

Feed changes during gestation can save money and benefit the sows

Feeding sows according to their changing energy needs in gestation can save at least 20 kilograms of feed per sow per gestation, an Edmonton research group has found. And it's better for the sow

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If you give a sow exactly what she needs during gestation, an Alberta research group has found, she'll repay you by delivering healthy piglets, living longer and saving you about \$5 a litter in feed costs.

Ron Ball, a professor and research chair in Swine Nutrition at the University of Alberta, heads a team at the Swine Research and Technology Centre in Edmonton which has been researching the sow's nutrient-intake needs during gestation for about three years.

The researchers have found that a sow's needs change during gestation, requiring a shift in feed and nutrient allowance. If you feed her the same way from day one to day 115, you may be overfeeding in the first 80 days and underfeeding in the last 35 days. Even if you top-dress her feed in the last month or so, it may do her some good, but you'll be spending money you could have saved earlier.

"It's not just the quantity of feed," Ball says, "but the nutrient balance. Our research and that of a group in Missouri shows that we are significantly overfeeding our sows in about the first two-and-a-half months of gestation."

Ball says that, during this period, the sow is depositing fat and muscle and then, in her last month of gestation, she's actually having to break down that body tissue to build piglets because we are not feeding her enough. And it's inefficient.

"The efficiency of depositing feed energy as fat is only 74 per cent," the group found, "and the efficiency of utilizing body fat for energy is only 90 per cent. Therefore, energy is lost twice – once during deposition of body tissues and again during their mobilization."

The group found that "feeding sows according to their changing energy needs in gestation can save at least 20 kilograms of feed per sow per gestation, or \$5 at a diet cost of \$250/tonne. Assuming 2.5 gestation cycles per year, this is a saving of \$12.50 per sow per year." The sows varied in weight from about 230 to 250 kilograms.

"We can save money by formulating a diet that's lower in nutrients, not just lower feed intake," Ball says, "but the energy and protein has to be balanced. We can feed a lower nutrient intake diet for almost the first three months and then we need to feed a much more specialized, much better diet in both energy and protein in the last month."

Advice to farmers before now came from 1998 National Research Council (NRC) data recommending a constant diet during gestation of 2.63 kilograms a day of corn-soy (84.7 per cent corn and 11.3 per cent soybean meal) yielding 36.3 mega joules of energy per day. The recommendation was based on a second-gestation sow weighing 185 kilograms carrying 13 piglets. The NRC diet prescribes 0.45 per cent lysine and 0.34 per cent threonine with four per cent minerals and vitamins.

In 2008, a group of German researchers published new guidelines for swine nutrition. Their recommendations suggest that amino acid requirements in late gestation are greater than in early gestation. However, in the absence of supporting data, their requirements were calculated from the estimated increased growth of piglets in late gestation.

The Germans proposed a diet change on day 85 of gestation to accommodate the greater amino acid requirement caused by increased fetal growth. They recommended a corn-soy diet of 2.32 kilograms a day from day 1 through 84 (86.5 per

cent corn and 9.5 per cent soybean meal) and 2.9 kilograms a day from day 85 to 115 (82.5 per cent corn and 13.5 per cent soybean meal). They prescribe 0.35 per cent lysine and 0.28 per cent threonine on days 1 through 84, increasing to 0.50 per cent lysine and 0.29 per cent threonine on days 85 to 115. A constant four per cent minerals and vitamins is recommended throughout gestation.

The Edmonton group found that both amino acid and energy requirements increase during gestation because of the exponential growth of fetuses. They point to recent research, which shows that sows develop insulin resistance if they don't get enough energy. Sows given a constant feed allowance during pregnancy developed insulin resistance in late gestation. Sows given a supplement of 540 grams a day of starch did not, showing that insulin resistance in late gestation is a response to inadequate energy intake.

"We recently found," the Edmonton group reported, "that sows increased their daily heat production by four megajoules on day 105 compared with day 30 and day 45 of gestation." Factoring in heat for maintenance, maternal and fetal tissue gain and assumed efficiency, the group calculated that sows have an increased dietary energy requirement of 7.5 megajoules of energy a day during late gestation.

The Edmonton group's research shows that same second-gestation, 185-kilogram sow should get 2.25 kilograms a day of feed on day 1 through 84 (89.2 per cent corn and 6.8 per cent soybean meal) and 2.79 kilograms on day 85 to 115 (80.1 per cent corn and 15.9 per cent soybean meal). They prescribe 0.35 per cent lysine and 0.26 per cent threonine on days 1 through 84 and much higher rates – 0.55 per cent lysine and 0.41 per cent threonine – on days 85 to 115. They also recommended a constant four per cent minerals and vitamins throughout gestation.

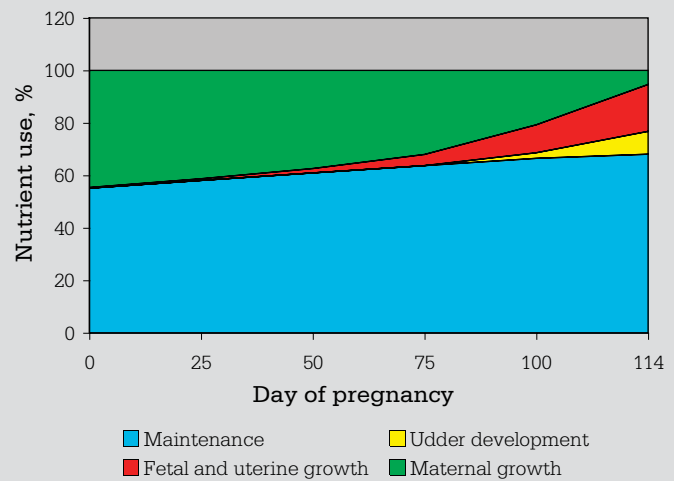
The Edmonton group also looked at net energy (NE) required for sows, noting there is a difference in the NE requirements for sows and growing-finishing pigs.

"Better NE data is needed for sows," the group stated, "because we will be better able to match feed intake with the desired energy deposition in the sow's body and conceptus during gestation. We predict that this will allow a reduction in feed allowance of two per cent and will amount to approximately five kilograms during gestation, or \$1.25 per sow at a cost of \$250/tonne."

The age of the sow also factors into the feed equation and research has shown that older sows who have had a greater number of litters require less amino acid and reduced lysine intake. "This lysine requirement could be met by 100 per cent grain diets without addition of any protein feeds (Moehn et al 2002)."

The Edmonton group cautions that "lysine probably is not the first-limiting amino acid for older sows that are at maintenance. Threonine and possibly methionine and cystine are more likely to be first limiting and diet formulation should be governed by the contents of these amino acids."

Nutrient partitioning during gestation



The group also notes that sows lose body reserves of minerals over several reproductive cycles, adding that "more research is necessary in sows specifying if, or how much, additional mineral supplementation may be beneficial."

Ball points out that turnover in sows can be improved by varying the diet during early and late gestation. "Sows seldom live beyond three or four years," he says. "If a sow has six gestations, that's generally considered pretty good."

He notes that the culling rate in sows ranges from 30 to 50 per cent per year, depending on the farm and estimates that following their feeding recommendation can reduce the culling rates by about 10 per cent leading to turnovers of 20 to 40 per cent per year.

While serving more than one diet to pigs during gestation may present some problems to farmers, Ball says, the return would be worth it. "When we had farmers with 100 sows to 300 sows, saving \$5 a sow per gestation wouldn't have paid off," Ball says, "but if you've got 5,000 sows or 10,000 sows or even 30,000 sows, that's \$10 a sow per year. You'd quickly get your return on investment by finding a way to feed separate diets."

The scope of the research done so far and the work yet to be done is reflected in the time line. "We started this about three years ago now," Ball notes, "and it will go for at least another four of five years before we complete the entire program."

The next challenge is lactation. "We don't have as much data yet on lactation," Ball says, "but clearly sows are limited in the quantity of feed they can eat and, as a result, they are in a negative balance and they are breaking down both muscle and fat tissue to make milk."

He says that the group may come up with a strategy in lactation similar to the one in gestation. "We're suggesting in gestation possibly coming up with phased feeding of two different types of diet, one for early lactation and one for late lactation."

In addition to Ball, the Edmonton group includes Soenke Moehn, Crystal L. Levesque and Ryan S. Samuel.

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