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Abstract

A total of 321 PIC sows was used to determine the effects of either increased feed (8 lb/d of complete feed) or added corn (4 lb/d of complete feed plus 4 lb/d of ground corn) from d 30 to 50 of gestation on sow and offspring performance. Sows fed increased feed intake from d 30 to 50 of gestation had fewer pigs born live than control sows; however this decrease was not observed for sows fed ground corn. Increased complete diet feed intake from d 30 to 50 of gestation resulted in heavier offspring at slaughter, with offspring from sows fed additional corn being intermediate. Gilts from sows that were fed extra feed or corn had decreased 10th rib fat depth at market. Increased feed or addition of ground corn resulted in increased percentage lean and fat-free lean index for the sows' offspring. Although further research is needed to verify our results, they indicate that increased nutrient intake during critical periods in gestation can influence growth and carcass composition of the offspring.; Swine Day, Manhattan, KS, November 20, 1997

Keywords

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EFFECTS OF INCREASED FEED INTAKE OR ADDITIONAL CORN FROM DAY 30 TO 50 OF GESTATION ON PERFORMANCE OF SOWS AND GROWTH PERFORMANCE AND CARCASS CHARACTERISTICS OF OFFSPRING[1]

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Summary

A total of 321 PIC sows was used to determine the effects of either increased feed (8 lb/d of complete feed) or added corn (4 lb/d of complete feed plus 4 lb/d of ground corn) from d 30 to 50 of gestation on sow and offspring performance. Sows fed increased feed intake from d 30 to 50 of gestation had fewer pigs born live than control sows; however this decrease was not observed for sows fed ground corn. Increased complete diet feed intake from d 30 to 50 of gestation resulted in heavier offspring at slaughter, with offspring from sows fed additional corn being intermediate. Gilts from sows that were fed extra feed or corn had decreased 10th rib fat depth at market. Increased feed or addition of ground corn resulted in increased percentage lean and fat-free lean index for the sows' offspring. Although further research is needed to verify our results, they indicate that increased nutrient intake during critical periods in gestation can influence growth and carcass composition of the offspring.

(Key Words: Gestation, Offspring, Improved Lean.)

Introduction

The potential to alter growth potential of pigs by increasing nutrient levels fed to sows during early gestation is a relatively new area of research. The changes in growth potential may result from the ability to alter the number of muscle fibers in the developing fetus. The development of muscle at this stage involves the formation of primary and secondary muscle fibers. As the primary fibers develop, they are supported by the proliferation of secondary fibers. Research from Europe observed that increasing gestation feed intake from d 25 to 50 resulted in offspring that grew faster and more efficiently than controls. Therefore, the objective of this experiment was to determine if feeding sows either increased feed or carbohydrates from d 30 to 50 of gestation results in improved carcass characteristics of offspring.

Procedures

A total of 321 PIC sows was used. This experiment was conducted on a 3,000 sow farrow-to-wean operation in southwest Minnesota. On d 30 of gestation, sows were assigned randomly to one of three treatments in groups of five. Treatments consisted of sows being fed either: 4 lb/d of complete feed (control), 8 lb/d of complete feed (extra feed), or 4 lb/d of complete diet plus 4 lb/d of added corn (added corn). The control and extra feed treatments were fed via feed drop systems; for the added corn treatment, the complete feed was fed by feeder drops and the added corn via topdressing. Until being moved to the farrowing house, all sows were

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fed 4 lb/d of complete feed before d 30 and after d 50 of gestation.

On d 95 of gestation, sows (15/trt) were bled, and plasma samples were frozen for later analysis for concentrations of insulin-like growth factor (IGF-I).

At farrowing, numbers of pigs born and born live, stillborns, and mummies per litter were recorded. In addition, a subsample of 20 litters per treatment was weighed to determine the effects of treatment on pig birth weight and the variation within litters. In 10 of these litters per treatment, the pig closest to the mean weight was bled for analysis of plasma for IGF-I concentrations.

Pigs were ear notched at birth according to the maternal treatment in gestation and were standardized across treatments. At weaning, pigs were mixed within sex and moved to offsite nurseries. Pigs were moved to finishing buildings at 10 weeks of age. As pigs reached market weight (260 lb), they were sorted and marketed by treatment and sex for a total of six different marketing groups (i.e. a load of barrows or gilts from each individual treatment). At the slaughter plant, experimental pigs were processed as the first pigs of the day to decrease potential variation in Fat-O-Meter measurements. Individual carcass measurements were obtained on 2,358 pigs.

Data were analyzed using the GLM procedure of SAS. Sow was used as the experimental unit for the analysis of farrowing data, and parity was used as a covariate. In the analysis of carcass data, pig was used as the experimental unit. Hot carcass weight was used as a covariate in the analysis of 10th rib fat depth, loin depth, percentage lean, and fat free lean index. Variation in birth weight was tested using Leaven's Test (the absolute difference between the mean birth weight and individual pig weight). Lower values from this test correspond to less variation within the litter.

Table 1. Gestation Diet Composition[a]

Ingredient	%[b]
Corn	74.9
Soybean meal (46.5%)	15.6
Alfalfa meal	5.0
Other vitamin and trace mineral additions	4.5
Total	100.0

[a]Sows were fed either 4 lb/d (control), 8 lb/d (increased feed intake), or 4 lb/d of complete feed plus 4 lb/d ground corn.
[b]Formulated to contain .7% lysine, 1.0% Ca, and .90 % P.

Results and Discussion

Sows fed increased feed intake from d 30 to 50 of gestation had fewer pigs born live than control sows; however this decrease was not observed for sows fed ground corn. No differences were observed ($P > .10$) in number of pigs stillborn or mummified per litter (Table 2). No differences were observed ($P > .10$) in either pig birth weight or variation in birth weight within the litters ($P > .05$; Table 2).

No differences were observed in plasma IGF-I concentrations for either gestation sows on d 95 or newborn pigs ($P > .05$; Table 3).

The analysis of hot carcass weight revealed that offspring from sows fed increased diet from d 30 to 50 of gestation were the heaviest, with offspring from sows receiving additional corn being intermediate ($P < .05$; Table 4). Differences were not observed in barrows for 10th rib fat depth; however, gilts from sows fed added corn or increased feed had less 10th rib fat depth at slaughter. No differences were observed for loin depth in gilts from various maternal treatments;

however, barrows from sows fed added corn had greater loin depth than offspring from sows fed either the control diet or increased feed. Gilts from sows fed either increased corn or increased feed level were higher ($P<.01$) in percentage lean and fat free lean index than control gilts. No differences were observed ($P>.10$) in either percentage lean or fat free lean index of barrows.

The decrease in number born live with the increased feed intake, but not with added corn, is a concern. Research from Europe has shown no effect of high feed intake on number born live; but in that study, feed intake was increased then decreased over several days. Regardless, our experiment demonstrated the ability to alter the lean growth of offspring with adjustments in maternal nutrition. Additional research is needed to determine the mode of action. Our next step will be to determine the timing and amount of increased feed intake that will affect carcass characteristics of the offspring.

Table 2. Effects of Feed Intake from D 30 to 50 of Gestation on Sow and Litter Performance

	Feed Intake, lb/d				
Item	4 lb Feed	4 lb Feed + 4 lb Corn	8 lb Feed	P<	SEM
No. sows	111	108	102		
Average parity[1]	3.41	3.12	3.32	.54	6.0
Total born	11.01	10.67	9.80	.05	3.4
Born live	10.14	10.03	9.14	.06	3.3
Stillborn	.593	.423	.523	.41	17.5
Mummies	.277	.221	.144	.31	29.3
Lactation length, d	16.79	16.06	16.49	.22	1.9
Length of return to estrus, d	5.85	6.02	6.43	.56	6.2
Born live per litter weighed	10.94	11.72	10.82	.60	6.2
Litter birth weight, lb	34.79	34.77	32.96	.54	3.5
Pig birth weight, lb	3.13	3.23	2.95	.26	3.6
Variation in birth weight, lb[2]	.62	.54	.65	.29	8.6

[1]Used as a covariate in the analysis of farrowing performance.
[2]Approximately 20 litters per treatment were measured for weight and variation.

Table 3. Effect of Feed Intake from D 30 to 50 of Gestation on Blood Metabolites

Item	Feed Intake, lb/d: 4 lb Feed	4 lb Feed + 4 lb Corn	8 lb Feed	P<	SEM
No. sows	14	14	14		
IGF-I, ng/ml					
Sow d 95 of gestation	20.64	29.06	20.08	.37	21.4
Newborn	13.55	13.35	10.13	.36	15.2

Table 4. Effects of Feed Intake from D 30 to 50 of Gestation on Offsprings' Carcass Characteristics

Item	Feed Intake, lb/d: 4 lb Feed	4 lb Feed + 4 lb Corn	8 lb Feed	P<	SEM
No. of pigs					
Barrows	404	412	366		
Gilts	403	433	340		
Hot carcass weight, lb					
Barrows	207.8	209.3	211.3	.05	.58
Gilts	202.2	205.6	205.8	.03	.62
10th rib fat depth, mm[1]					
Barrows	20.27	20.23	20.44	.77	.13
Gilts	17.28	16.46	16.43	.01	.11
Loin depth, mm[1]					
Barrows	57.88	58.93	57.62	.01	.17
Gilts	58.97	59.72	59.23	.21	.18
NPPC percent lean, %[1]					
Barrows	53.47	53.59	53.31	.41	.07
Gilts	55.46	55.96	55.93	.01	.08
Fat-free lean index[1]					
Barrows	49.10	49.10	49.00	.77	.06
Gilts	50.36	50.75	50.76	.01	.06

[1]Used hot carcass weight as a covariate in the analysis.