

2002

Effect of Nursery Pen Group Size on Performance and Weight Variation of Pigs Weaned at 10 to 20 and 20 to 30 Days of Age

G.W. Libal
South Dakota State University

Follow this and additional works at: http://openprairie.sdstate.edu/sd_swinereport_2001

 Part of the [Animal Sciences Commons](#)

Recommended Citation

Libal, G.W., "Effect of Nursery Pen Group Size on Performance and Weight Variation of Pigs Weaned at 10 to 20 and 20 to 30 Days of Age" (2002). *South Dakota Swine Research Report, 2001*. 28.
http://openprairie.sdstate.edu/sd_swinereport_2001/28

This Article is brought to you for free and open access by the Animal Science Field Day Proceedings and Research Reports at Open PRAIRIE: Open Public Research Access Institutional Repository and Information Exchange. It has been accepted for inclusion in South Dakota Swine Research Report, 2001 by an authorized administrator of Open PRAIRIE: Open Public Research Access Institutional Repository and Information Exchange. For more information, please contact michael.biondo@sdstate.edu.



Effect of nursery pen group size on performance and weight variation of pigs weaned at 10 to 20 and 20 to 30 days of age

G. W. Libal
Department of Animal and Range Sciences

SWINE 2001 - 27

Current trends in the swine industry are for management of pigs in larger groups well beyond that which has been recommended. With larger groups there is the potential for higher stocking rates because of more effective pig space per pen, savings in cost of dividing fences, and, in some cases, feeding equipment. However, with larger groups, more initial weight variation within a pen would be expected due to less sorting and more social competition because of more pigs per pen. It is unclear if these potentially negative factors would result in poorer pig performance during the nursery period and/or more weight variation as pigs leave the nursery negating the savings in fixed building costs. The research reported herein was designed to evaluate the effect of doubling nursery pig group size from 24 to 48 on performance, survival, and weight variation for pigs weaned at 10 to 20 and 20 to 30 days of age and provided the same unit of floor space per pig.

(Key Words: Weaned pigs, Nursery group size, Age at weaning.)

Experimental Procedure

All litters of a contemporary farrowing group were weaned when the average age of the pigs was 20 days. The farrowing group was divided into two groups, 20 days of age and less and 20 days of age and more (96 older pigs and 96 younger pigs). From within each age group two subgroups (48 pigs) were formed stratified by weight, sex, and litter. Each subgroup was further divided based on individual pig weight (24 lighter pigs and 24 heavier pigs). These groups were penned as combined groups of 48 pigs or two groups of 24 sorted by weight.

Resulting treatments evaluated were:

Young pigs - 24 light and 24 heavy pigs in separate smaller pens

Older pigs - 24 light and 24 heavy pigs in separate smaller pens

Young pigs - 24 light and 24 heavy pigs in one large group pen

Older pigs - 24 light and 24 heavy pigs in one large group pen.

Two farrowing groups were utilized in the experiment with each farrowing group being a replicate over time. Each farrowing group contributed 196 pigs (8 groups of 24 pigs) for a total of 392 pigs.

Pigs were housed in two identical nursery rooms at the SDSU Swine Research Center. Older pigs were penned on Tri-bar metal flooring and younger pigs were housed on vinyl flooring. Both groups were provided with an adequate warm, solid sleeping area supplied by heat-pad supplemental heat. In addition, the nursery rooms were at 30°C (86°F) at the beginning of the trial and the temperature was reduced weekly to 20°C (70°F) by the end of the trial. Younger pigs were on test for 35 days and older pigs were on test for 28 days. Therefore, end weights were for pigs of the same age, averaging approximately 52 days of age. A commercial phase-I diet was provided to the younger pigs for 2 weeks and the older pigs for 1 week followed by a commercial phase-II diet for 3 weeks. The diets contained Carbadox. For each age group, rectangular pens were utilized which provided 17.8 sq. m. (96-sq. ft.) of total pen space for 48 pigs. Three feeders were placed at each end of the rectangle and two nipple waterers were placed along the sides near each end of the rectangle. The heat pads were in the center of the rectangular pen. For the groups of 48 pigs, the entire pen was utilized to house the mixed 24 light and 24 heavy pigs. For the groups with 24 pigs, the rectangular pen was divided down the middle over the heated sleeping area to form two pens, one for the 24 light pigs and one for the 24 heavy pigs.

Individual pig weights were obtained weekly. Pig weights, gain, and estimates of variation were obtained for groups of 24 heavy pigs and 24 light pigs whether penned separately in groups of 24 or penned in groups of 48 pigs. Feed intake, adjusted for collected wastage, was obtained for each pen on a weekly basis. Feed data were obtained by pen and analyzed on the basis of groups of 48 pigs. The data were analyzed as a randomized block design with a factorial arrangement of age and group size blocked over time. It was recognized that time on trial and floor-type utilized for each group of pigs were confounded with age of pig and it was expected that performance between age groups would be different. Of interest was if this confounding would contribute to an interaction between age at weaning and group size of nursery pen.

Results

The means for the effect of nursery pen group size are shown in Table 1. Of the two groups of 192 pigs that began the experiment in one pen of 48 pigs or in two pens of 24 pigs, 183 pigs survived in each group. Average pen gain and average pen feed intake were similar ($P>.10$). Gain/feed was the same ($P>.10$) for pigs penned in groups of 48 pigs or two groups of 24 pigs sorted by weight.

The effect of age at weaning on pig nursery performance is shown in Table 2. Average pen weight gain and average pen feed intake were not different ($P>.10$) between groups of pigs weaned at less than 20 days of age or more than 20 days of age. However, gain/feed was greater ($P<.05$) for the older pigs. Older pigs were on test 28 days and younger pigs, 35 days. Table 3 summarizes the effects of the 2 x 2 factorial of age at weaning and nursery pen group size on pen pig performance.

TABLE 1. EFFECT OF NURSERY PEN GROUP SIZE ON PIG NURSERY PERFORMANCE^a

Item	Pen group size		SE
	48 mixed	24 + 24	
No. of pigs, initial	192	192	
No. of pigs, end	183	183	
Pig survival, %	95.3	95.3	
Avg pen gain, kg	525.7	526.0	25.9
Avg pen feed, kg	778.1	776.9	27.8
Gain/feed	.67	.68	.002

^aPen data for two replications of 192 pigs each.

TABLE 2. EFFECT OF AGE AT WEANING ON PIG NURSERY PERFORMANCE^a

Item	Age at weaning		SE
	Young	Old	
No. of pigs, initial	192	192	
No. of pigs, end	179	187	
Pig survival, %	93.2	97.4	
Avg pen gain, kg	556.5	495.2	25.9
Avg pen feed, kg	851.7	703.3	28.8
Gain/feed ^b	.66	.70	.002

^aPen data for two replications of 192 pigs each.

^bAge effect ($P<.05$).

Average pen gain and average pen feed intake were not affected ($P<.10$) by the

combination of age at weaning and pen group size. However, there was an age at weaning by

pen group size interaction for gain/feed. Pen management did not affect gain/feed for older pigs, but mixing of 48 pigs in one pen reduced gain/feed compared to penning pigs 24 per pen sorted by weight for younger pigs.

Table 4 lists the least square means for pig weights and gain on a weekly basis throughout the trial. These were analyzed by age of pig and not by the time after weaning. Because the young pigs were on test 35 days and the older pigs were on test 28 days, the final weights for

both groups of pigs are at approximately 52 days of age. Gain was affected by age at weaning for pigs between <27 and <35 days of age ($P<.01$) and the last week of the trial ($P<.10$). Allotment to weight groups affected weights and gain at all points throughout the trial. Lighter pigs were lighter and gained less at all stages. Pigs penned in groups of 24 had heavier weights ($P<.05$) at <35 and <42 days and had greater gains ($P<.10$) during the last week of the trial than pigs penned in groups of 48.

TABLE 3. MEANS FOR INTERACTIONS OF AGE AT WEANING AND NURSERY PEN GROUP SIZE FOR PIG NURSERY PRODUCTION^a

Group size	Young		Old		SE
	48 mixed	24 + 24	48 mixed	24 + 24	
No. of pigs, initial	96	96	96	96	
No. of pigs, end	89	90	94	93	
Pig survival, %	92.7	93.8	97.9	96.9	
Avg pen gain, kg	541.5	571.6	509.9	480.9	36.6
Avg pen feed, kg	845.6	857.9	710.6	696.0	39.3
Gain/feed ^{bc}	.64	.67	.70	.69	.003

^aPen data for two replications of 192 pigs each.

^bAge effect ($P<.05$).

^cAge x group size interaction ($P<.10$).

TABLE 4. LEAST SQUARES MEANS FOR PIG WEIGHTS AND PIG GAIN AS AFFECTED BY AGE AT WEANING, NURSERY GROUP SIZE, AND WEIGHT OF PIG AT WEANING^a

Item	Young				Old			
	Group of 48		Groups of 24		Group of 48		Groups of 24	
	Light	Heavy	Light	Heavy	Light	Heavy	Light	Heavy
<u>Pig weights, kg</u>								
<20 days old ^b	4.53	6.31	4.46	6.39				
<27 days old ^{bc}	5.04	7.09	4.92	7.04	6.32	8.88	6.54	8.89
<35 days old ^{bcd}	6.84	9.53	6.94	9.88	7.34	9.72	7.61	9.92
<42 days old ^{bf}	8.76	12.11	9.18	12.64	9.62	12.18	9.84	12.25
<48 days old ^b	11.69	16.11	12.21	16.09	12.93	16.04	12.87	15.61
<56 days old ^b	15.58	20.31	16.27	20.51	16.39	20.15	16.71	19.91
<u>Pig gain/day, g</u>								
<20 - <27 ^b	73	111	66	9				
<27 - <35 ^{bc}	373	470	400	481	359	402	362	392
<35 - <42 ^b	404	507	425	502	426	496	438	473
<42 - <48 ^b	482	585	495	562	474	568	482	541
<48 - <58 ^{bde}	556	599	579	632	494	586	548	614

^aIndividual pig data; two replications of 192 pigs each.

^bWeight effect ($P<.01$).

^cAge effect ($P<.01$).

^dAge effect ($P<.10$).

^eGroup size effect ($P<.05$).

^fGroup size effect ($P<.10$).

Raw means for pigs included in the eight treatments, the result of the weaning age x pen group size x weight within weaning age interaction, are shown in Table 5. Initial weights were the average of 48 pigs from two replications of pigs that were penned in groups of 24 or 48 pigs. Final weights were the average of the pigs still left in the pens at the end of the trial when the pigs averaged about 52 days of initial average group weights from 4.46 to 8.89 kg. However, the CV for average initial weight for pen group size was similar within weaning ages and weight groups. At the end of the trial, means and CV for final weights by nursery pen group size remained similar. In addition, average final weights for young and old pigs were similar within weight groups because of the 28 and 35 days on test for old and young

age, after 28 days for older pigs, and after 35 days for younger pigs. None of the means presented in the table have been subjected to statistical analysis. However, coefficients of variation (CV) were calculated from the raw means and the individual standard error of those means for the eight resulting treatment groups. Differences in age at weaning and allotment to light and heavy outcome groups caused a range pigs, respectively. Thus, for average pig weight leaving the nursery and for weight variation at the end of the nursery period, it would appear that housing pigs in groups of 24 sorted by weight into heavy or light groups was of no advantage over housing pigs in groups of 48 with the whole array of weights of pigs in one pen. Pig survival was high in the weaning groups studied.

TABLE 5. INITIAL AND ENDING PIG WEIGHTS AND ESTIMATES OF VARIATION WITHIN PENS AS AFFECTED BY AGE AT WEANING, NURSERY GROUP SIZE, AND WEIGHT OF PIG AT WEANING^a

Item	Young				Old			
	Group of 48		Groups of 24		Group of 48		Groups of 24	
	Light	Heavy	Light	Heavy	Light	Heavy	Light	Heavy
Initial								
No. of pigs	48	48	48	48	48	48	48	48
Pig wt, kg	4.53	6.31	4.46	6.39	6.32	8.88	6.54	8.89
CV, %	14.8	13.2	14.3	14.9	23.3	20.9	25.2	21.3
Ending								
No. of pigs	43	46	43	47	46	48	46	47
Pig wt, kg	15.59	20.29	16.25	20.50	16.39	20.15	16.71	19.96
CV, %	17.9	15.3	19.8	18.8	17.6	15.8	20.2	14.9
Trial								
Survival, %	89.6	95.8	89.6	97.9	95.8	100.0	95.8	97.9
Gain/day, g ^b	315	400	337	403	360	402	363	394

^aRaw means for two replications of 192 pigs each.

^bCalculated from least squares average initial and final weights divided by 35 and 28 days, respectively, for young and old pigs.

Means for percentage of survival were equal to or higher for pigs weaned at an older age than pigs weaned at a younger age. In all cases, pig survival was higher for the heavier pigs within an age group than the lighter pigs. Pig survival was equal between pigs penned in groups of 24 or 48 pigs within age at weaning and weaning weight group. Because all pigs that began the trial did not survive, a true average daily gain could not be calculated. An estimate of average daily gain was made for the trial utilizing the least squares means for average initial pig weight and average final pig weight and 28 or 35

days on test for young and old pigs, respectively. Those are presented in this table. Average pig gain for the trial was greater for older pigs than younger pigs and greater for heavier pigs than lighter pigs within weaning age groups. However, size of group in which pigs were penned, 24 or 48, appeared to not affect gain for the trial.

Although age of weaning and weight of the pig within an age group weaned will influence nursery performance, the results of this trial provide little evidence to suggest a detrimental

effect on gain, feed intake, gain/feed, pig survival rate, or variation in weight when removed from the nursery when pigs are penned in groups of 48 compared with groups of 24 sorted by weight.

Summary

Two farrowing groups were utilized in the experiment with each contributing 196 pigs as a replicate over time. All litters of a contemporary farrowing group were weaned when the average age of the pigs was 20 days. The pigs were divided into two groups, 20 days of age and less and 20 days of age and more (96 older pigs and 96 younger pigs). From within each age group two subgroups (48 pigs) were formed stratified by weight, sex, and litter. Each subgroup was further divided based on individual pig weight (24 lighter pigs and 24 heavier pigs). These groups were penned either as a combined pen of 48 pigs or as two separate pens of 24 pigs divided by weight.

Younger pigs were on test for 35 days and older pigs were on test for 28 days so that end weights were for pigs approximately 52 days of age. A commercial phase-I diet was provided to the younger pigs for 2 weeks and the older pigs for 1 week followed by a commercial phase-II diet for 3 weeks. Rectangular pens were utilized with three feeders placed at each end of the rectangle, two nipple waterers placed along the sides near each end, and heat pads in the center of the rectangular pen. For the groups of 48 pigs, the entire pen was utilized to house the mixed 24 light and 24 heavy pigs. For the groups with 24 pigs, the rectangular pen was divided down the middle over the heated sleeping area to form two pens, one for the 24 light pigs and one for the 24 heavy pigs.

Of the 192 pigs in each group that began the experiment, either in one pen of 48 pigs or in two pens of 24 pigs, 183 pigs survived in each group. Average pen gain, average pen feed intake, and gain/feed were similar for pigs penned in groups of 48 pigs or two groups of 24 pigs sorted by weight. Nursery pen group size affected pig weights at <35 and <42 days of age and affected gains between <48 and <56 days of age. Gain/feed was greater for the older pigs than younger pigs. There was an age at weaning by pen group size interaction for gain/feed. Pen management did not affect

gain/feed for older pigs, but mixing of 48 pigs in one pen reduced gain/feed compared to penning pigs 24 per pen sorted by weight for younger pigs. Allotment to weight groups affected weights and gain at all points throughout the trial. Lighter pigs were lighter and gained less at all stages.

There was no evidence for increased variation in weight when pigs were penned in groups of 48 compared to groups of 24 sorted by weight. Coefficients of variation were the same for both groups as were the means for final weight. Pig survival was not affected by nursery pen group size. Heavier pigs had a higher percentage of survival than light pigs within each age group.

Implications

It has been common practice to sort pigs into uniform, small groups for the nursery period. The results of this study give little evidence to support the use of smaller nursery pen group size. Final weights and variation in weight were the same for pigs penned in groups of 48 pigs with a whole range of pig weights or penned in two groups of 24 pigs sorted by weight. Pen space per pig was kept constant for this study. It is probable that larger groups of pigs could be penned with greater pig density because of more effective pen space in larger pens.

The response of pigs to group size was the same for pigs weaned at less than 20 days of age and those weaned at more than 20 days of age except for gain/feed. Younger pigs had better gain/feed when penned in groups of 24. At the same final age, pigs weaned at different ages weighed the same, indicating no advantage or disadvantage to earlier weaning. However, pigs weaned at an older age had a higher survival rate after weaning that resulted in better gain/feed.

Within groups of pigs of the same age at weaning, lighter pigs remained lighter and gained at a slower rate as well. This occurred regardless of size of nursery pen group. It would appear that the potential for increased weight variation in a pen is greater for pens composed of light and heavy pigs of the same age than for increasing the size of the group of pigs in the pen.