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Abstract

We tested the effects of feeding 4 or 7.4 lb of a complete gestation diet to gilts during days 0 to 2 or 3 to 10 after first detected estrus (day 0) and mating. There was a tendency (P = .11) for the 7.4 lb/day treatment to increase litter size when fed from day 0 to 2 and to decrease (P = .17) litter size when fed from day 3 to 10. Gilts artificially inseminated at puberty farrowed fewer (P < .05) pigs than gilts inseminated at a second or later estrus.; Swine Day, Manhattan, KS, November 17, 1988

Keywords

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LITTER TRAITS FOR GILTS FED 4 OR 7.4 LB FEED DURING THE FIRST TEN DAYS AFTER BREEDING

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Summary

We tested the effects of feeding 4 or 7.4 lb of a complete gestation diet to gilts during days 0 to 2 or 3 to 10 after first detected estrus (day 0) and mating. There was a tendency (P = .11) for the 7.4 lb/day treatment to increase litter size when fed from day 0 to 2 and to decrease (P = .17) litter size when fed from day 3 to 10. Gilts artificially inseminated at puberty farrowed fewer (P < .05) pigs than gilts inseminated at a second or later estrus.

(Key Words: Feeding Level, Flushing, Embryo Survival, Litter Traits, Fertility.)

Introduction

Sows and gilts are routinely fed 4 or 5 lb of feed daily after breeding to promote embryonic survival. That concept rests on early work demonstrating that relatively high feed intake over the first 30 days of gestation decreases the number of live embryos. Recently, Canadian researchers found that high feed intake from mating to day 10 interfered with embryo survival measured on day 25. Feeding level from day 11 to 25 was without effect. Therefore, we conducted an experiment to test the effects of providing additional feed during the first 3 days or day 3 to 10 of pregnancy.

Procedures

Crossbred (Hampshire X Yorkshire X Chester White X Duroc) gilts weighed from 251 to 430 lb (mean ± standard error = 306 ± 35) when assigned to treatment and were 7 to 9 mo old. Gilts were housed in outside lots. Beginning at least 10 days before breeding, gilts were provided free access to feeders containing a milo-soybean meal diet fortified with vitamins and minerals to KSU recommended levels. All gilts were vaccinated twice for leptospirosis and parvovirus and were exposed to manure from the breeding herd prior to initiation of the experiment.

The experiment consisted of four trials conducted in November and December, 1987 and January and February, 1988. Gilts were provided exposure to mature (> 18 mo old) boars for 5 days beginning 24 days before the start of breeding to induce puberty. A second period of boar exposure began 3 to 4 days before the start of breeding to stimulate puberty in as many of the remaining prepubertal gilts as possible. Breeding occurred over a 10-day period scheduled so that gilts responding to the first boar contact would recycle during breeding. Two samples of blood serum were collected from the anterior vena cava of each gilt prior to breeding and assayed for progesterone. Progesterone concentrations greater than 2 ng/ml were indicative of previous estrus and ovulation. There were 8 to 11 days between the two blood samples, and low concentrations of progesterone in both samples indicated the absence of ovulation. Therefore, gilts with both blood samples containing less than 2 ng/ml were considered prepubertal at the start of breeding. Gilts were checked once daily for estrus with a mature boar. Gilts were inseminated artificially when detected in estrus and the following day with pooled semen from two or more boars.

After being detected in estrus, gilts were moved to individual gestation stalls and fed according to one of the following treatment schedules: 4 lb of feed from day 0 to day 10; 4 lb for day 0 to day 2 and 7.4 lb from day 3 to day 10; 7.4 lb from day 0 to d 2 and 4 lb from day 3 to day 10; or 7.4 lb from day 0 to day 10.

Results

Farrowing and litter responses are presented for each treatment in Figure 1 and by main effects of feeding level for 0 to 2 days and 3 to 10 days after estrus in Table 1. Farrowing rates of the gilts inseminated ranged from 83 to 97%. No treatment effects on litter traits were detected. However, there was a tendency ($P = .11$) for gilts fed 7.4 lb/day from 0 to 2 days to farrow more pigs than gilts fed 4 lb/day for the same interval (Table 1). In contrast, total pigs farrowed tended ($P = .17$) to be greater for gilts fed 4 as opposed to 7.4 lb/day from day 3 to 10. Weight and backfat of gilts just before farrowing were not ($P > .35$) affected by feeding level during the first 10 days of gestation.

Pubertal status did not affect farrowing rate (Table 2). However, gilts inseminated at puberty weighed less ($P < .05$) at AI and prefarrowing ($P < .05$) and tended ($P < .18$) to have less backfat prefarrowing. Gilts inseminated at puberty also farrowed 1.3 fewer ($P < .05$) total pigs, tended ($P < .10$) to farrow fewer live pigs, and had litters weighing 3.7 lb less ($P < .05$) at farrowing. Number of mummies/litter was not affected by pubertal status.

Discussion

Canadian researchers reported that the detrimental effects of high feed intake on embryo survival occurred during the first 10 days of pregnancy. Therefore, we anticipated that one or more of our 7.4 lb-treatments would decrease litter size. We observed a tendency ($P = .17$) for feeding 7.4 lb/day from day 3 to 10 to decrease litter size by .8 pigs (Table 1). That result may indicate that the detrimental effects of high feed intake occur between days 3 and 10 of pregnancy. However, further work is needed to clarify our results. An unexpected finding was the tendency ($P = .11$) for the 7.4 lb-treatment from 0 to 2 days of pregnancy to increase litter size by .9 pigs. That result also should be studied further.

Pubertal status exhibited the most marked effects on the litter traits (Table 2). Gilts inseminated at puberty farrowed 1.3 fewer pigs. In our previous studies (Swine Day Reports, 1984 and 1987, KAES Reports of Progress 461 and 528, respectively), flushing prepubertal gilts with high feed intake before breeding increased their litter size to a level equivalent to that of postpubertal gilts. Because gilts in our present study were flushed prior to breeding we did not expect pubertal status to affect litter traits. In our previous studies, nonflushed gilts inseminated at first estrus farrowed 7 and 8.4 pigs. That is 1.2 to 2.6 fewer pigs than gilts inseminated at puberty in our current study. Therefore, it is likely that litter size for gilts inseminated at puberty benefited from flushing prior to breeding.

Our results suggest that increased feed/day during the first 3 days (day 0 to 2) of pregnancy may not decrease embryo survival and, in fact, may increase litter size. Further work is required to determine whether litter size can be increased consistently by this treatment. Feeding level at that time might affect ovulation rate, fertilization rate, or embryo survival. Our results also indicate that embryo survival may be decreased by feeding 7.4 lb/day from day 3 to 10. If that is confirmed, it will be important to establish the stage(s) of embryo development affected and the ingredient(s) in the diet that is detrimental to embryos.

Table 1. Farrowing and Litter Traits for Gilts Fed 4 or 7.4 Lb/Day during the First 10 Days of Gestation

Item	Feed/day, lb				Standard Error[a]
	0 to 2 days		3 to 10 days		
	4	7.4	4	7.4	
No. of gilts	76	75	74	77	---
No. farrowed, %	69(91)	67(91)	67(89)	69(90)	---
Total pigs/litter	9.8	10.7	10.7	9.9	.4
Live pigs/litter	9.3	9.9	9.8	9.4	.4
Mummies	.2	.3	.2	.2	.1
Total weight of pigs farrowed, lb	28.1	30.1	29.6	28.5	1.0
Prefarrowing weight, lb	392	395	393	394	3.0
Prefarrowing backfat, in	1.1	1.1	1.1	1.1	.3

[a]Average standard error.

Table 2. Farrowing and Litter Traits for Gilts Inseminated (AI) at a Pubertal or a Postpubertal Estrus

Item	Pubertal status	
	Puberty	Second or later estrus
No. of gilts	26	125
No. farrowed, %	24(92)	112(90)
Weight at AI, lb[a]	285 ± 7	313 ± 3
Total pigs farrowed[a]	9.6 ± .5	10.9 ± .2
Live pigs farrowed[b]	9.2 ± .5	10.1 ± .2
Mummies	.21 ± .12	.20 ± .06
Total weight of pigs farrowed, lb[a]	27.2 ± 1.3	30.9 ± .6
Prefarrowing weight, lb[a]	380 ± 5	408 ± 2
Prefarrowing backfat, in[b]	1.04 ± .3	1.10 ± .1

[a]Affected (P<.05) by pubertal status.
[b]Affected (P<.10) by pubertal status.

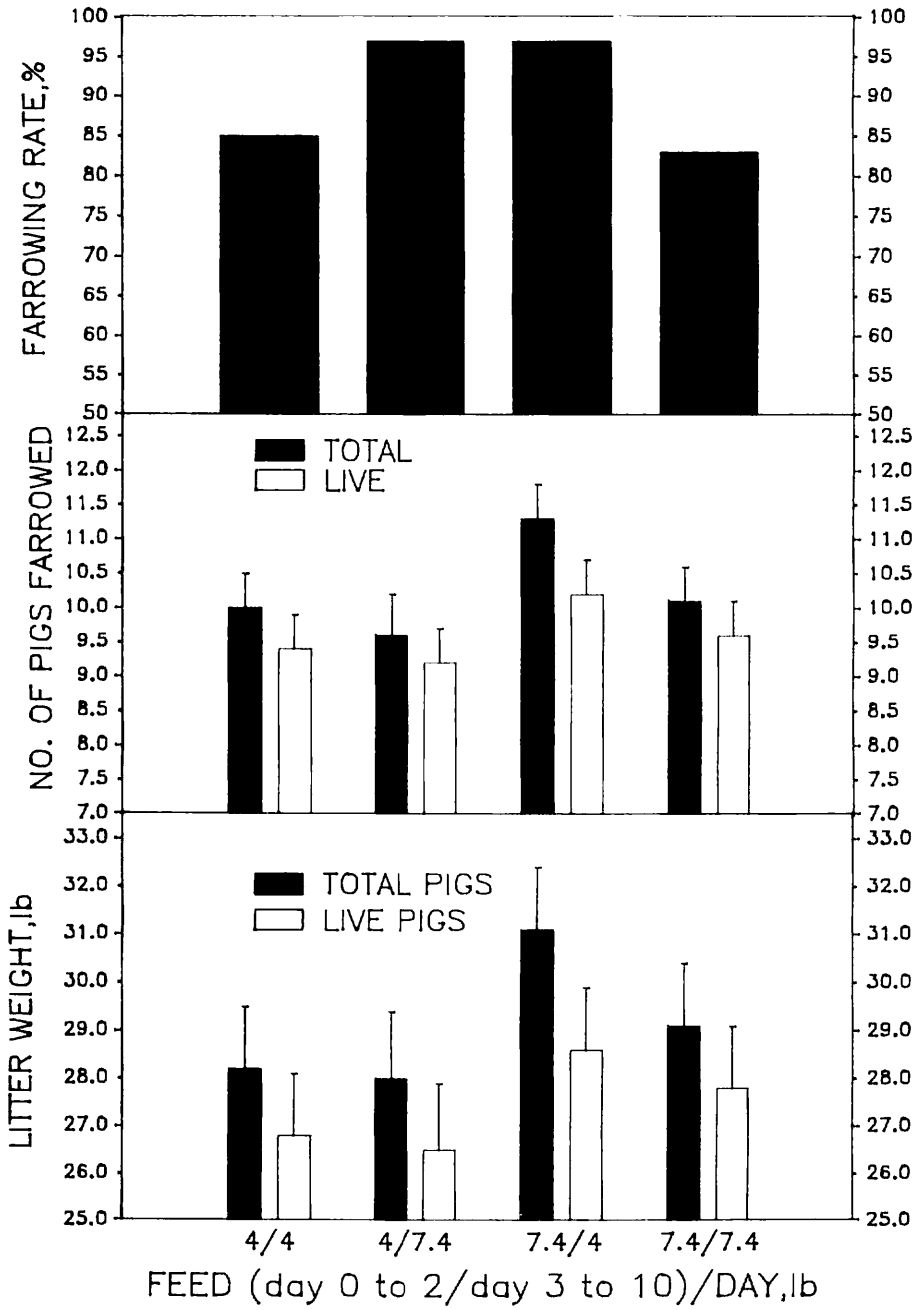

Figure 1. Fertility and litter traits of gilts fed 4 or 7.4 lb during days 0 to 10 of gestation.