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Litter size at birth is a function of ovulation rate, fertilization rate and embryo survival during gestation. Nutrition has little, if any, effect upon fertilization. However, it has been demonstrated to have a large influence on ovulation rate and embryo survival.

Flushing, feeding high energy levels for short periods of time preceding heat, has been shown to increase ovulation rate; but if this high energy level is continued after breeding a decrease in embryo survival prevails. There is limited evidence which suggests that a one-feeding flushing period may increase ovulation rate without increasing embryonic death.

Low levels of energy fed during gestation have been shown to result in reductions in daily gain, birth weight and 21-day weight of offspring. Other trials have shown that a low nutrient intake following mating and an increased intake during the last third of gestation resulted in a higher percent embryonic survival and more live pigs per litter.

The experiment reported here was conducted to determine what effect one-feed flushing and energy level during the first third of gestation had on reproductive performance.

Experimental Procedures

Thirty-two crossbred gilts which had been fed ad libitum until they reached 210 lb. of body weight were fed 4 lb. of a 16% protein diet per day until they reached approximately 10 months of age. At this time, gilts were checked for heat daily for one estrus cycle, then checked twice daily, and bred at the first sign of heat and again 24 hours later to sexually mature boars. At the time of breeding, gilts were divided into two groups--one group received 4 lb. of feed (1,465 Kcal./lb.) approximately 12 hours after breeding and the other group received 8 lb. of feed (1,465 Kcal./lb.) approximately 12 hours after breeding. These two groups were then subdivided so that one-half of the gilts received 5,850 Kcal. of metabolizable energy (M.E.) per day, considered a normal energy level, and the other half of the gilts received a lower energy level of 3,000 Kcal. M.E. per day during the first third of the gestation period. After 35 days of gestation, all gilts were weighed and placed on 5,850 Kcal. M.E. per day for the remainder of the gestation period. At 110 days of gestation, gilts were weighed and placed into farrowing crates. During the lactation period, all gilts received 12 lb. of lactation diet per day. The composition of the gestation and lactation diets is shown in table 1. The above design resulted in four treatments: Treatment A, nonflushed and normal energy; Treatment B, nonflushed and low energy; Treatment C, flushed and normal energy; and Treatment D, flushed and low energy.

Results

A summary of the effect of flushing and early gestation energy levels on reproduction and pig performance to weaning is shown by treatment in table 2. The effects of flushing are summarized in table 3 and the effects of energy intake the first 35 days of gestation are summarized in table 4. Six of the 32 gilts that were bred did not conceive. Three of these were in the nonflushed, low energy group, two were in the flushed, low energy group and one was in the group that was flushed and received the normal energy diet during the first 35 days of gestation.

A level of 3,000 Kcal. of M.E. per day did not quite maintain the weight of gilts during the early gestation period. The two groups of gilts fed this energy level lost an average of 1.0 and 3.5 lb. during this 35-day period. Gilts fed 5,850 Kcal. of M.E. gained an average of approximately 26 lb. during this same period. At farrowing time there was still a difference of about 20 lb. in weight between these two groups. Total gestation gain averaged 107 and 87 lb. for the gilts receiving the normal and low energy treatments, respectively.

Flushing, feeding 8 lb. of feed at a single feeding 12 hours after breeding, compared to the control feeding of 4 lb. of feed did not affect the number of total or live pigs farrowed, pig birth weight or number and weight of pigs weaned at 21 days. The number of pigs farrowed (total and live) and pig birth weight were similar when gilts were fed either 3,000 or 5,850 Kcal. of M.E. daily for the first 35 days of gestation. However, gilts fed the lower energy level during early gestation weaned only 66% of those pigs born live while the gilts fed the higher energy level weaned approximately 82% of their pigs.

Summary

Thirty-two crossbred gilts were allotted to one of four treatments at breeding. One-half of the gilts were flushed for one feeding 12 hours after breeding (8 lb. of feed), while the other half received 4 lb. of feed. These two groups were further divided into two groups, one-half receiving 5,850 Kcal. M.E. per day and the other half receiving 3,000 Kcal. M.E. per day during the first one-third of gestation. No differences between treatments were found for number of pigs born, average birth weight or average 21-day weight, but the normal energy treatment had an advantage in number of pigs weaned. Flushing vs. nonflushing showed no differences in any reproductive criteria measured. Normal energy vs. low energy showed no differences in any criteria measured except weight gain to 35 days of gestation and number of pigs weaned, which were higher for the normal energy treatment.

Table 1. Composition of Diets

	3,000 Kcal.	5,850 Kcal.	Lactation
Ground corn	560	1,560	1,370
Soybean meal (44%)	420	380	--
Soybean meal (50%)	--	--	360
Dehydrated alfalfa meal (17%)	960	--	--
Dried beef pulp	--	--	200
Dicalcium phosphate	45	20	40
Limestone	--	30	16
T.M. salt (Hi zinc)	10	10	10
Vitamin premix	a	a	b
	1995	2000	1996

[a] Provided 3,064,500 I.U. vitamin A, 356,000 I.U. vitamin D, 2.4 gm. riboflavin, 9.3 gm. calcium pantothenate, 20.5 gm. niacin and 10 mg. vitamin B_{12} per ton.
[b] Provided same as above plus 100 gm. of aureomycin per ton.

Table 2. Effects of Treatment on Reproductive Performance

	Treatment A Nonflushed and normal energy	Treatment B Nonflushed and low energy	Treatment C Flushed and normal energy	Treatment D Flushed and low energy
Number of gilts bred	8	8	8	8
Number of gilts pregnant	8	5	7	6
Weight at breeding, lb.	318.3	315.2	312.4	313.0
Weight gain during first third of gestation, lb.	25.6	-1.0	26.7	-3.5
Weight at farrowing, lb.	426.3	404.8	418.3	396.2
Number of pigs born live	10.1	11.4	11.3	9.7
Number of stillborn pigs	0.4	0.6	0.1	0.5
Total number of pigs born	10.5	12.0	11.4	10.2
Average birth weight, lb.	2.9	2.7	2.8	2.8
Number of pigs weaned	8.2	7.6	9.4	6.3
Average 21-day weight, lb.	9.9	11.0	9.9	10.6
Percent weaned of those born live	80.25	66.67	83.54	65.52

Table 3. Effects of Flushing on Reproductive Performance

	Nonflushed 4 lb. feed 12 hours after breeding	Flushed 8 lb. feed 12 hours after breeding
Number of gilts bred	16	16
Number of gilts pregnant	13	13
Weight at breeding, lb.	317.1	312.7
Weight gain during first third of gestation, lb.	15.4	12.8
Weight at farrowing, lb.	418.0	408.1
Number of pigs born live	10.6	10.5
Number of stillborn pigs	0.5	0.3
Total number of pigs born	11.1	10.8
Average birth weight, lb.	2.8	2.8
Number of pigs weaned	7.9	8.0
Average 21-day weight, lb.	10.4	10.1
Percent weaned of those born live	74.64	75.91

Table 4. Effects of Energy on Reproductive Performance

	Normal energy (5,850 Kcal./day)	Low energy (3,000 Kcal./day)
Number of gilts bred	16	16
Number of gilts pregnant	15	11
Weight at breeding, lb.	315.5	314.0
Weight gain during first third of gestation, lb.	26.1	-2.4
Weight at farrowing, lb.	422.5	400.1
Number of pigs born live	10.7	10.5
Number of stillborn pigs	0.3	0.6
Total number of pigs born	11.0	11.1
Average birth weight, lb.	2.9	2.8
Number of pigs weaned	8.7	6.9
Average 21-day weight, lb.	9.9	10.8
Percent weaned of those born live	81.88	66.09