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E Weaver

Michael D. Tokach

Jim L. Nelssen

*See next page for additional authors*



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# Effects of spray-dried blood cells in lactation diets on sow and litter performance


## Authors

E Weaver, Michael D. Tokach, Jim L. Nelssen, Robert D. Goodband, and Steven S. Dritz

# EFFECTS OF SPRAY-DRIED BLOOD CELLS IN LACTATION DIETS ON SOW AND LITTER PERFORMANCE [1]

*S. S. Dritz [2], M. D. Tokach, J. L. Nelssen, R. D. Goodband, and E. Weaver [3]*


## Summary

High producing sows were used to evaluate the effect of spray-dried blood cells as a dietary protein source on lactation performance and subsequent reproductive performance. No significant differences were observed between sows fed a corn-soybean cells-based diet or a diet containing 2.5% spray-dried blood cells for lactation performance or subsequent reproductive performance. Therefore, spray-dried blood cells can be used as a partial replacement for the protein source in lactation diets.


(Key Words: Spray-Dried Blood Cells, Lactation, Reproduction.)

## Introduction

Several experiments have showed the improved sow milk production and increased litter growth rate for sows fed diets containing greater amounts of dietary lysine than recommended by NRC (1988). Thus, recommendations for commercial herds range from 45 to 55 g/d of lysine (.9 to 1.2% of the diet). Soybean meal is the predominate protein source used in lactation diets; however, diets formulated to 1.0% lysine or greater, contain high levels of soybean meal (> 550 lb/ton). Little information is available to evaluate the effects of highly palatable and digestible protein sources such as spray-dried blood cells on sow feed intake and performance. Therefore, the objective of this experiment was to evaluate the effect of spray-dried blood cells in a lactation diet on sow and litter performance.

## Procedures

A total of 417 sows (PIC Camborough genotype) was assigned randomly at farrowing to one of two dietary treatments in an on-farm field study (208 sows fed diets containing spray-dried blood cells and 209 sows fed the control lactation diet). Care was taken to equalize the number of gilts and sows of each parity to each treatment. Sows used in the experiment farrowed from June 30, 1995 to August 23, 1995.

Sows were fed corn-soybean meal-based diets formulated to contain 1.2% lysine and 3% added fat during the lactation period (Table 1). The dietary treatments consisted of the corn-soybean meal control or a diet formulated with 2.5% granular spray-dried blood cells (AP 301 G) substituted on an equal lysine basis. All sows then were fed a common gestation diet in the subsequent gestation period.

Sow feed intake was recorded daily during lactation. Sows were provided ad

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[2]Food Animal Health and Management Center.

[3]American Proteins Corp, Ames, IA.

libitum access to feed throughout lactation. Number of pigs born (total, stillborn, mummies, and alive) and weaned, sow weight at entry into the farrowing room and weaning, sow parity, lactation length, and litter weaning weights also were recorded. Litters were equalized across dietary treatments within 48 hours of farrowing. Pigs were not transferred among litters after 48 hours postfarrowing.

Following weaning, sows were moved to an environmentally controlled breeding facility, and all parity 1 sows were injected with PG-600 on the day of weaning. Sows were checked for estrus daily with a boar. Once estrus was detected, sows were artificially inseminated once every 24 hours until they were not in standing estrus. Sows culled or returning to estrus after insemination were removed from the experiment, and removal reason was recorded. Total and live births in subsequent parities also were recorded.

Sow weight; ADFI; and farrowing, weaning, and subsequent farrowing performance were analyzed using a General Linear Model with treatment and parity as the independent variables. In addition, lactation length was used as a covariate for sow weight, ADFI, and weaning performance. No parity by treatment interactions were observed and number of sows within parity did not differ among treatment; therefore, main effect means are reported in the tables. A chi square statistic was calculated for breeding performance, removal reasons, and farrowing rate.

## Results and Discussion

No differences were detected in sow weight, ADFI, and farrowing or weaning performance (Table 2). However, numerical trends were observed for improvements in ADFI ($P < .14$) and litter weaning weight ($P < .15$). Similar to observations noted in nursery pigs, farrowing house personnel observed that the piglets in litters from sows fed the spray-dried blood cells were "dirtier" in appearance. However, this appearance was not associated with a decrease in litter performance. Removal reasons, total removals, or farrowing rate were not different among treatments (Table 3). Spray-dried blood cells fed in lactation did not influence the wean to estrus interval or the litter size (total or live births) of the sows that farrowed in the subsequent parity (Table 4).

Sow and litter performance by parity was examined (data not shown). The sows' lysine requirement was calculated assuming that 49 mg lysine $\times$ $BW^{.75}$ + 26 g lysine per kg litter growth/day is required. This calculation is based on maximizing litter growth performance and the fact that lysine is the limiting amino acid. The calculations indicate that the average sow in parities 1 to 4 was consuming lysine below her projected requirement. Therefore, if the lysine from the spray-dried blood cells is more available, the litter performance should have improved.

In conclusion, spray-dried blood cells can be used as a partial replacement for soybean meal in the lactation diet of high-producing sows without adverse effects on feed intake.

**Table 1. Diet Composition (%) As-Fed**

| Item | Lactation | | Gestation |
|---|---|---|---|
| | Blood Cells | Control | |
| Ingredient, % | | | |
| Corn | 62.65 | 57.4 | 74.9 |
| Soybean meal (46.5% CP) | 27.2 | 35.1 | 15.6 |
| Spray-dried blood meal | 2.5 | -- | -- |
| Alfalfa meal | -- | -- | 5.0 |
| Choice white grease | 3.0 | 3.0 | -- |
| Monocalcium phosphate (21% P) | 2.6 | 2.5 | 2.7 |
| Limestone | 1.1 | 1.2 | .8 |
| Salt | .50 | .50 | .50 |
| Sow add pack premix[a] | .125 | .125 | .125 |
| Vitamin premix[a] | .125 | .125 | .125 |
| Trace mineral premix[a] | .15 | .15 | .15 |
| DL-methionine | .055 | -- | -- |
| Nutrient, % | | | |
| Lysine | 1.20 | 1.20 | .70 |
| Methionine | .36 | .33 | .25 |
| Methionine + cystine | .72 | .72 | .55 |
| Crude protein | | | |
| Calculated | 20.3 | 21.3 | 14.6 |
| Analyzed | 21.1 | 21.8 | -- |
| Calcium | 1.00 | 1.00 | 1.00 |
| Phosphorus | .90 | .90 | .90 |

[a]Premixes to provide 60,000 IU vitamin E per ton and all other vitamins and trace minerals as specified in the Kansas Swine Nutrition Guide.

**Table 2. Influence of 2.5% Spray-Dried Blood Cells Fed in Lactation to High-Producing Sows[a]**

| Item | Lactation Diet | | Probability | |
|---|---|---|---|---|
| | Spray-Dried Blood Cells | Control | $P<$ | CV |
| No. of sows | 208 | 209 | -- | -- |
| Sow weight | | | | |
| Prefarrowing, lb | 531 | 533 | .66 | 8.5 |
| Weaning, lb | 502 | 504 | .62 | 8.3 |
| Weight loss, lb | 29.8 | 29.7 | .97 | 76.2 |
| ADFI, lb | 11.2 | 10.9 | .14 | 16.2 |
| Farrowing performance | | | | |
| Total births | 10.9 | 10.7 | .57 | 29.2 |
| Stillbirths | .7 | .9 | .17 | 189.9 |
| Mummies | .1 | .2 | .30 | 299.4 |
| Live births | 10.2 | 9.6 | .20 | 31.7 |
| Weaning performance | | | | |
| Number weaned | 9.1 | 8.9 | .23 | 11.8 |
| Litter weight, lb | 106.9 | 103.2 | .15 | 18.1 |
| Avg pig weight, lb | 11.7 | 11.5 | .39 | 14.6 |

[a]Lactation length (15.6 d) was used as a covariate for sow weight, ADFI, and weaning performance. Sows farrowed from June 30, 1995 to August 25, 1995.

**Table 3. Influence of 2.5% Spray-Dried Blood Cells Fed in Lactation on Subsequent Reproductive Performance and Removal Reasons[a]**

| | Lactation Diet | |
|---|---|---|
| Item, % (No.) | Spray-Dried Blood Cells | Control |
| No heat (No.) | 3.4 (7) | 3.8 (8) |
| Did not conceive (No.) | 3.4 (7) | 3.3 (7) |
| Regular returns (No.) | 5.8 (12) | 6.7 (14) |
| Irregular returns (No.) | 5.8 (12) | 5.7 (12) |
| Total reproductive removals (No.) | 18.3 (38) | 20.1 (42) |
| Nonreproductive (No.) | 5.3 (11) | 3.3 (7) |
| Unknown (No.) | .5 (1) | .5 (1) |
| Total removals (No.) | 24.0 (50) | 23.4 (49) |
| Farrowing rate | 76.0 | 76.6 |

[a]No significant differences observed.

**Table 4. Influence of 2.5% Spray-Dried Blood Cells Fed in Lactation on Subsequent Wean to Estrus Interval and Parity Litter Size[a]**

| | Lactation Diet | | | |
|---|---|---|---|---|
| Item | Spray-Dried Blood Cells | Control | *P*< | CV |
| No. of sows | 158 | 160 | -- | -- |
| Wean to estrus, d | 5.2 | 5.2 | .87 | 13.3 |
| Total births | 11.0 | 11.2 | .72 | 33.7 |
| Live births | 10.1 | 9.6 | .40 | 34.6 |

[a]Five animals from each treatment group with wean to estrus intervals of > 15 d and 9 animals from each treatment group culled before exhibiting estrus were removed from the data set.