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Abstract

Four hundred and eight sows were used to evaluate the effects of feeding high levels of vitamins (2 to 7 times average inclusion rate) for the first 35 d postbreeding on later reproduction performance. number of pigs born alive and number born dead following feeding high vitamin levels showed a numeric advantage compared with sows fed the control diet. These numeric responses resulted in trends toward higher number weaned (9.75 vs 9.54) and litter weaning weight (l 07.8 vs 105.4 lb). Further research needs to be conducted to determine which vitamin or vitamins may have an influence on embryo survival.; Swine Day, Manhattan, KS, November 16, 1995

Keywords

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INFLUENCE OF INCREASED VITAMIN LEVELS FOR THE FIRST 35 D POSTWEANING ON BREEDING AND SUBSEQUENT LACTATION PERFORMANCE OF SOWS[1]

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Summary

Four hundred and eight sows were used to evaluate the effects of feeding high levels of vitamins (2 to 7 times average inclusion rate) for the first 35 d postbreeding on later reproduction performance. Number of pigs born alive and number born dead following feeding high vitamin levels showed a numeric advantage compared with sows fed the control diet. These numeric responses resulted in trends toward higher number weaned (9.75 vs 9.54) and litter weaning weight (107.8 vs 105.4 lb). Further research needs to be conducted to determine which vitamin or vitamins may have an influence on embryo survival.

(Key Words: Sows, Gestation, Reproduction, Vitamins.)

Introduction

Research at North Carolina State University has demonstrated that a single injection of beta carotene at weaning will increase the number of pigs born alive at the subsequent farrowing. Further research demonstrated that injecting beta carotene or vitamin A at weaning, breeding, and 7 days after breeding increased subsequent litter size from 10 to 10.6 pigs per litter. The mechanism for this effect is not known but appears to involve increased embryo survival. Other research has indicated improved embryonic survival and (or) live births when various supplemental vitamins were added during the gestation period. The vitamins examined have included riboflavin, folic acid, and biotin. Two questions that remain are: 1) will embryonic survival be affected when increased vitamin A levels are provided in the feed for the first 35 days postweaning and 2) will other supplemental vitamins affect subsequent reproductive performance under commercial conditions? Therefore, the objective of this experiment was to examine the effects of elevated supplemental levels of vitamins for the first 35 days postweaning on subsequent reproductive performance.

Procedures

A total of 408 sows on a commercial operation in Northeast Kansas were used in this study. At weaning, the sows ($\geq$ parity 2) were assigned randomly to one of two dietary treatments for the first 35 days postweaning (Table 1). Following weaning, sows were moved to an environmentally controlled breeding facility. Sows were checked for estrus twice daily with a boar. Once estrus was detected, sows were mated naturally once every 24 hours until they were not in standing estrus. Sows that did not exhibit estrus by 7 days postweaning were removed from the experiment. Sows then were checked daily for signs of return to estrus

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[3]Northeast Area Extension Office.

[4]BASF Canada Inc.

postbreeding. Sows returning to estrus postbreeding were removed from experiment and culled.

All diets fed from weaning to the subsequent farrowing were 14% crude protein (.65% lysine), milo-soybean meal-based diets (Table 1). Supplemented vitamin levels are listed in Table 2. The control diet was formulated to closely match the average industry supplemental levels (BASF, 1992). The fortified diet was formulated to include between 2 and 7 times the industry average fortification levels. Sows were fed ad libitum from weaning to estrus. After insemination, sows were fed from 4 to 5.5 lb of feed per day throughout gestation. During the subsequent lactation, sows were fed ad libitum a 1.00% lysine milo-soybean meal based lactation diet. At farrowing, number of pigs born alive and dead and number of mummies were recorded. Pigs were cross-fostered within treatment, within the first 48 hours postweaning. At weaning, litter weaning weight and number of pigs weaned were recorded.

A chi square statistic was calculated for breeding performance and farrowing rate. Subsequent litter performance data were analyzed using analysis of covariance to determine if current lactation length was a significant covariant. Lactation length had a significant effect on litter weaning weight. Therefore, the analysis of variance model included treatment and lactation length as the independent variables.

Results and Discussion

Percentages of return to estrus by d 7 postweaning, pregnant by d 35 postweaning, and deaths were not affected by treatment (Table 3). Farrowing rate was excellent for both groups and was not affected by treatment. Sows fed high supplemental vitamins for the first 35 d postweaning had numerically more pigs born alive and fewer dead compared with those fed the control diets (Table 4). Sows fed high supplemental vitamins for the first 35 d postweaning tended to have more pigs ($P<.08$) and had heavier litters at weaning ($P<.18$).

The results of this study indicate that feeding increased vitamin levels for the first 35 d postweaning in sows did not influence breeding performance. However, embryo survival may have been affected, as indicated by the increased number of pigs weaned. This resulted in a heavier litter weaning weight. Therefore, further research needs to be conducted to determine which vitamin or vitamins may have an influence on embryo survival.

Table 1. Diet Composition[a]

Ingredient, %	Breeding (d 0 to 35 postweaning)	Gestation	Lactation
Milo	80.15	79.69	64.12
Soybean meal (46.5% CP)	15.52	15.52	28.33
Choice white grease	--	--	3.00
Monocalcium phosphate (21% P)	2.50	2.50	2.32
Limestone	1.14	1.14	1.08
Salt	.50	.50	.50
Breeding premix	.04	--	--
Vitamin premix	--	.25	.25
Sow add pack	--	.25	.25
Trace mineral premix	.15	.15	.15

[a]Diets were formulated to contain .65% lysine in breeding and gestation and 1.00% lysine in lactation. All diets were formulated to contain .9% calcium and .8% phosphorus.

Table 2. Supplemental Vitamin Levels (per Ton of Complete Feed)

	Breeding (d 0 to 35 postweaning)		
Nutrient	Control	Fortified	Gestation and lactation
Vitamin A, IU	8,200,000	20,000,000	10,000,000
Vitamin D3, IU	1,800,000	3,000,000	1,000,000
Vitamin E, IU	34,500	130,000	40,000
Riboflavin, mg	5,700	50,000	7,500
d-Pantothenic acid, mg	19,600	40,000	26,000
Niacin, mg	35,350	100,000	45,000
Vitamin B12, mg	25	80	30
Thiamine, mg	850	5,000	--
Pyridoxine, mg	1,050	5,000	--
Biotin, mg	135	1,000	300
Folic acid, mg	800	6,000	1500
Menadione, mg	2,075	4,000	4,000
Choline, g	500	500	500

Table 3. Effect of Increased Vitamin Levels in Early Gestation (Weaning to d 35) on Breeding Performance

Item	Control	Fortified	χ^2
Sows on Test	205	203	--
Removals			
% estrus by d 7 postweaning (No.)	98.5 (203)	98.0 (199)	.49
% pregnant d 35 postweaning (No.)	91.7 (188)	89.2 (181)	.19
% Death (No.)	.5 (1)	.5 (1)	.99
% Unknown (No.)	1.0 (2)	--	--
Sows farrowed	185	179	--
Farrowing rate, %[a]	91.1	88.6	.20

[a]Farrowing rate = number farrowed/ (number on test - number deaths - number unknown removals).

Table 4. Effect of Increased Vitamin Levels in Early Gestation (Weaning to d 35) on Subsequent Parity Litter Performance

Item	Control	Fortified	P-value	CV
Born alive	10.72	10.82	.73	23.6
Born dead	.90	.76	.27	142.7
Mummies	.11	.12	.82	326.7
Weaned	9.75	9.94	.08	10.0
Litter wean weight, lb[a]	105.4	107.8	.18	16.1

[a]Average lactation length of 14.4 days. Lactation length used as a covariant.