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The Effect of Littermate Weight on Survival, Weight Gain, and Suckling Behavior of Low-Birth-Weight Piglets in Cross-Fostered Litters

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KEYWORDS

swine, survival, competition, cross-fostering, suckling

SUMMARY

Objective: To determine whether low-birth-weight piglets show better survival, weight gain, and suckling behavior when grouped with other small piglets by cross-fostering.

Methods: We manipulated the number and size of foster littermates for low-birth-weight piglets in 31 small (eight or nine piglets) and 22 large (11 or 12 piglets) litters. Experimental litters were composed of four to six piglets of lowest birth weight and either four to six slightly heavier or four to six much heavier piglets from two combined litters.

Results: Low-birth-weight piglets raised with much heavier littermates had somewhat lower survival rates, but showed no tendency towards lower weight gains or less successful suckling behavior than low-birth-weight piglets raised with slightly heavier littermates. The somewhat higher survival rate of low-birth-weight piglets raised with slightly heavier littermates was largely offset by more deaths in the foster littermates, so there was no overall reduction in total losses. Low-birth-weight piglets fought more when raised with slightly heavier piglets than with much heavier piglets, and they missed more nursing episodes and had smaller weight gains than littermates, regardless of littermate weight.

Implications: Cross-fostering low-birth-weight pigs into litters with other small pigs, compared to fostering into litters with high-birth-weight pigs, slightly improved their survival, but did not affect their weight gain or ability to suckle successfully, nor overall litter survival, even in litters as large as 11 or 12 piglets. Cross-fostering low-birth-weight pigs to litters of similar birth weight increased the level of fighting.

Sibling competition is thought to have a major effect on pre-weaning piglet growth and survival.[1,2,3] In the first few hours and days after birth, piglets compete aggressively for access to teats. Most piglets establish ownership of a particular teat; the others usually die, or survive by suckling opportunistically.[4,5] Many low-birth-weight piglets die in the first few days after birth, presumably because they fail to establish ownership of a functional teat.[2,3,6] Subsequently, the heavier piglets seem better able to stimulate their own teats to produce milk[7] and thus garner more of the hormones and nutrients available from the sow's blood.[2] This may constitute a second, indirect form of competition whereby stronger piglets receive more milk from their respective teats than smaller littermates.[8] As a result, differences in body weight between low- and high-birth-weight piglets often increase during lactation.

Management of low-birth-weight piglets is very important for the pig producer. Dead piglets are an obvious loss, but piglets with poor weight gains are also an important problem because they incur extra facility costs, produce less pork, and complicate management.[9] Producers need to identify piglets likely to be excluded from an adequate milk intake by competitive pressure, and develop fostering or rearing strategies to allow these piglets to thrive. Cross-fostering piglets between litters is a common practice aimed at improving survival and growth of piglets by equalizing the number of pigs per litter and minimizing birth weight variation.[10] Cross-fostering so that low-birth-weight piglets are raised with piglets of similar size is particularly encouraged because low-birth-weight piglets are presumed to be at greatest risk of being excluded from the udder by heavier littermates.[11]

However, the evidence that littermate size affects survival and weight gain of low-birth-weight piglets is limited. Litters with high variation in birth weight tend to have more deaths, especially among low-birth-weight piglets.[6,12,13] However, this correlation is confounded by the tendency for litters with variable birth weights to have more piglets of low birth weight.[14] One study found that fostering low-birth-weight pigs into litters with other low-birth-weight pigs improved their survival and weight gain relative to pigs of comparable size that were not fostered,[15] but a similar study found no such effect.[16]

If littermate size has the expected effects, then low-birth-weight piglets raised in litters with similarly sized littermates should have better growth and survival than low-birth-weight piglets raised with heavier littermates. Low-birth-weight piglets raised with littermates of similar weight should also show fewer behavioral signs of difficulty in competing, for example, by missing fewer nursing episodes and suckling more consistently from the same teats, compared to low-birth-weight piglets raised with much heavier piglets. Presumably, these differences should also be greater when litter sizes are larger because competitive pressure will be increased. The purpose of this investigation was to study the effect of littermate weight on survival, weight gain, and suckling behavior of low-birth-weight piglets in cross-fostered litters of two different sizes.

Table 1: Mean (± SE) birth weight (kg) of piglets of high (quartile A) to low (quartile D) birth weight, and of all piglets in the litter, in 53 litters cross-fostered in pairs to produce Small[†] or Large, and Light (CD) or Variable (AD) litters.

		Mean birth weight			
Litter size and type	**No. of pigs (litters)**	**Quartile A**	**Quartile C**	**Quartile D**	**Entire litter**
Small Light	123 (15)	NA	1.24 ± 0.04	1.03 ± 0.03	1.14 ± 0.03
Small Variable	132 (16)	1.73 ± 0.4	NA	1.07 ± 0.03	1.41 ± 0.02
Large Light	128 (11)	NA	1.24 ± 0.05	1.02 ± 0.04	1.13 ± 0.05
Large Variable	127 (11)	1.61 ± 0.06	NA	1.01 ± 0.04	1.34 ± 0.04

[†]Small litters contained eight or nine pigs; Large litters contained 11 or 12 pigs.

Materials and methods

Experimental design

This experiment used 53 pairs of Yorkshire and Yorkshire X Landrace sows and their litters from the Center for Food and Animal Research herd near Ottawa. The average number of live piglets born per litter in the herd was 10.1 ± 2.1 (SD), based on a sample of 416 litters. Pairs of litters were cross-fostered to achieve different litter sizes and distributions of piglet weights. Sows and their litters were paired if they farrowed within 24 hours of each other, if the combined litters consisted of 15 to 25 piglets, and if the two litters were ready for initial processing at the same time within 24 hours of birth. Piglets that had physical abnormalities or weighed less than 0.60 kg were fostered to a non-experimental sow. The remaining piglets from the two sows were marked for identification and weighed to the nearest 5 g. Other processing followed normal herd procedures, including tooth-clipping within the first day, and castration and provision of supplementary solid feed on day 10 or 11.

To create the experimental treatments, piglets were ranked according to descending birth weight in the combined litters, and quartiles were defined by body weight rank from the heaviest (A) to lightest (D) piglets. Fostering was then used to create “Variable” (AD) litters consisting of low-birth-weight piglets (D) raised with much heavier littermates (A), and “Light” litters (CD) consisting of low-birth-weight piglets (D) raised with the next smallest quartile (C). To study these comparisons at two levels of maternal resource availability, we used “Small” litters of eight or nine piglets and “Large” litters of 11 or 12 piglets, on the assumption that more milk is available per piglet in small litters.[17-19] Litters were thus randomly assigned to one of four types. Small Light litters (n = 15) were composed of the four lightest and the four or five next lightest piglets of the two combined litters. Large Light litters (n = 11) were composed of the six lightest and the five or six next lightest piglets of the combined litters. Small Variable litters (n = 16) were composed of the four lightest and the four or five heaviest piglets of the combined litters. Large Variable litters (n = 11) were composed of the six lightest and five or six heaviest piglets of the combined litters. In each pair of sows and fostered litters, only sows with Light or Variable litters were used in this study. Table 1 presents the mean birth weight of piglets in each treatment group.

All piglets were weighed 3 and 21 days postpartum. Behavioral variables were recorded for 11 litters in each litter type (Light or Variable) at each litter size (Small or Large), providing behavioral measurements for 44 litters (11 × 2 × 2). Four consecutive nursing episodes were observed 1, 4, 10, and 17 days postpartum to assess the suckling behavior of each piglet. On each day of observation, the back of each piglet was marked with a conspicuous number.

Observations began when at least half of the litter had assembled at the udder for a nursing episode, defined as the production of a characteristic series of grunts by the sow that signals milk ejection.[20] All behavioral measures were recorded for individual pigs.

Percent of nursing episodes missed (based on four successful nursing episodes for the litter) was calculated for each pig on each day of observation. A nursing episode was said to be missed if a piglet failed to switch at the same time as its littermates from teat massage and slow sucking movements to the rapid, regular sucking movements indicative of milk ingestion. Milk ejection and the nursing episode were considered finished when most piglets ceased rapid, regular sucking movements.[20]

A piglet’s typical teat pair was calculated as the teat pair where a piglet suckled successfully on at least half of the 16 nursing episodes observed. Teat pairs were identified by number from anterior (pair 1) to posterior (pair 7). Consistency in a piglet’s choice of a teat was assessed by calculating a teat consistency score (C) for each piglet on each day of observation.[21] Values of C have a maximum of 1, which indicates that a piglet is entirely consistent in suckling the same teat pair.

The number of teat disputes from the start of observation to the end of the nursing episode was recorded for each piglet. A teat dispute was characterized by a piglet biting or pushing its head or shoulders against another piglet when one or both piglets were attempting to stimulate the udder.[4] Teat disputes were always scored as reciprocal events and were scored separately if at least 3 seconds elapsed between them. An instantaneous scan of piglets in contact with the udder was made every minute for 20 minutes after the nursing episode ended. The observer recorded whether each piglet was engaged in a teat dispute at the time of the scan. The percent of positive scans (based on 20 scans per observation for four observations) was used as an estimate of the proportion of time a piglet spent in teat disputes after nursing episodes on each observation day.

Statistical analysis

Data were tested for normality using a Kolmogorov-Smirnov goodness of fit test using SYSTAT NPAR.[22] Distribution of weight gain data did not significantly depart from normal. Teat consistency scores and survival data were negatively skewed and were analyzed after reflection and log transformation. The distributions of percent of nursing episodes missed, number of teat disputes during nursing episodes, and percent of time spent in teat disputes after nursing episodes, were positively skewed, and were analyzed after log transformation. Unless otherwise noted, statistical analysis was performed using SYSTAT MGLH.[22]

Litter survival (proportion of piglets that survived to day 21), 3-day gain, and 21-day gain were analyzed by a two-way analysis of variance (ANOVA) with litter type (Light or Variable), litter size (Small or Large), and the interaction of litter type and litter size in the model. Using data for only the D piglets, a two-way ANOVA was used to examine the effect of littermate weight (ie, having A or C piglets as littermates) on survival (proportion of D piglets that survived to day 21), 3-day gain, and 21-day gain with litter type, litter size, and the interaction of litter type and litter size in the model. The effect of littermate size on survival, 3-day gain, and 21-day gain of all piglets was examined with an incomplete randomized block ANOVA which allows comparison between paired or dependent samples.[22] Variable and Light litters were analyzed separately. Quartile (D and either A or C), litter size, the interaction of quartile and litter size, and the effect of the sow as a blocking term were included in the statistical model.

One Large Variable litter was omitted from the analysis because the sow became seriously ill. Extremely low 21-day gains of four Small Variable litters were identified as statistical outliers (and thus omitted from the main analysis of weight gain) using a studentized residual procedure.[22] The analysis of survival was performed both with and without these four litters.

Using data for only the D piglets, a two-way ANOVA was used to examine the effect of littermate weight (ie, having A or C piglets as littermates) on the five behavioral variables: percent of nursing episodes missed, mean teat pair, mean teat consistency score, number of teat disputes per piglet during nursing episodes, and percent of time spent per piglet in teat disputes after nursing episodes. The model included litter type, litter size, the interaction of litter type and litter size, time (days 1, 4, 10, and 17 postpartum), and the interactions of time (time and litter type, time and litter size, time and litter type and litter size). Using data for all piglets, an incomplete randomized block ANOVA was used to compare the different quartiles on the same five behavioral variables. Variable and Light litters were analyzed separately. The model included quartile (D and either A or C), litter size, the interaction of quartile and litter size, the effect of the sow as a blocking term, and time and its interactions. Piglet sex and fostering status (fostered or non-fostered) were also included in preliminary analyses.

Results

On average, males (1.26 kg) were heavier at birth (P = .033) than females (1.22 kg), but sex had no significant effect on subsequent weight gains (P > .05). Data from Variable litters have also been reported elsewhere in a study on birth weight variation.[14]

Fostering had no significant effect on weight gains. There were no significant differences between fostered and non-fostered piglets at any age nor between males and females at any age in the percent of nursing episodes missed, teat pair used, mean teat consistency scores, number of teat disputes during nursing episodes, or percent time spent in teat disputes after nursing episodes. Therefore, piglet sex and fostering status were ignored in all other analyses.

Relative weight of littermates had a significant effect ($P < .05$) on death in D piglets. Of the 256 D piglets, 12 died in Variable litters and three in Light litters (Table 2). However, the effect was less marked ($P = .083$) when the four litters identified as having very poor weight gains were omitted from the analysis, as three D piglets died in these litters. Litter type (Variable or Light) had no significant impact ($P > .60$) on total number of piglet deaths, but in Variable litters there were significantly more piglet deaths ($P < .05$) among D littermates than among the much heavier A littermates (Table 2). In Light litters, the number of deaths in D piglets did not differ ($P > .10$) from the number of deaths in slightly heavier C littermates (Table 2).

Table 2: Number of deaths in piglets of high (quartile A) to low (quartile D) birth weight and total number of piglet deaths in the litter, within Small [†] or Large, and Light (CD) or Variable (AD) cross-fostered litters.

		Number of deaths (number of affected litters)			
Litter size and type	**No. of pigs (litters)**	**Quartile A[a]**	**Quartile C**	**Quartile D[b]**	**Entire litter**
Small light	121 (15)	NA	1 (1)	1 (1)	2 (2)
Small variable	127 (16)	1 (1)	NA	4 (4)	5 (5)
Large light	121 (11)	NA	5 (5)	2 (2)	7 (7)
Large variable	122 (11)	0 (0)	NA	8 (5)	8 (5)

[†] Small litters contained eight or nine pigs; Large litters contained 11 or 12 pigs.

[a] There were significantly more deaths among low-birth (D) piglets than among much heavier A littermates ($P < .05$).

[b] There were significantly more deaths among low-birth (D) piglets when raised with much heavier A littermates than when raised with slightly heavier (C) littermates ($P < .05$).

Weight gain of D piglets was not significantly affected by litter type, litter size, or the interaction of litter type and litter size. The average weight gain of the D piglets was actually slightly (6%), but not significantly, higher when they were raised with much heavier A littermates than with slightly heavier C littermates (Table 3).

The A piglets gained more weight than their lighter littermates in both Variable and Light litters (Table 3), with no significant interaction of litter size and piglet quartile. Piglets gained more weight in Small Light than in Large Light litters ($P < .05$), but there was no significant effect of litter size in Variable litters.

Within either Light or Variable litters, D piglets did not differ from their C or A littermates in the typical teat pair used, teat consistency score, number of teat disputes during nursing episodes, or percent time spent in teat disputes after nursing episodes. However, D piglets missed more nursing episodes than their heavier littermates in both Light ($P < .05$) and Variable ($P < .01$) litters. In Small Light litters, D piglets missed 4.5% ± 1.2% of nursing episodes, compared to 2.8% ± 0.4% for their C littermates, and in Large Light litters, D piglets missed 10.2% ± 2.5% of nursing episodes compared to 3.5% ± 1.1% for their C littermates. In Small Variable litters, D piglets missed 2.2% ± 0.6% of nursing episodes compared to 1.0% ± 0.4% for their A littermates, and in Large Variable litters, D piglets missed 7.0% ± 1.5% compared to 3.5% ± 1.1% for their A littermates.

Although there was no difference between A and D piglets in the mean teat pair appropriated, there were 13 D piglets but only three A piglets on the seventh teat pair ($P < .05$ by chi-squared test).

The D piglets raised with much heavier A littermates did not miss a greater percent of nursing episodes, suckle from more posterior teat pairs, or have lower teat consistency scores than D piglets raised with slightly heavier C littermates. The D piglets raised with much heavier A littermates had fewer teat disputes during nursing episodes than D piglets raised with slightly heavier C littermates ($P < .05$). The D piglets had 0.6 ± 0.1 teat disputes with much heavier A littermates in Small Variable litters and 1.1 ± 0.2 teat disputes with A littermates in Large Variable litters, while D piglets had 1.2 ± 0.2 teat disputes with slightly heavier C littermates in Small Light litters and 2.6 ± 0.7 teat disputes with C littermates in Large Light litters.

Table 3: Mean (± SE) 21-day weight gain (kg) of piglets of high (quartile A) to low (quartile D) birth weight and of all piglets in the litter within Small † or Large, and Light (CD) or Variable (AD) litters.

		Number of deaths (number of affected litters)			
Litter size and type[a]	**No. of pigs (litters)**	**Quartile A**	**Quartile C**	**Quartile D[b]**	**Entire litter**
Small light	121 (15)	NA	4.80 ± 0.18	3.84 ± 0.18	4.28 ± 0.18
Small variable	127 (16)	5.06 ± 0.14	NA	4.08 ± 0.13	4.57 ± 0.11
Large light	121 (11)	NA	4.10 ± 0.18	3.54 ± 0.23	3.81 ± 0.20
Large variable	122 (11)	5.00 ± 0.22	NA	3.78 ± 0.19	4.40 ± 0.18

† Small litters contained eight or nine pigs; Large litters contained 11 or 12 pigs.

[a] 21-day weight gains were significantly greater for pigs in Small Light litters than in Large Light litters ($P < .05$).

[b] 21-day weight gains were significantly less for low-birth-weight (D) piglets than for either heavier (A) or slightly heavier (C) littermates ($P < .05$).

The D piglets in either Small or Large Variable litters spent less time in teat disputes after nursing episodes than did piglets in either Small or Large Light litters ($P < .01$). The D Piglets in Small Variable litters spent 0.6% ± 0.1% of their time in teat disputes after nursing episodes, and the D piglets in Large Variable litters spent 1.10% ± 0.2% of their time in teat disputes after nursing, compared to 1.2% ± 0.2% for D piglets in Small Light litters and 2.6% ± 0.7% for D piglets in Large Light litters.

Litter size and litter type significantly affected percent of nursing episodes missed, number of teat disputes during nursing episodes, and percent of time spent in teat disputes after nursing episodes, but not typical teat pair or teat consistency score. Piglets in Light litters missed a greater percent of nursing episodes than piglets in Variable litters ($P < .05$). Pigs in Small Light litters missed 3.6% ± 0.8% of nursing episodes, compared to 1.6% ± 0.4% for pigs in Small Variable litters; and pigs in Large Light litters missed 7.9% ± 1.4% of nursing episodes, compared to 5.0% ± 1.0% for pigs in Large Variable litters. Piglets in Light litters had more teat disputes during nursing episodes than piglets in Variable litters ($P < .05$). Piglets in Small Light litters had 1.3 ± 0.2 teat disputes compared to 0.6 ± 0.1 for piglets in Small Variable litters; and piglets in Large Light litters had 2.4 ± 0.4 teat disputes compared to 1.1 ± 0.2 for piglets in Large Variable litters.

Piglets in Light litters spent a greater percent of time in teat disputes after nursing episodes than piglets in Variable litters ($P < .01$). Piglets in Small Light litters spent 1.3% ± 0.2% of their time in teat disputes after nursing episodes, compared to 0.6% ± 0.1% for Small Variable litters; and piglets in Large Light litters spent 2.4% ± 0.4% of their time in teat disputes, compared to 1.1% ± 0.2% for Large Variable litters.

Piglets in Large litters missed 6.5% of nursing episodes compared to 2.6% for piglets in Small litters ($P < .001$); piglets in Large litters had 1.8 teat disputes during nursing episodes compared to 1.0 for piglets in Small litters ($P < .005$); and piglets in Large litters spent 1.6% of their time in teat disputes after nursing episodes compared to 1.0 % for piglets in Small litters ($P < .05$).

One slow-gaining piglet (D2) became established on a functional teat after the death of a littermate (D3) at 10 days of age (Figure 1). Piglet D3 appeared to be well established on teat pair 6, having been observed suckling successfully during seven of the eight nursing episodes recorded on days 1 and 4, using teat pair 6 in all but one case. On these same days, piglet D2 was seen to suckle successfully only twice, once on teat pair 2 and once on teat pair 5. Upon the death of D3, D2 appeared to appropriate teat pair 6, and suckled successfully in seven of the eight nursing episodes recorded on days 10 and 17, using teat pair 6 in all but one case. Piglet D2 gained virtually no weight (70 g) until taking over the vacant teat on day 10, but gained at an approximately normal rate thereafter.

Discussion

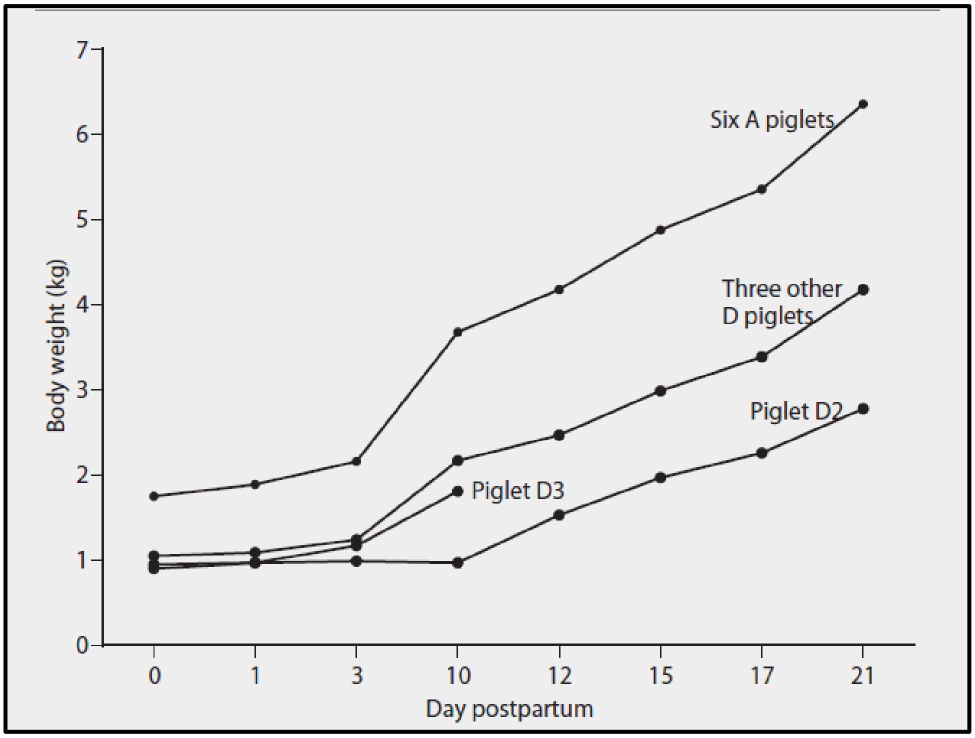
Fostering strategies are often based on the premise that low-birth-weight piglets will fare better if competing against littermates of similar size.[23] In our study, although relatively few piglets died, there were significantly more deaths among low-birth-weight piglets reared with much heavier rather than slightly heavier littermates. One experiment reported similar findings,[15] while another did not.[16] However, the total number of deaths in Variable and Light litters were similar in our study. This suggests that even if there are fewer losses among low-birth-weight piglets raised with similarly sized littermates, this difference may be partly or largely offset by decreased survival of other littermates.

Low-birth-weight piglets gained the same amount of weight whether they were raised with much heavier or slightly heavier littermates. These results challenge the hypothesis that low-birth-weight piglets are at a competitive disadvantage with regard to weight gain when raised with heavier compared to similarly sized littermates.[23] In an earlier study, piglets of medium birth weight (quartile B) did show smaller gains when raised with heavier littermates than when raised with lighter littermates.[24] Cross-fostering to achieve littermates of similar birth weight improved weight gains of low-birth-weight piglets in one study,[15] but not in another.[16] In the present study, low-birth-weight piglets actually showed a tendency to gain more weight when raised with heavier littermates than when raised with similarly sized littermates, but the difference was not statistically significant. This trend may be explained by the tendency for low-birth-weight piglets to miss fewer nursing episodes when raised with heavier littermates. Alternatively, it is possible that when the litter contains only small piglets, there may not be enough stimulation of the udder to maintain maximum lactation. In that case, retaining some large piglets in the litter might improve the weight gains of low-birth-weight piglets. Thus, for very small piglets whose ability to stimulate the udder is limited, there may be a balance between the negative effect of competition from larger littermates and the positive effect of having a greater overall suckling stimulus for the sow.

Littermate size may affect low-birth-weight piglets in two ways: through “direct” competition for access to a functional teat during the first few days after birth, and through the “indirect” competition in which piglets stimulate and drain their respective teats in a manner that increases milk production, somewhat to the detriment of the other members of the litter.[2] The early, direct competition may account for differences in survival, with those that fail to establish consistent use of a teat either dying or surviving as runts. For piglets that succeed in becoming established on a teat, the later, indirect competition may result in differences in weight gain, depending on level of resources and perhaps other factors. In this study, low-birthweight piglets raised with much heavier littermates may have had slightly more difficulty establishing teat ownership, and hence were at an increased risk of dying, compared to low-birth-weight piglets raised with slightly heavier littermates. Once established on a functional teat, the low-birth-weight piglets showed no apparent effect of indirect competition, achieving similar weight gains regardless of littermate weight.

In this study, the effect of littermate weight on survival and weight gain of low-birthweight piglets may have been underestimated because of the experimental design. By excluding very small piglets and unhealthy piglets, litters with more than 12 piglets, and sick sows, we probably eliminated piglets most likely to suffer from intense sibling competition. Although our results differ from those of previous studies,[15,24] the poorer survival and weight gains observed in those studies suggest that maternal resources for the piglets may have been more limited. Littermate size might have a greater effect on survival and weight gain of low-birth-weight piglets when resources are more limited, for example, in larger litters or if the sow's ability to produce milk is compromised.

Figure 1: Body weights of low-birth-weight piglets D2 and D3 (4th birth weight quartile) compared to mean body weights of three other low-birth weight piglets and six heavier piglets (1st birth weight quartile) in the same litter during the 21 days post partum. Piglet D3 died at 10 days of age and its teat pair was appropriated by Piglet D2.



Consistent with the weight gain results, low-birth-weight piglets reared with much heavier littermates did not miss more nursing episodes, suckle less consistently from the same teat pair, or suckle from more posterior teat pairs, compared to low-birthweight piglets reared with slightly heavier littermates. This further suggests that the suckling behavior of surviving low-birthweight piglets was unaffected by littermate size. Poor weight gains of D piglets may be partly explained by their tendency to miss more nursing episodes, regardless of littermate size.

In the past, piglet competition has been interpreted as competition for the anterior teats, and placement of piglets from anterior to posterior has been viewed by some authors as a form of dominance order.[25] In this study, littermates of lower birth weight did not generally suckle from more posterior teat pairs than their heavier littermates, even in Variable litters where there was a marked disparity in birth weight. In Variable litters, however, low-birth-weight piglets tended to suckle from the last teat pair more often than their heavier littermates, a tendency reported in a previous study.[24] Given the slightly lower productivity of posterior teats, this tendency may constitute one way that some low-birth-weight piglets are at a competitive disadvantage compared to larger littermates, at least in litters large enough that the posterior teats are used.

It has been suggested that runt piglets, which fail to establish ownership of a teat but survive by suckling opportunistically from various teats, may function as “insurance” offspring that will be raised in place of more established siblings if these should die accidentally, and may thus allow the sow to maximize the number of piglets raised.[2] This study documented the case of a runt piglet that took over a productive teat when it was vacated through the death of a larger littermate. In this instance, the runt’s serving as a replacement was obvious because it occurred at the late age of 10 days, when differences between teat-owners and non-teat-owners were clear. This phenomenon may actually be common, but largely overlooked, because it would tend to occur in the first few days after birth when deaths are frequent but differences between teat-owners and non-teat-owners may not be obvious.

Implications

Fostering low-birth-weight pigs to litters with other small piglets rather than with much larger piglets slightly improved their survival rate, but this effect was largely offset by a lower survival rate of their littermates.

Fostering low-birth-weight pigs to litters with other small piglets did not improve their weight gain or ability to suckle successfully, even when litter size was relatively large.

Fostering low-birth-weight pigs to litters with other small piglets increased the level of fighting and number of missed nursing episodes for the whole litter.

Low-birth-weight piglets missed more nursing episodes and gained less weight than their littermates, regardless of littermate weight.

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