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Jim L. Nelssen

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**K****FOLIC ACID SUPPLEMENTATION FOR SOW DIETS****S****J.L. Nelssen****U**

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Folic acid is an essential B-vitamin for swine, and green, leafy plants are an excellent source of this vitamin. Even though pigs cannot synthesize folic acid, bacteria in their lower gut can, making feces another source of folic acid. Research in the late 1940's and early 1950's indicated that folic acid supplementation to pig diets was not necessary. However, in the last 40 years, the number of sows raised in outside lots with access to leafy plants has decreased. Also, improvements in waste removal systems have decreased the sow's access to fecal material. These changes in management systems have removed two sources of folic acid from the sow, thereby causing researchers to reevaluate folic acid supplementation to sow diets.

In 1984, scientists in Canada reported that concentrations of folic acid in serum of sows decreased drastically during gestation. That suggests that sows suffer a folic acid deficiency during gestation. When the sows were then given a series of folic acid injections during gestation, the concentrations of folic acid in their sera increased and the sows farrowed 1.3 more pigs/litter and 1.1 more pigs born alive/litter. This improvement in litter size was attributed to decreased embryonic mortality.

A series of folic acid injections requires additional labor and management, therefore, universities have studied the effects of dietary additions of folic acid on sow performance. Further work by the Canadians was conducted to determine what dietary level of folic acid would result in concentrations of serum folate similar to those observed in sows injected with folic acid. Ninety-five sows were fed gestation diets supplemented with either 0, 3, 9, or 27 g of folic acid/ton of feed. In order to maintain the serum folate concentration at a level previously observed to increase litter size, gestation diets should be supplemented with 3.9 g of folic acid/ton.

In a recent study at Kansas State University, three levels of folic acid supplementation to gestation/lactation diets were analyzed (0, 1.5, or 6.0 g folic acid/ton of feed). This was a two-parity study, utilizing 153 gilts in parity I and 80 sows in parity II. With the addition of 1.5 g of folic acid, the number of pigs born, born alive, and weaned at day 21 was increased by approximately 1 pig/litter (Figure 1). Also, litter weight at birth and on day 14 of lactation was increased by supplementing gestation and lactation diets with 1.5 g/ton of folic acid. Further results of this study are discussed in a separate report in this publication (Thaler and co-workers).

A three-parity study utilizing a total of 59 gilts was conducted at Virginia Polytechnic Institute to determine the effects of .91 g of supplemental folic acid/ton of feed on sow performance. Both total pigs and pigs born alive were increased by 1 pig per litter with folic acid supplementation. However, gestation and lactation weight changes were not affected by folic acid supplementation nor were number of days to estrus postweaning.

Research conducted at the University of Illinois provided conflicting data on the efficacy of folic acid additions to sow diets. Forty-two gilts received gestation diets supplemented with either 0 or .18 g of folic acid/ton. None of the litter criteria were affected by folic acid addition, but gestational weight gain was increased by supplemental folic acid.

The lack of response in litter size may be due to the low concentration rate of folic acid utilized (.18 vs. .91 or 1.5 g/ton for the Virginia and Kansas studies, respectively).

Based on the results of these studies, supplementing gestation and lactation diets with folic acid improves sow performance by increasing litter size. The optimum level of folic acid supplementation to these diets appears to be 1.5 g/ton of feed.

**Figure 1. Folic Acid Effect on Litter Size**

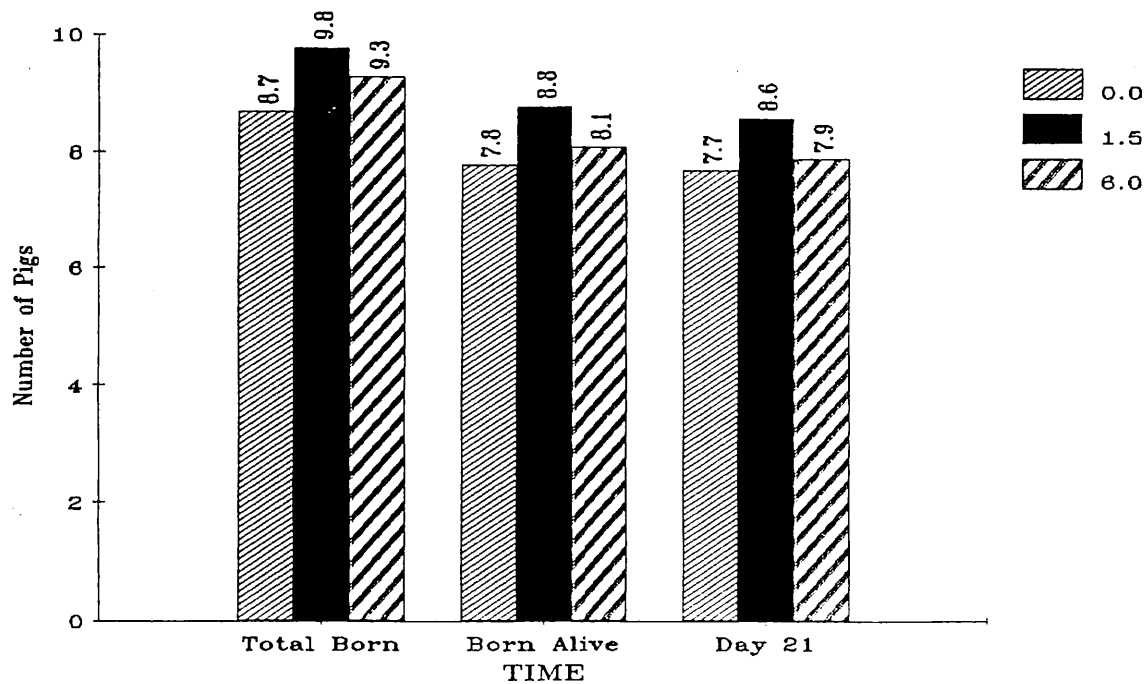


Figure 1. Effect of folic acid additions on number of pigs per litter. Total number born (TB) was quadratically increased ( $P < .05$ ) by folic acid additions but number born dead (BD) was not affected. However, number born alive (BA) ( $P < .05$ ), number on d 14 (D14;  $P < .001$ ), and number on d 21 (D21;  $P < .001$ ) were quadratically affected by folic acid additions.