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EFFECTS OF SPLIT-NURSING MANAGEMENT ON GROWTH PERFORMANCE IN NURSING PIGS [1]

T. S. Donovan [2] and S. S. Dritz [2]

Summary

We evaluated the effects of split nursing the lightest 50% of pigs per litter or the lightest and heaviest 50% of pigs per litter at birth on growth performance until weaning. We did not observe any effects of split nursing on growth performance in pigs from litter sizes < 9 at birth. Additionally, we did not observe a difference in mean ADG or pig weight at weaning. However, we did observe a reduction in the variation of ADG between litters. The resulting decrease in variation leads to approximately a 55% (1.3 vs 3.0) reduction in pigs weighing less than 8 lb at weaning. We conclude that the greatest economic benefits are derived from split nursing the lightest 50% of pigs from litter sizes ≥ 9.

(Key Words: Split Nursing, Colostrum, Lactation, Growth.)

Introduction

Split nursing is defined as removing piglets from the dam for a set period of time to allow uncompetitive suckling for others. Split nursing is a management tool that can be used to decrease the competitiveness for colostrum in large litters. Implementing split nursing allows underprivileged piglets (less than 2 lb) the opportunity for adequate transfer of passive immunoglobulin. If these piglets are able to gain sufficient amounts of immunoglobulin, they will benefit by being more viable and heavier at weaning. Production on a sow farm typically is measured by pigs/sow/year (p/s/y). Measuring (p/s/y) gives no indication of the quality of pigs being produced. Pigs that receive inadequate amounts of immunoglobulin are challenged by disease and unthriftiness. Thus, increasing the amount of immunoglobulin absorbed by piglets will enhance the quality of weaned piglets. More efficient production has led to larger litters with an increased variation in piglet size. This includes more piglets in the less viable category. Variation in weight among litter mates starts at birth and seems to continue to weaning age and often through the nursery and finisher. Limiting weight variation is important for improving the facility's utilization of all-in all-out systems. Our objective was to improve weaned pig quality by decreasing the variation in growth performance of nursing pigs using management methods.

Procedures

Treatment Groups. We used a total of 118 litters, randomly assigned to one three treatment groups:

Control = Control group in which no split nursing was performed.

Light = Removed the heaviest 50% of the litter to allow uncompetitive suckling for the lightest 50%.

[1]Appreciation is expressed to Newsham Hybrids USA, Colorado Springs, CO for providing the facilities and animals used in this experiment. A special thank you to Chris Allen for providing technical assistance.

[2]Food Animal Health and Management Center.

All = Removed the heaviest 50% (as in Light group), then removed the lightest 50% to allow the same uncompetitive suckling for the heavier pigs.

A sow was assigned randomly to a treatment group before parturition. At the completion of farrowing (expulsion of the placenta), each piglet was weighed and tattooed with an individual ID. The individual pig birth weight, piglet identification, sow identification, parity, gestation length, and farrow date were recorded. The litters that were split nursed were divided by birth weight into the heaviest and lightest 50%. If a litter consisted of an odd number of piglets, the odd piglet was put in the heavier group. The heavy piglets were put in a box next to the crate for 2 hr. After 2 hr, the heavy pigs were placed back into the farrowing crate. For the litters in which the heavier pigs were split suckled, the light pigs were now removed for 2 hr. This allowed the heavier piglets an opportunity for nursing without competition from the lighter pigs. After completing the split nursing, the piglets were left to suckle the sow for 24 hr. The litters then were processed, which includes cutting teeth, castrating, cauterizing tails, and injecting with a 3 cc IM iron. Lastly, the piglets were cross-fostered to create even litters of nine to 11 per sow depending on the size of the litters. The piglets were weighed individually again at weaning. Mortality was monitored, with the date and piglet weight at mortality recorded.

Calculations. The standard deviation (STD) for birth weight (BW) and weaning weight were calculated for each litter. Average daily gain (ADG) was calculated for each pig by dividing piglet weight gain by days of lactation. The coefficient of variation (CV) was calculated by taking the STD for each litter divided by average pig weight. The standard normal curves then were obtained using the average and STD for pig weaning weight and ADG.

Statistical Analysis. Data were analyzed as a randomized complete block design in a 2 × 3 factorial arrangement. With the main effects of litter size (less than 9 and 9 or greater pigs born alive) and split nursing treatment (control, light 50% split nursed, light and heavy 50% split nursed). Litter was considered the experimental unit for all response criteria. Analysis of variance was performed using the GLM procedure of SAS with birth weight and lactation days used as a covariates.

Results and Discussion

Preweaning mortality was not affected by treatment (data not shown). Other results are listed in Table 1. Interactions for litter size by split nursing strategy were detected for ADG STD and ADG CV ($P < .09$ and .07, respectively). No significant main effects ($P > .10$) were detected for any of the other response criteria. Interpretation of the values suggests that weaning weights in litters with less than 9 born alive were not affected by the split nursing procedure, whereas a linear improvement ($P < .05$) in the ADG STD and CV occurred for litters with 9 or greater pigs born alive. The distribution of weaning weights shows a shift to the right (Figure 1). This shift for the split-nursed pigs indicates fewer lighter weight pigs at weaning. Occurrence of the shift for both groups of split-nursed pigs suggests less variation among weights of pigs at weaning.

The distribution of the mean pig ADG is depicted in a normal curve in Figure 2. The shifting of the weaning weight was due to decreased variation in ADG for the split-nursed piglets. Split nursing the less viable piglets achieved a more consistent growth performance.

These data suggest that the quality of weaned pigs from split-nursed litters is improved. The decrease in variation of ADG among litters will produce pigs that are more uniform at weaning, possibly reducing the variation in days to market pigs at optimal weight. The decrease in lighter weight pigs limits variation at weaning. An all-in all-out system would benefit by a decreased variation in weight of pigs entering the nursery. A decrease in variation would improve facility utilization by decreasing turnaround time. Improving variation in a group carried

throughout the finisher would produce a more uniform, consistent product at market. Further research must be conducted to determine if the benefits of split nursing are maintained to market.

Intestinal absorption of immunoglobulin from colostrum normally ceases by 24 to 36 hr after birth. Small amounts of colostrum in newborn piglets induces intestinal closure, suggesting that piglets must have adequate time to suckle. Therefore, a short but vital period exists when sufficient intake for each pig must be accomplished. The competition among litters of 9 or greater pigs inhibits adequate transfer of immunoglobulin in the lighter weight, less viable piglets. Split nursing decreases the competition and allows the underprivileged pigs an opportunity for colostral intake.

Economic Analysis. This study included 118 litters with a total of 1,193 pigs. We assumed that pigs were sold at weaning and 1,193 pigs were sold. The following market prices per head were assumed: $32 for weaned pigs 9 lb or greater, $25 for pigs 8 lb or greater but less than 9 lb, and $7 for pigs less than 8 lb.

The percentages of pigs 8 lb or greater and 9 lb or greater from a litter size of 9 or greater are listed in Table 2. Using the above prices for the weaned pigs, the litters that were split nursed (light) would have a gross income of $37,500. The litters in which both groups were split nursed (all) would have a gross income of $37,407. The control group that was not split nursed would produce only $36,849 gross income. The difference in income between the light and control groups is $651. These litters were farrowed in a 2-week period. Therefore, the increased income per day is $46.50 (based on 8 litters/day). Subtracting the labor cost (1.5 hr/8 litters @ $10/hr) of implementing the split nursing, the total profit from split nursing is $46.50 - $15 = $31.50/day. The yearly increase in net income from implementing split nursing would be $11,497.50. These calculations are based on a sow herd size of 1800 sows in which split-nursing is practice for only the lightest 50%. We also assumed that approximately 2/3 of the litters will have 9 or greater pigs born alive.

Practical Implementation of Split Nursing. In a production setting, the time-consuming tasks of weighing, tattooing, and record keeping involved in this project would be eliminated. In addition, our data suggest that greater benefits are obtained by split nursing litters with > 8 pigs born alive. The weight of the piglet could be estimated, and the heaviest or largest half of the litter removed. A plastic container that can be disinfected and reused is suggested along with a heat lamp with a clamp or a heat pad. Monitoring the split nursing would be the most time-consuming part of the procedure. Limiting the split-nursing time to 2 hr needs to be watched carefully to prevent hypoglycemia or hypothermia. Small portable timers can be used to remind personnel when piglets need to be returned to the crate. Piglets should be split nursed within 24 hr of birth in order to have sufficient opportunity for immunoglobulin.

In conclusion, split nursing can be used to decrease the variation of average daily gain of pigs while nursing. Split nursing the lightest pigs from litters of 9 or greater resulted in the greatest economic benefit.

Table 1. Influence of Litter Size and Split-Nursing Management Strategy on Growth Performance of Nursing Pigs[a]

	Litter Less than 9			Litter 9 or Greater			S×T[c]	
Item	Control	Light	All[b]	Control	Light	All	P-value ($P<$)	CV
Average, lb								
Weaning weight	12.8	12.2	12.3	11.9	12.0	12.1	.55	11.3
ADG	.51	.47	.48	.46	.46	.47	.52	16.0
Average litter STD, lb								
Birth weight	.63	.69	.58	.61	.61	.68	.18	29.2
Weaning weight	1.9	1.8	1.9	2.1	1.8	2.0	.84	32.7
ADG[d]	.09	.09	.11	.12	.11	.10	.09	34.4
Average coefficient of variation, %								
Birth weight	17.9	19.6	16.8	16.9	17.0	19.1	.21	28.8
Weaning weight	14.7	14.6	16.2	17.3	15.3	16.2	.73	31.6
ADG[d]	17.1	19.8	23.6	26.3	24.1	22.4	.07	36.2

[a]A total of 118 litters was used. Birth weight and lactation days were used as covariates. The average birth weight was 3.6 lb, and average lactation length was 18.2 days.
[b]The split-nursing strategies consisted of control (no split nursing), light (only the lightest 50% of the litter allowed to suckle uncompetitively, and all (both the light and heavy 50% were split nursed). The pigs were allowed to suckle uncompetitively for 2 hr following the birth of the last pigs in the litter.
[c]$S \times T$ = litter size $<$ or ≥ 9 by split-nursing strategy
[d]Treatment $\times$ litter size ≥ 9, linear ($P<.05$).

Table 2. Percent of Pigs Greater than or Equal to 8 or 9 lb at Weaning Weight Born to Sows with Litter Sizes of 9 or Greater

	Split-Nursing Treatment		
Pigs, %	Control	Light	All
Greater than or equal to 8 lb	97.0	98.7	98.4
Greater than or equal to 9 lb	91.8	95.4	94.9

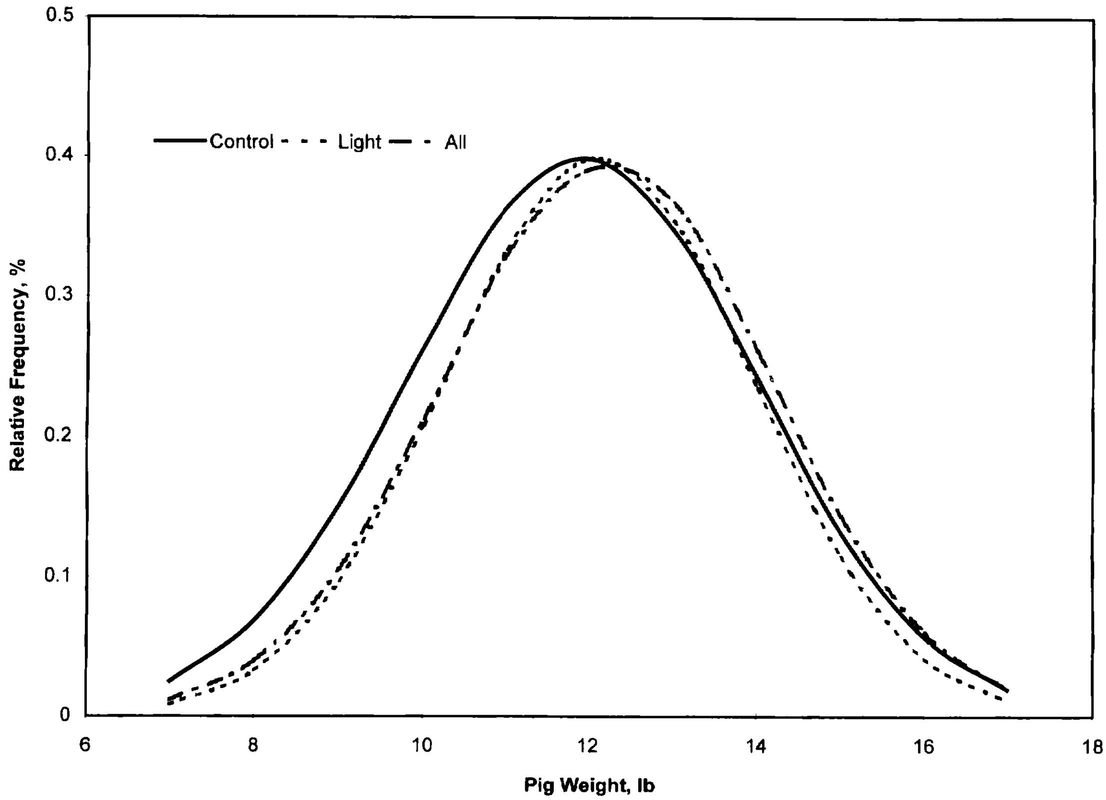

Figure 1. Distribution of Weights of Split-Nursed Pigs at Weaning

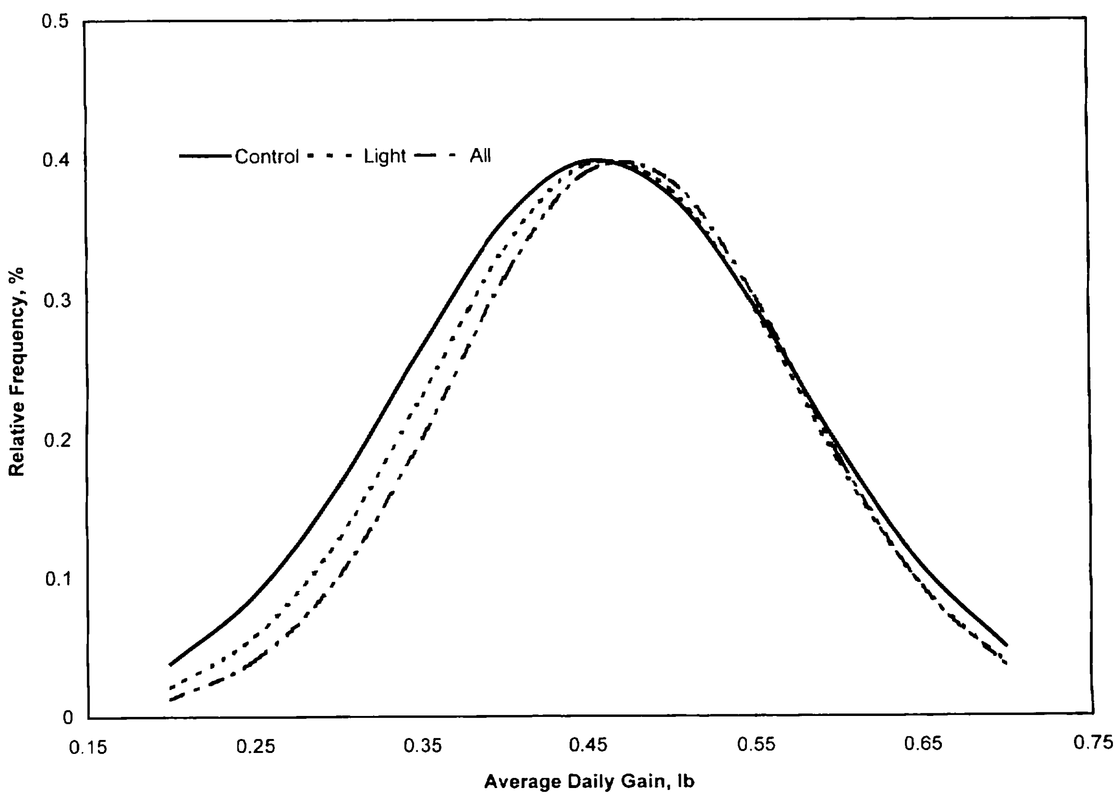

Figure 2. Distributions of ADG of Split-Nursed Pigs during Lactation