

The Duration of Farrowing in Relation to the Reproductive Performance of Yorkshire Sows¹

by D. W. Friend, H. M. Cunningham and J. W. G. Nicholson²

ABSTRACT

Records for 212 attended farrowings by 38 Yorkshire sows were examined. Eighty per cent of the farrowings were less than six hours, 18 per cent between six and 12 hours and two per cent between 12 and 17 hours duration. There appeared to be no marked relationship between the duration of farrowing and the size of litter.

In spite of a higher stillbirth rate in males, there were more male (52.3 per cent) than female piglets born alive. As the time taken to farrow increased from within 1-3 hours to more than eight hours, the percentage of stillborn piglets and the percentage of litters with stillbirths increased to 10.5 from 2.4 and to 61.1 from 18.2 per cent respectively.

Twenty-nine per cent of the litters were farrowed on the 114th day of gestation. As the gestation period lengthened to 117 days or more, from 113 days or less, there were corresponding increases in the duration of farrowing and the incidence of stillbirths, and a decrease in litter size.

A need to investigate the use of hormones to control parturition in sows was suggested.

A comprehensive review of literature on the reproductive performance of sows has been made by Duncan and Lodge (3). This review showed that little information about the duration of farrowing is available other than that reported by Schafer (9) from Germany. Evidence was given of a relationship between the duration of farrowing and the incidence of stillbirths. This is considered of sufficient importance to warrant further investigation; consequently, the farrowing records of the Yorkshire sows used in the herd at the Experimental

Farm, Nappan, between 1950 and 1961, have been examined and the results reported in the present paper. The time at the birth of the first and last piglet in each of 212 litters had been recorded to the nearest half-hour. This elapsed time is referred to as the duration of farrowing.

General

The sows were housed in a piggery except during periods in the summer when they had access to pasture. Individual pens were used for farrowing. The average litter size for the sows was maintained at a high level by culling sows which had small litters; herd replacements were home-bred by a purchased boar.

There were 38 sows involved in this study of which eighteen contributed 1-4 litters: seven, 5-8 litters and thirteen, 9-13 litters each. Only two sows produced 13 litters and four sows, 12 litters each. On a basis of litter order, grouped as the 1st-4th, 5th-8th and 9th-13th litters, the average duration of farrowing was 4.7, 4.5 and 6.2 hours respectively. Within the same litter order groups, the percentage of litters containing one or more stillborn piglets was 24.8, 48.4 and 51.2 per cent; the gestation period was 114.8, 114.5 and 115.1 days and the average size of a litter was 11.0, 11.6 and 11.0 piglets respectively.

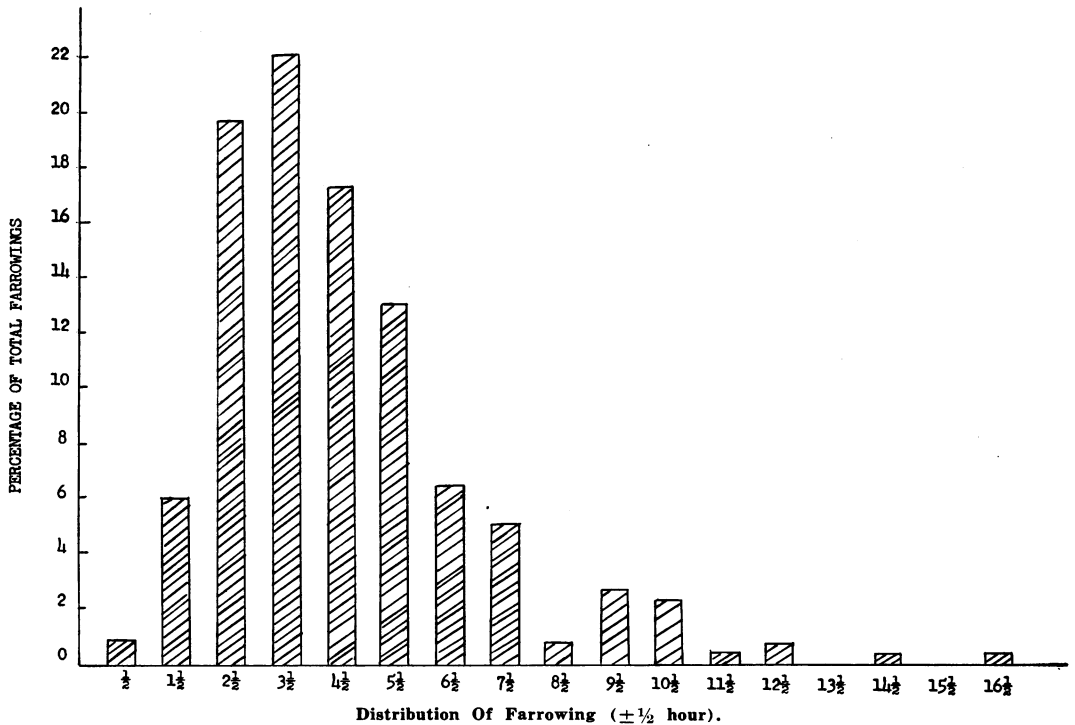
Distribution of farrowing time

(a) Duration of farrowing. The longest farrowing recorded was 16½ hours for one litter of 14 piglets and the shortest time, one hour each for a litter of 10 and for a litter of nine piglets. Eighty per cent of the farrowings were less than six hours, 18 per cent between six and 12 hours and two per cent between 12 and 17 hours duration (Figure 1). These data show an opposite trend to Schafer's (from observations of 90 farrowings) in which only 5.5 per cent of the farrowings were less than

¹Contribution No. 127, Division of Animal and Poultry Science, Research Branch, Canada Department of Agriculture, Nappan, Nova Scotia.

²The authors wish to express their appreciation to R. M. Grant (Herdsman) who recorded the farrowing data from which this paper was prepared.

Fig. 1 — Percentage Distribution of the Time Taken to Farrow for 212 Litters.



six hours, increasing to 46.7 per cent for 18 to 24 hours duration.

(b) Time of farrowing. The recorded farrowings were classified "day" when occurring between 6 a.m. and 6 p.m. and "night" between 6 p.m. and 6 a.m. Any doubt as to a classification on this basis was decided by favouring the time period within which the greater number of farrowing hours took place. Eighty-seven farrowings occurred during the day and 125 during the night; that is, nearly 60 per cent of the total were at night. The day farrowings averaged 4.6 hours and the night farrowings 5.1 hours duration. Deakin and Fraser (2) recorded the hour at which each of 410 sows (from 15 Experimental Farms) farrowed. The largest number of sows farrowed at night, 31 per cent farrowing between 7 p.m. and midnight, and 73 per cent between 2 p.m. and 4 a.m.

(c) Litter size. The time required to farrow litters of 11 piglets or less averaged 5.1 hours per sow (120 farrowings) and for litters of 12 piglets or more, 4.7 hours per sow (92 farrowings). The data agrees with Schafer's values only in that litters of 16 piglets or more were the slowest to be

delivered (Table 1). There was no marked difference between the time taken to farrow litters of nine piglets and less, and those with 13-15 piglets. However, within a range of five piglets and less per litter, the average farrowing time for four farrowings was only 128 minutes. Schafer recorded for litters of less than nine piglets, an average farrowing time of 104 minutes for 12 sows.

Stillbirths

(a) General. The number of litters in which one or more piglets were stillborn was 78 or 36.8 per cent of the total. Of the 2,367 piglets born, 5.7 per cent were stillborn, a figure concurring with that estimated by McPhee and Zeller (4) for herds in the United States.

(b) Sex of stillborn pigs. The total number of male piglets born was 1,247 (52.7 per cent) and of female piglets 1,120 (47.3 per cent). Of the 134 piglets stillborn 59.7 per cent were male and 40.3 per cent female; but in spite of this higher mortality, more male (52.3 per cent of the total) than female piglets were born alive. A difference between the numbers of male and

female piglets in litters was reported by Carmichael and Rice (1); they recorded for 5,657 births slightly lower percentages of males, 51.9 per cent born and 56.0 per cent stillborn, than those reported here.

This tendency for a differential mortality between the sexes in pigs conforms with the view of Parkes (5) who found the proportion of male to female fetuses higher than that of male to female births. In contrast to these results however, Pomeroy (6) reported work in which the fetal and the birth ratios approached equality.

(c) Duration of farrowing and number of stillbirths. For 134 litters in which no stillbirths occurred, the average duration of farrowing was 271 minutes, compared with 338 minutes for 78 litters in which from one to five stillbirths occurred and 388 minutes for 14 litters with three to five stillbirths (Table 2). Pomeroy (7) found no clear connection between the duration of farrowing and the proportion of stillbirths or neonatal deaths from the attended farrowings of inbred Large White pigs.

Schafer's analysis (9) of 69 litters from Landschwein sows showed that the percentage of stillbirths rose from zero with an average 8.3 piglets born within 60 minutes to 16.3 per cent with an average of 12.3 piglets for a farrowing period of more than 480 minutes. The data in Table 3 corroborates this observation, although the stillbirth percentages shown are lower than Schafer's. It appears probable that the incidence of stillbirths may be associated with the duration of farrowing. A possible nutritional implication may be deduced from the work of Salmon-Legagneur and Jacquot (8). They studied the effect of feed

TABLE 1—Relationship between the duration of farrowing and the size of the litter

| Litter size (Piglets) | Number of farrowings | Av. Duration (Minutes) |
|-----------------------|----------------------|------------------------|
| 9 or less..... | 47 | 310 |
| 10 - 12..... | 99 | 290 |
| 13 - 15..... | 58 | 286 |
| 16 or more..... | 8 | 352 |

TABLE 2—Relationship between the duration of farrowing time and the number of stillborn piglets

| Number of stillborn piglets (per litter) | Number of farrowings | Av. Duration (Minutes) |
|--|----------------------|------------------------|
| Zero..... | 134 | 271 |
| One..... | 43 | 315 |
| Two..... | 21 | 351 |
| Three..... | 8 | 405 |
| Four..... | 5 | 366 |
| Five..... | 1 | 360 |

intake on the reproductive performance of sows, by comparing pregnant sows fed *ad libitum* with others restricted to 50 per cent of this consumption. The "high level" sows averaged 1.7 fewer live pigs, 0.6 more stillborn pigs and one hour longer to farrow per litter, than the "low level" sows. There is evidence (3) to suggest an increase in the proportion of stillbirths with litter size, but the data presented in Table 3 are not sufficiently consistent to confirm this.

Gestation

(a) General. The gestation period ranged from 111 days to 121 days. The greatest number of litters, 62 or 29 per cent of the

TABLE 3—Relationship between the duration of farrowing, the number of pigs per litter and the incidence of stillbirths.

| Duration (Minutes) | Number of farrowings | Piglets born/litter (av.) | Piglets stillborn (per cent) | Litters with stillbirths (per cent) |
|--------------------|----------------------|---------------------------|------------------------------|-------------------------------------|
| 1 — 60..... | 2 | 9.5 | 0.0 | 0.0 |
| 61 — 180..... | 55 | 10.6 | 2.4 | 18.2 |
| 181 — 300..... | 84 | 11.6 | 5.5 | 40.5 |
| 301 — 480..... | 53 | 11.4 | 7.8 | 43.4 |
| 481 or more..... | 18 ¹ | 10.6 | 10.5 | 61.1 |

¹Nine of these farrowings were by six old sows (9-13 litters), two being responsible for five of the 18 farrowings. The other nine farrowings were by seven younger sows; four farrowings being the 1st or 2nd litter from three sows.

TABLE 4 — Relationship of the gestation period to the duration of farrowing, the number of pigs per litter and to the incidence of stillbirths.

| Gestation period (Days) | Number of farrowings | Av. Duration (Minutes) | Piglets born litter (Av.) | Stillbirths Piglets (%) | Litters (%) |
|-------------------------|----------------------|------------------------|---------------------------|-------------------------|-------------|
| 113 or less..... | 34 | 246 | 12.2 | 3.9 | 35.3 |
| 114 — 116..... | 157 | 302 | 11.2 | 5.5 | 36.9 |
| 117 or more..... | 21 | 331 | 8.2 | 10.4 | 38.1 |

total, were farrowed on the 114th day of pregnancy and 58 or 28 per cent on the 115th day.

(b) Relationship of gestation period to the duration of farrowing and the number of piglets born. Table 4 shows that as the gestation period lengthened, farrowing time increased together with corresponding increases in the percentage of stillbirths recorded and the percentage of litters within which stillbirths occurred. The average litter size decreased as the gestation period increased.

Discussion

Data presented in this paper suggests a direct relationship between the duration of farrowing and the number of stillborn piglets per litter. The cause of this relationship is problematical for it is not known if the presence of a dead fetus tended to prolong farrowing or if the slow delivery of a litter was responsible for fetal deaths.

McPhee and Zeller (4) found considerable variability in the birth weight of stillborn pigs and suggested that some large, fully developed fetuses were born dead because of some accident at parturition. There

appears to be a need therefore, to investigate the applicability of the hormonal inducement and, or, acceleration of parturition as a means to reduce an unnecessary occurrence of stillbirths in sows.

REFERENCES

- CARMICHAEL, W. J., and J. B. RICE. Variations in farrow with special reference to the birth weight of pigs. Illinois Agr. Exp. Sta. Bull. No. 226. 67-95. 1920.
- DEAKIN, A., and E. B. FRASER. Fecundity and nursing capacity of large Yorkshire sows. Sci. Agr. 15: 458-462. 1935.
- DUNCAN, D. L., and G. A. LODGE. Diet in relation to reproduction and the viability of the young. III. Pigs. Tech. Communication No. 21. Commonwealth Bureau An. Nutrition. 1960.
- McPHEE, H. C., and J. H. ZELLER. The stillborn pig. J. Am. Vet. Med. Assoc. 85: 224-231. 1934.
- PARKES, A. S. Studies on the sex-ratio and related phenomena. 7. The foetal sex-ratio in the pig. J. Agr. Sci. 15: 284-299. 1925.
- POMEROY, R. W. Infertility and neonatal mortality in the sow. IV. Further observations and conclusions. J. Agr. Sci. 54: 57-66. 1960.
- . Infertility and neonatal mortality in the sow. III. Neonatal mortality and foetal development. Ibid. p. 21-57.
- SALMON-LEGAGNEUR, E., and R. JACQUOT. Influence du niveau alimentaire sur le comportement nutritionnel de la Truie gestante. (Influence of the level of feeding on the nutritional behaviour of the pregnant sow). C. R. Acad. Sci. 253: 1497-1499. 1961.
- SCHAFFER, H. Die physiologischen Verhältnisse beim Gebarakt des Schweines und ihre Beziehungen zu einigen Leistungsausserungen. (The physiology of parturition in the sow and its relationship to productivity). Ztschr. Tierrucht. Zuchtungsbiol. 48: 207-254. 1941.

Nitrate Poisoning in Cattle Due to Clover Feeding

An outbreak of nitrate poisoning in cattle due to clover feeding is recorded. A total of 14 fatalities (13 cows and 11 heifers) occurred. Temperatures in affected animals were below 100°F. Cyanotic membranes, accelerated and shallow respiration and a rapid soft pulse were observed. Blood was of a dark chocolate colour. On autopsy cyanosis and slight catarrh of the mucous membranes of the intestines and a slightly swollen liver were the only pathological changes observed. A high nitrate

content (0.99% on a wet weight basis) was found in the clover. It was calculated that the cows consumed approximately 400 gms and the heifers 200 gms. of nitrates daily. All blood samples were strongly positive for methaemoglobin. One of the most common weeds found in the pastures involved was the variegated thistle *Silybum marianum* and this gave a very strong nitrate reaction.

Egyed, M. and Silberman, A. *Refuah Vet.* 18: 95, 1961.