs. During gestation there is a physiological drive for the sow to consume and store nutrients for the developing fetuses and for the support of the coming lactation. The pancreas secretes more insulin in response to a meal and the consumed nutrients are quickly stored for future use. This process necessitates the need for limit feeding sows. In studies at the University of Nebraska (1994), where sows are allowed to eat all they care to daily intakes were in excess of 3.8 kg of feed per day and weight gain during the final 42 days of gestation was 47 kg. This drive to store nutrients makes it very easy for sows to become fat in gestation which can lead to several problems during farrowing and lactation.

The emphasis during lactation is to provide nutrients for milk production. The sow has two separate sources from which she can draw nutrients to support lactation. She can consume food and produce milk from consumed nutrients or she can mobilize body tissue to support productive functions. Where the balance of nutrients for milk production comes from is determined by many factors. The most obvious of these would be the physical availability of feed for the sow to consume. In many cases producers have and still today limit feed for up to 10 days post farrowing. The limited amount of feed available requires the sow to mobilize body tissue to meet the demands of milk production. This limited amount of feed may also adversely affect subsequent reproductive performance through its effects on insulin and reproductive hormones.

Another critical factor in determining where the nutrients for milk production come from is the condition of the sow at the time of farrowing. If the sow is fat then there is an abundant source of nutrients on her back and she will make use of them, seeking few nutrients from feed. In the example used above, sows that consumed feed at will during gestation consumed only 2.9 kg of feed daily during a 21 day lactation. This was in contrast to a group of sows fed 1.84 kg of feed during gestation that consumed 5.4 kg of feed daily during the same 21 day lactation period. The resulting weight loss in the two groups of sows was 35 and 15 kg for the sows consuming feed at will in gestation, and the sows restricted to 1.84 kg of feed per day during gestation, respectively. If this weight loss was primarily fat there would be little problem in reproduction, however, when sows do not consume feed they mobilize body stores not only for energy but also other nutrients including protein and minerals. These examples demonstrate the importance of feeding sows so that they are in good condition and consume large quantities of feed during lactation.

Environmental temperatures, disease and physical constraints (poor feeder design) also may limit the amount of feed consumed by sows. As much as possible it is important to reduce the impact of these environmental factors on sow feed intake. The use of evaporative and other cooling methods significantly enhance the feed intake of sows and will reduce the amount of weight loss experienced by sows during lactation. Proper herd health procedures and equipment design will also benefit performance by allowing sows to consume large amounts of feed and reduce the amount of feed that is mobilized from body tissue.

Optimal performance will be achieved when sow condition is relatively stable across the reproductive cycle.

Nutrients are provided as needed rather than through processes of storage and retrieval. This serves as a basis for proper nutritional formulation of diets for sows based on needs during the different phases of production.

### *Nutrient Supply*

There are two key pieces of information relative to the supply of adequate nutrients for productive function. First is the quantity of feed consumed and second the concentration of nutrients in the feed. The quantity of nutrients in the feed is readily known, formulation sheets specifically list the quantities of nutrients in our diets. The amount consumed is more difficult to ascertain unless detailed records are kept. If the quantity of feed being consumed is unknown then it is a guess as to how concentrated the nutrients in the diet should be. There is variation in the quantity of feed that is consumed throughout the year. In data collected from a commercial farm the average daily feed disappearance ranged from a high of 6.1 kg in November, December and January, to a low of 4.8 kg in August. This represents a 22% reduction in the feed intake of sows during the course of the year. This reduction in intake resulted in similar changes in the rebreeding performance of sows. The percent of sows bred by seven days ranged from a high of 93% in January to a low of 62% in July and August a 31% drop. This variation in performance is detrimental to profitability and to pig flow. Obviously, there is a need for very different diets depending on the time of year, to in essence stabilize the supply of nutrients to the sow. With reliable feed intake records it is possible to monitor and predict periods of low feed intake and make dietary changes in a manner that will allow intakes of essential nutrients to be met.

## FEEDING SOWS FOR OPTIMAL PERFORMANCE

WILLIAM C. WELDON

### *Nutrient Quality*

The quality of nutrients is critical for two specific reasons. First if there is poor ingredient quality feed intake could be reduced and toxins could directly reduce sow performance. Good quality control measures are necessary to ensure that poor quality ingredients are not incorporated into sow diets. In general ingredient quality is most often a problem with energy feedstuffs, corn, wheat midds, and wheat. It is in these ingredients that we most often have problems with mold, and their micotoxins.

The other measure of quality refers to the nutrition of the particular diets that are formulated for sow feeding. The primary component of the diet where we are most concerned is the quality of the protein in sow diets. The concept of ideal protein, the proper ratios of amino acids in protein, applies to sows as well as growing and finishing pigs. This concept provides that all amino acids need to be provided in specific ratios to the other amino acids. The most crucial amino acid is lysine. Several researchers have studied the effects of additional lysine on lactating sow performance. Research at Iowa State University (1991) showed a 25% increase in litter weight gain when lysine consumption increased from 20 to 47 grams of lysine per sow per day. In addition sow weight loss was reduced by over 75%. Other studies have indicated responses in excess of 54 g of lysine intake daily. Total intake is the critical number because of the variations in feed intake of lactating sows. The other amino acid that has been much in the literature as of late is valine. Valine is a branched chain amino acid that is common in the native proteins of swine diets. When there is a problem, however, is when large amounts of synthetic amino acids are added to lactation diets. Research at the University of Minnesota and at Kansas State University have indicated responses in litter weight gain up to a valine to lysine ratio of 1.28 to 1.

These data indicate that the relative amounts of amino acids are important as well as the quantity of amino acids in swine diets. Care must be taken in formulation to ensure that the correct quantity of amino acids are supplied in the appropriate ratios to optimize sow performance in lactation. Protein nutrition during gestation is also important, but is not usually as difficult due to the relatively low needs of the sow for amino acids during gestation. It is important, however, to be particularly careful in formulation when using feedstuffs other than corn and soybean meal, due to the variation in the availability of lysine in alternative ingredients.

### *Other Nutrients*

Several other nutrients have been indicated in improving reproductive performance. These include vitamin A, folic acid, and chromium picolinate. All of these have shown promising results when fed or injected in sows. There have also been in most cases indications of variable results. The success of these products should be evaluated carefully as they may be beneficial to sow performance.

### *New Considerations*

Changes in the systems by which we produce pigs has led to some new consideration in sow feeding. The biggest is the movement to early weaning. Most commercial operations are weaning today at lactation lengths below 17 days, and in some operations sows are weaned as early as 7-10 days of lactation. This change in production practice forces us to reconsider some of the common feeding practices that we have done for years in the field.

Increasing feed in the final 2 to 4 weeks of gestation has been a common practice to increase pig birth weights and sow condition in advance of farrowing. In some cases the increase in feed is large, up to a total of 3.8 kg per day for 30 days. Most of this additional weight was then taken off during the lactation period that was routinely 21 to 28 days. As the length of the lactation is shortened there is less time for sows to "milk off" the excess condition and we see an increase in condition as parity advances. All of the negatives associated with over conditioned sows begins to occur, including increase still births and poor rebreeding performance. To combat this problem the extra feed offered to sows in late gestation needs to be limited. In many farms only those sows that are in poor condition are fed additional feed. Much more moderate increases are common (1 kg / day for 14 days), and in some cases the practice is stopped all together if birth weights are not a problem.

The other area that is affected by shorter lactation lengths is the time with which sows are brought onto full feed after farrowing. Programs that allow for 7 days or more to get sows on full feed miss nearly one half of the opportunity for increased intake. It is even more critical to get sows on full feed as soon as possible, in many cases farms have a goal of 3 days to get sows on full feed. In an experiment to determine how much opportunity for intake is lost, sows that were allowed to eat at will during the first seven days of lactation consumed an additional 4 kg of feed in the first week and an additional 6 kg during the entire lactation. This intake is critical to the successful rebreeding performance of the sow herd.

### *Summary*

Managing nutrient supply during the reproductive cycle is critical to optimal sow performance. Management strategies that allow for maximal intake during lactation provide for improved maintenance of sow condition. By maintaining a consistent condition sow performance is consistently at a high level and helps to promote profitable pork production.