# INJECTION OF VITAMIN A AT INSEMINATION AND REPRODUCTIVE PERFORMANCE IN GILTS[1]

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## Summary

This experiment tested the hypothesis that an injection of vitamin A on the day of first detected estrus would improve reproductive performance of gilts. Gilts (432) were assigned to either receive vitamin A (1,000,000 IU) or placebo injected intramuscularly on the first day of estrus. No differences in farrowing rate, number of pigs farrowed per litter, or birth weight of pigs were detected. Possibly, gilts do not respond to vitamin A with improved fecundity. Other workers have reported an improvement in litter size for sows. Alternatively, treatment with vitamin A may need to precede estrus to improve litter size or multiple injections may be required. Experiments showing benefits for sows have treated them at weaning and, therefore, a few days before estrus.


(Key Words: Gilts, Vitamin A, Litter Size.)

## Introduction

Several recent reports indicate that vitamin A, injected when the litter is weaned, increases the number of pigs farrowed in the next litter. The mechanism for this effect is not known but appears to be achieved by increasing embryo survival. Because the treatment is given at weaning, it precedes estrus by 3 or more days, and the importance of that interval is not known.

Gilts make up a significant proportion of swine breeding herds, and the number of pigs in the first litter may limit reproductive performance. The expected date of the next estrus usually is not known for gilts, making the administration of vitamin A before estrus difficult. Therefore, in the present experiment, vitamin A was administered on the day of first detected estrus.

## Procedures

Gilts were moved to outside pens 22 days before the start of breeding and exposed to a mature boar (fenceline) to stimulate puberty. The boar was removed after 5 days and reintroduced 2 days before the start of breeding. Gilts were flushed by feeding a milo-soybean meal diet free choice beginning approximately 10 days before the start of breeding.

The experiment included 10 groups of gilts that were artificially inseminated from May, 1993 to March, 1994. Each breeding period was for 10 to 12 days, during which gilts were checked daily for estrus. When the standing reflex was detected, gilts were moved to a breeding-gestation building where they were placed in individual gestation stalls and injected with 2 ml of either vitamin A or placebo (the vehicle minus vitamin A).

Gilts were artificially inseminated (AI) on the first and second days of estrus. Pooled

[1]The authors appreciate the donation of injectable vitamin A and placebo by Phoenix Scientific, St. Joseph, MO.

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semen (at least 3 billion motile sperm) from two or more boars was used for each AI. Gilts were checked for return to estrus from 18 to 23 days after AI, and pregnancy was checked (ultrasound) from 28 to 30 days after AI. Pregnant gilts were moved to outside pens for the remainder of gestation and fed individually 4 lb/day of a complete milo-soybean meal diet until approximately day 90 of gestation, when the daily feed was increased to 5 lb/day. Within a few days of expected farrowing, gilts were moved to the farrowing-nursery complex. At farrowing, the total number of pigs farrowed, the number born alive, and the birth weight of each pig were determined.

## Results and Discussion

No effects of vitamin A treatment on farrowing rate or litter size were detected (table 1). Further, litter weight at farrowing was not affected by treatment (27.1 vs 27.3 lb for control and vitamin A-treated gilts, respectively). Breeding group differences ($P < .05$) were detected for farrowing rate and litter traits (Table 1). Farrowing rates ranged from 67 to 100%, and the number of pigs born alive from 7.6 to 11.2. Some of this variation appears to be related to season, but genotype also changed, with pigs before November 1993 sired by Yorkshire boars and those farrowed later sired by Duroc × Hampshire boars. The breed makeup of the gilts changed also in the rotational crossbreeding system used.

There are three possible explanations for the failure of vitamin A to improve litter traits. First, most of the research reporting positive effects has been conducted with sows. A second possibility is that the injection of vitamin A was administered too late. A third possibility is that multiple injections of vitamin A are required to elicit the effect. As described in the introduction, other experiments have studied the injection of vitamin A to sows at weaning, and, therefore, treatment preceded estrus by a few days. To apply a similar regimen to gilts in practical situations may require use of estrous synchronization, but no estrous synchronization products currently are labelled for use in gilts in the U.S.

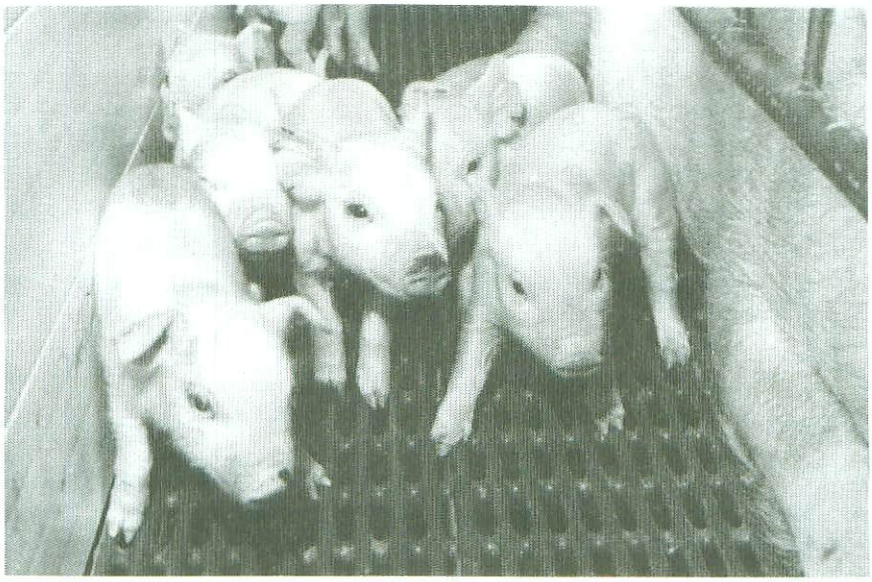

**Table 1. Fertility of Gilts Injected with Placebo or Vitamin A at Insemination**

| | Placebo | | | | Vitamin A[a] | | | |
|---|---|---|---|---|---|---|---|---|
| Month inseminated | n | Farrowed (%) | Total born | Born alive | n | Farrowed (%) | Total born | Born alive |
| All months | 216 | 181 (84) | 10.6[b] | 9.6[b] | 216 | 191 (88) | 10.1 | 9.3 |
| May | 22 | 21 (95) | 10.0 | 8.8 | 21 | 20 (95) | 11.3 | 10.2 |
| June | 23 | 22 (96) | 10.1 | 9.7 | 23 | 23 (100) | 10.4 | 9.3 |
| July | 24 | 16 (67) | 10.4 | 9.3 | 23 | 19 (83) | 10.7 | 10.1 |
| August[c,d,e] | 24 | 19 (79) | 9.6 | 9.2 | 24 | 19 (79) | 7.9 | 7.6 |
| September[d] | 20 | 16 (80) | 10.5 | 7.9 | 21 | 21 (100) | 11.1 | 8.7 |
| November | 22 | 17 (77) | 11.6 | 11.2 | 21 | 17 (81) | 9.9 | 9.4 |
| December | 20 | 19 (95) | 11.7 | 10.8 | 21 | 19 (90) | 10.6 | 10.4 |
| January | 20 | 17 (85) | 11.8 | 11.2 | 22 | 21 (95) | 10.4 | 9.7 |
| February[d] | 20 | 16 (80) | 9.9 | 8.7 | 20 | 16 (80) | 10.1 | 9.1 |
| March[d,f] | 21 | 18 (86) | 10.4 | 9.2 | 20 | 16 (80) | 9.0 | 8.5 |

[a]Vitamin A (1,000,000 IU) was injected on the first day of estrus.
[b]Pooled standard errors are .23 for total born and pigs born alive/litter.
[c]Fewer ($P < .05$) total pigs farrowed than for inseminations in all other months except March.
[d]Fewer ($P < .05$) live pigs farrowed than for inseminations in January, May, June, July, November, and December.
[e]Fewer live pigs farrowed than for inseminations in all other months except September.
[f]Fewer total pigs farrowed than for January and December inseminations.