LITTER SIZE FOR GILTS FED HIGHER LEVELS OF FOLIC ACID AND RIBOFLAVIN DURING GESTATION

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Summary

We fed gilts diets containing either additional folic acid throughout gestation (1.5 g/ton, 4.5 lb/gilt daily), additional riboflavin (100 mg/gilt daily) from d 4 to 10 of gestation, both folic acid and riboflavin, or neither supplement. All diets provided all KSU recommended allowances for all other nutrients. Neither farrowing rate nor litter size was affected by the treatments.

(Key words: VitB, Riboflavin, Gestation, Litter, Sow, Performance.)

Introduction

Thirty percent of potential pigs per gilt, about four pigs at farrowing, are lost by either embryonic (first 30 d of pregnancy) or fetal (after 30 d) death. About 20% of the potential pigs die during the first 14 d after breeding. The causes for embryonic and fetal death are not known, even though the high rate of mortality was discovered over 40 y ago. Recent reports indicate that pigs often are marginally deficient in folic acid during gestation. Thaler and coworkers (1988 Swine Day Report of Progress) observed increased litter sizes for gilts fed diets containing 1.5 g/ton supplemental folic acid. Another water soluble vitamin, riboflavin, exhibits a surge in its concentration in the uterine secretions between d 6 and 8 of pregnancy. There is a report that additional riboflavin provided in the diets of gilts from d 5 to 10 of gestation both increases the riboflavin in the uterine secretions and enhances embryo survival. In light of these reports, we compared the effects of riboflavin and folic acid in an experiment to evaluate their potential interactions.

Procedures

Crossbred (Duroc × Yorkshire × Hampshire × Chester White) gilts were vaccinated twice for leptospirosis and parvovirus and exposed to manure from the breeding herd prior to the initiation of the experiment. When approximately 7 mo old, gilts were moved from a finishing building to outside lots and exposed (fenceline) to mature boars to stimulate puberty. After 4 to 6 d, the boars were removed. Beginning 10 d before breeding, gilts were provided free access to feeders containing a corn-soybean meal diet fortified with vitamins and minerals at KSU recommended levels. Eighteen days after their initial move, gilts were re-exposed to boars, and daily estrous checks were initiated 3 d later. Two blood samples, collected 10 d apart and before the beginning of breeding, were evaluated for progesterone. If the concentration of progesterone exceeded 2 ng/ml in either sample, the gilt was considered post-

pubertal. Only five gilts that were detected in estrus were not classified as post-pubertal and were excluded from data analyses.

The experiment consisted of seven trials (221 gilts) and was conducted from October 1989 to August 1990. Breeding occurred over 10-d periods, with approximately 25-d intervals between trials. At breeding gilts were assigned to receive 4.5 lb of a corn-soybean meal diet containing one of the following: no supplements, folic acid, riboflavin, or folic acid and riboflavin. The folic acid supplement (1.5 g/ton) was fed throughout gestation. The riboflavin was fed from d 5 to 10 of pregnancy (100 mg/gilt/d). Otherwise, the diets were identical and provided nutrients to meet all KSU recommendations.

Results and Discussion

Seventy-eight percent of the inseminated gilts farrowed, and farrowing rate was not affected by treatment (76 to 81% for individual treatments). Likewise, no treatment effects were observed for either total pigs or live pigs farrowed (Figure 1). Therefore, our results do not agree with other reports showing improvements in litter size (folic acid) or embryo survival (riboflavin). Gilts were not riboflavin-deficient as indicated by the erythrocyte glutathione reductase test, and results of that test were not affected by riboflavin treatment. Concentrations of folic acid in serum are being measured.

In theory, riboflavin supplementation would benefit embryo survival early in pregnancy, and additional folic acid might have effects throughout pregnancy. The number of pigs developed to term (litter size) was good in our study and may be near the maximum that can be supported by the gilt's uterus. Consequently, if embryo survival in early gestation had increased, fetal survival might have decreased to the limit imposed by uterine capacity. In fact, in other studies, we observed a significant improvement in embryo survival to d 10 of pregnancy attributable to riboflavin. If this enhancement in embryo survival is repeatable, it might be possible to improve litter size in groups of females that have not completely utilized their uterine capacity.

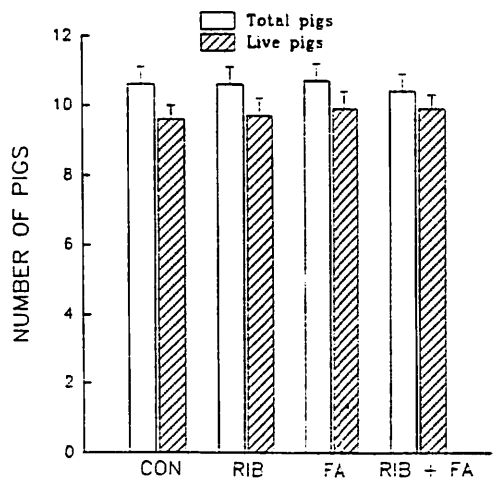

Figure 1. Litter size for gilts fed control (CON), riboflavin (RIB), folic acid (FA), or RIB+FA supplemented diets.