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Interrelationships of Birth Weight, Farrowing Order,  
Sex, Stillbirths and Farrowing Time  
Interval of Pigs

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Little information is available concerning conditions present at the time of parturition in swine. This study was conducted to determine whether the succession at birth was related to weight at birth, sex, condition (whether alive or stillborn) and time interval between pigs. Possible relationships between birth weight, sex, farrowing order, farrowing interval and stillbirths were also studied.

Experimental Procedure

Thirty litters were used in this study resulting in the birth of 347 pigs. For complete collection of data, an observer was present during the entire parturition period. This involved 23 second and third litter crossbred sows and 7 first litter crossbred sows. Each pig was identified with a birth sequence number within the litter and a record of time of birth, sex, condition (whether alive or stillborn) and wet birth weight was obtained. The pigs were then placed in a box under a heat lamp and they remained there until parturition was completed and a dry birth weight was obtained.

From this information, time interval between pigs born, average time interval and total farrowing time for each litter were determined. Average wet birth weight and dry birth weight and the difference between the two were calculated for each litter.

Besides the birth sequence number the pigs were also assigned to birth order groups to place all litters on a common basis, although a great difference in litter size existed.

Table 1 indicates the method used to allot the pigs to the five birth order groups. An example would be that in a litter of 11 pigs birth sequence numbers would be 1 through 11 numbered in order of their birth. These would then be assigned to the five farrowing order groups. Pigs one and two were assigned to group one, pigs three and four to group two, pigs five, six and seven to group three, pigs eight and nine to group four and pigs ten and eleven to group five. The farrowing order groups were assigned because, when using birth sequence numbers, fewer pigs would be represented in the high numbers than in the small numbers. This type of grouping spread the smaller litters and larger litters over five groups.

Results

Litter size ranged from 4 to 16 pigs with an average litter size of 11.5 pigs and an average birth weight of 2.6 lb. Table 2 shows the distribution of the 30 sows observed within litter size groups and the corresponding average pig birth weights for each litter size group. As expected, average pig birth weight declined as the litter size increased.

Table 3 shows the effect of farrowing order on birth weight and the number of stillborn pigs. Wet birth weight was obtained by wiping off the pig and weighing it immediately after farrowing. Dry birth weight was taken after parturition was complete and the pigs had been under the heat lamp long enough to dry. Pigs farrowed in the first and last groups were heavier than those in the middle groups. However, there was no significant correlation between birth order group and birth weight or birth sequence number and birth weight. This finding is in contrast with work reported from Illinois where a significant positive correlation between birth sequence number and birth weight had been found. Wet birth weight was highly correlated with dry birth weight, indicating that either weight was a satisfactory measurement for calculating correlations with other variables. Of the 17 stillbirths observed, 10 were born in the last two groups of the farrowing order. Examining the litters individually, it was found that 47% of the stillbirths occurred in the last three pigs farrowed. Illinois workers have reported that 75% of the stillbirths occurred in the last three pigs farrowed. Of the 347 pigs observed in this study, 17 or 4.9% were stillborn. Illinois workers have found the incidence to range from 5 to 10%. Of the 30 litters in the study reported here, 43% had one or more stillbirths and all stillbirths occurred in litters of nine or more pigs.

Table 4 shows a summary of the time intervals between successive pigs born. The table begins with interval two because the time of birth of the first pig was recorded as the beginning of parturition and the first interval would end at the birth of the second pig. The average interval between all pigs of all litters was about 20 minutes. When only live pigs were considered, the interval from the previous pig averaged 17 minutes and the average interval from the previous pig for stillborn pigs was 43 minutes. Intervals of 21 minutes and 20 minutes for live pigs and 78 minutes and 54 minutes for stillborn pigs from sows and gilts, respectively, have been reported by Illinois workers.

Table 5 summarizes the results related to litter size. There was a trend toward lower birth weight as litter size increased, resulting in a significant correlation (-.44) between birth weight and total litter size including stillbirths. A significant negative correlation (-.195) also existed between condition (whether alive or stillborn) and birth weight. Stillborn pigs were lighter than those born alive.

For all litters, the average total farrowing time was 214 minutes. However, a great deal of variation in time was observed. Farrowing time was not correlated with litter size. However, average interval between pigs was significantly correlated with litter size. As litter size increased, the time interval between pigs decreased. Birth sequence order was significantly correlated with interval between pigs. Time interval between pigs increased toward the end of the litter.

No differences in any criteria were found due to the sex of the pigs. In this study, of the 347 pigs born, 174 were males and 173 females.

Summary

Thirty sows were observed at parturition to study the relationships between birth weight, sex, farrowing order, farrowing interval and stillbirths in pigs. The pigs were allotted to five birth order groups to accommodate litters ranging in size from 4 to 16 pigs. There was no significant correlation between pig birth weights and farrowing order. Stillborn pigs were significantly smaller than live pigs born. Out of 347 pigs observed, 17 or 4.9% of the pigs were stillborn and 47% of all stillbirths occurred in the last three pigs born to the litter.

Total farrowing time was not related to litter size. The interval between pigs was shorter for large litters and stillborn pigs had a longer interval from the previous pig born than did live pigs. Sex distribution was equal and no relationship of sex with other criteria was observed.

Table 1. Classification of Pigs into Five Farrowing Order Groups

Litter size	Farrowing group				
	1	2	3	4	5
4	1 <sup>a</sup>	2	--	3	4
6	1	2	3,4	5	6
7	1	2,3	4	5,6	7
8	1,2	3	4,5	6	7,8
9	1,2	3,4	5	6,7	8,9
11	1,2	3,4	5,6,7	8,9	10,11
12	1,2	3,4,5	6,7	8,9,10	11,12
13	1,2,3	4,5	6,7,8	9,10	11,12,13
14	1,2,3	4,5,6	7,8	9,10,11	12,13,14
16	1,2,3	4,5,6	7,8,9,10	11,12,13	14,15,16

<sup>a</sup>Numbers indicate pig birth sequence number.

Table 2. Litter Size Groupings and Corresponding Pig Birth Weights

Litter size <sup>a</sup>	No. of litters	Avg. birth wt., lb.
4	1	3.2
5	1	3.1
8	2	2.9
9	3	3.1
10	4	2.6
11	3	2.5
12	1	2.6
13	6	2.3
14	4	2.6
15	4	2.7
16	1	2.1

<sup>a</sup>No litters with six or seven pigs were included in the 30 litters observed.

Table 3. Effect of Farrowing Order on Birth Weight and Number Stillborn

Farrowing groups	Avg. wet birth wt., lb. (all pigs)	Avg. dry birth wt., lb. (live pigs)	Total no. stillborn
1	2.7	2.6	1
2	2.5	2.4	2
3	2.5	2.4	4
4	2.6	2.5	6
5	2.7	2.6	4

Table 4. Average Interval Between Pigs by Pig Number

Pig no.	Avg. interval, min.	No. of intervals
2	17	30
3	28	30
4	25	30
5	20	29
6	21	28
7	8	28
8	36	28
9	21	26
10	14	23
11	9	19
12	14	16
13	28	15
14	14	9
15	20	5
16	25	1
Avg.	20	317

Table 5. Relationships of Litter Size to Birth Weight, Farrowing Time, Farrowing Interval and Stillbirths

Litter size	No. of litters	Avg. birth wt., lb.	Avg. farrowing time, min.	Avg. farrowing interval, min.	Avg. no. stillborn
4	1	3.2	214	71	0
5	1	3.1	101	25	0
8	2	2.9	246	35	0
9	3	3.1	389	49	0.67
10	4	2.6	212	24	0.75
11	3	2.5	161	16	0.33
12	1	2.6	61	6	0
13	6	2.3	200	17	1.0
14	4	2.6	188	14	0.25
15	4	2.7	215	15	0.50
16	1	2.1	250	16	2.0