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## Influence of a single injection of beta carotene and/or vitamin A at weaning on subsequent reproductive performance of sows

### Abstract

A total of 956 sows was used to determine the influence of a single injection of beta carotene, vitamin A, or the combination of beta carotene and vitamin A at weaning on subsequent reproductive performance. At weaning, sows were allotted randomly to one of the following four treatments: 1) 5 ml of saline (control); 2) 5 ml of beta carotene (200mg); 3) 2 ml of vitamin A (1,000,000 IU); or 4) 5 ml of beta-carotene and 2 ml of vitamin A. A total of 718 sows farrowed following a normal return to estrus (≤ 30 days) and normal gestation length. The other 238 sows that received the injections were removed from the study for failing to return to estrus within 30 days postweaning, failing to conceive, failing to farrow, and lameness. Farrowing rate ranged from 73.2 to 78.4% (average of 75.1 %), but was not influenced significantly by treatment. Total pigs born, pigs born alive, or pigs born dead were not influenced by the injections. These results are different from previous research, which indicated that an injection of beta carotene or vitamin A increased number of pigs born alive. Number of pigs born alive (10.4) may have been too high on the farms used in this study to detect a significant improvement. Another possibility is that a second injection of beta carotene or vitamin A at breeding may be needed to elicit the increase in litter size.; Swine Day, Manhattan, KS, November 17, 1994

### Keywords

Swine day, 1994; Kansas Agricultural Experiment Station contribution; no. 95-175-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 717; Swine; Sows; Litter size; Vitamin A; Beta carotene

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**INFLUENCE OF A SINGLE INJECTION OF  
BETA CAROTENE AND/OR VITAMIN A AT WEANING  
ON SUBSEQUENT REPRODUCTIVE PERFORMANCE  
OF SOWS<sup>1</sup>**

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and J. L. Nelssen*

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**Summary**

A total of 956 sows was used to determine the influence of a single injection of beta carotene, vitamin A, or the combination of beta carotene and vitamin A at weaning on subsequent reproductive performance. At weaning, sows were allotted randomly to one of the following four treatments: 1) 5 ml of saline (control); 2) 5 ml of beta carotene (200 mg); 3) 2 ml of vitamin A (1,000,000 IU); or 4) 5 ml of beta-carotene and 2 ml of vitamin A. A total of 718 sows farrowed following a normal return to estrus (< 30 days) and normal gestation length. The other 238 sows that received the injections were removed from the study for failing to return to estrus within 30 days postweaning, failing to conceive, failing to farrow, and lameness. Farrowing rate ranged from 73.2 to 78.4% (average of 75.1%), but was not influenced significantly by treatment. Total pigs born, pigs born alive, or pigs born dead were not influenced by the injections. These results are different from previous research, which indicated that an injection of beta carotene or vitamin A increased number of pigs born alive. Number of pigs born alive (10.4) may have been too high on the farms used in this study to detect a significant improvement. Another possibility is that a second injection of beta carotene or vitamin A at breeding may be needed to elicit the increase in litter size.

(Key Words: Sows, Litter Size, Vitamin A, Beta Carotene.)

**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. Relatively little information is available from commercial production units concerning the influence of a single injection of vitamin A or beta carotene at weaning on subsequent litter size. Additionally, the influence of injections of both beta carotene and vitamin A at weaning on subsequent litter size has not been determined. Therefore, the objective of this trial was to determine if a single injection of beta carotene and/or vitamin A at weaning would increase subsequent litter size in multiple parity sows.

**Procedures**

A total of 956 sows on three farms were used in this study. Before leaving the farrowing crate at weaning, sows were assigned randomly to one of the injection treatments. Sows were injected with either 5 ml of sterile saline (control); 5 ml of beta carotene (200

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mg); 2 ml of vitamin A propionate (1,000,000 IU); or 2 ml of vitamin A propionate and 5 ml of beta carotene. Injections were given with a 1.5 in, 18 gauge needle deep in the neck muscle to avoid injecting directly into fat tissue.

Previous sow performance, including number of previous litters, prior lactation length, number of pigs born alive and dead, and number of mummies, was recorded at weaning. Following weaning, sows were moved to an environmentally controlled breeding facility. Sows were checked with a boar twice daily for estrus. Once estrus was detected, sows were inseminated once every 24 hours until sows were not in standing estrus. Sows were mated naturally on two farms and with artificial insemination on the third farm. Interval from weaning to estrus was recorded.

Sows were fed 4 to 5.5 lb of feed per day throughout gestation. Gestation diets were 14% crude protein, corn- or milo-soybean meal based diets. Gestation diets on all three farms contained approximately 10,000,000 IU of added vitamin A per ton.

At farrowing, number of pigs born alive and dead and number of mummies were recorded. Litter birth weight was measured on two of the farms. Number of pigs fostered on and off of each sow were recorded. At weaning, litter weaning weight, average pig weight, and number of pigs weaned were recorded. However, because cross-fostering was done among treatments, weaning information cannot be attributed entirely to treatment.

Data were analyzed to determine if any farm by treatment interactions occurred. Because no interactions were present, data were pooled for analysis. Further analysis revealed that number of prior litters, prior lactation length, and prior number of pigs born alive were not significant covariates. Therefore, no covariates were used in the final analyses. The statistical model included farm and treatment as the only independent variables.

## Results and Discussion

A total of 718 of the 956 sows returned to estrus within 30 days postweaning and farrowed after a normal gestation period. Thus, farrowing rate was 75.1%. Farrowing rate and interval from weaning to estrus were not influenced significantly by treatment (Table 1).

Numbers of total pigs born, born alive, born dead, and mummies were not significantly influenced ( $P > .30$ ) by injection treatment. Number of pigs born alive following injection with vitamin A or beta carotene showed a numeric advantage; however, the magnitude of the response was very small. Litter weaning weight and number of pigs weaned also were not influenced by treatment.

The results of this study indicate that a single injection of beta carotene and/or vitamin A at weaning did not improve subsequent reproductive performance. These results are different than the earlier trials at North Carolina State University. One reason for the difference in response may be the large number of pigs born alive to the control sows in this study (10.4 pigs). Additionally, the timing of the injection may have been wrong. Most of the initial work from North Carolina was conducted using two or more injections. If sows in this experiment had received another injection at breeding, the magnitude of the response might have been greater.

In a recent trial at the University of Minnesota, a single injection of beta carotene improved farrowing rate by approximately 5%. The numerical response was similar in our trial; however, the Minnesota study was able to detect the improvement in farrowing rate because they used a greater number of animals. This economically important response must be further tested and verified.

In conclusion, these results indicate that further research must be conducted with beta carotene and/or vitamin A before their use will be adopted widely in herds with large litter sizes.

**Table 1. Influence of Beta Carotene and/or Vitamin A on Sow Productivity<sup>a</sup>**

Item <sup>b</sup>	Control	Beta carotene	Vitamin A	Vitamin A & beta carotene	CV
Total sows	250	241	236	229	---
Sows farrowed	183	189	174	172	---
Farrowing rate, %	73.2	78.4	73.7	75.1	---
Weaning to estrus, d	7.4	7.5	7.7	7.7	104.8
Total pigs born	11.13	11.29	11.21	11.43	27.3
Pigs born alive	10.36	10.48	10.51	10.57	27.1
Pigs born dead	.55	.61	.49	.67	169.2
Mummies	.20	.18	.20	.19	269.2

<sup>a</sup>Sows were injected with 200 mg beta carotene and/or 1,000,000 IU vitamin A at weaning.

<sup>b</sup>No significant treatment differences ( $P > .10$ ).

