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INFLUENCE OF THE PARASYMPATHOMIMETIC DRUG NEOSTIGMINE ON PARTURITION AND STILLBIRTH RATE IN THE PIG

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Introduction

About one million pigs per year are lost in the UK through stillbirths and this constitutes a serious source of loss to the industry. Over 80 percent of stillbirths die in utero during, or immediately prior to, parturition (intrapartum or Type II stillbirths) (4,5) the majority of these occurring in the later part of the parturition process (10,11,14). Anoxia and ultimately asphyxia during delivery due to twisting or breaking of the umbilical cord or to premature separation of the placenta is responsible for these Type II stillbirths(12). Since the risk of stillbirths occurring is greater in protracted farrowing (1,2,6), and following long intervals between births (9), one approach to reducing stillbirth rate is to speed up the later part of farrowing by stimulating uterine muscle contractions. An injection of oxytocin administered during farrowing has produced variable results (7,8), possibly due to its very short physiological half life (3). More recently the synthetic anticholinesterase drug neostigmine has been used in an attempt to increase the vigour of uterine contractions and thus improve the efficiency of parturition (13,14). This compound acts on the parasympathetic nervous system through its anticholinesterase activity, thus prolonging smooth muscle contractions. The experiment reported here involves a study of the effects of neostigmine on intrapartum stillbirth rate, farrowing duration and interval between births.

Experiment

A total of 104 sows (from third parity upwards) were randomly allocated to one of two treatments at farrowing. Treatments consisted of an intramuscular injection of either 5 mg Prostigmin (Neostigmine methylsulphate, Roche Products Ltd.) or 2 ml sterile water as a control. The injections were administered following the birth of the fourth or fifth piglet. Time of expulsion of all piglets was recorded and all stillbirths were subjected to post mortem examination. The trial was carried out in a large commercial herd weaning between 14 and 21 (mean 17) days of age.

Results

Total births per litter were similar for neostigmine treated (11.92± 0.35) and control sows (11.65± 0.29). Stillbirths per litter were 0.61(±0.14) and 0.79 (±0.15) for neostigmine treated and control sows respectively. However, this reduction in stillbirths of over 20 per cent from neostigmine treated sows was not statistically significant. Over 90 per cent of stillbirths in both control and neostigmine treated sows were of the intrapartum type.

Interval between births prior to injection of either neostigmine or sterile water was 18.37 (±1.41) and 18.25 (±1.42) minutes for neostigmine treated and control sows respectively. Following injection, respective intervals between births were 16.79(±1.21) and 18.26(±1.64) minutes. The reduction in birth interval following injection of over nine per cent for neostigmine treated sows was not statistically significant.

As expected, a considerably higher proportion of stillbirths occurred in the later part of the parturition process. In the first, second and last third of the piglet delivery phase, stillbirth rate was 2.00, 6.00 and 12.14 per cent respectively for control sows and 1.89, 3.86 and 9.71 per cent respectively for neostigmine treated sows. It is possible that in large litters a second injection after the delivery of the tenth or eleventh pig might be beneficial.

A proportion of sows treated with neostigmine (10 out of 52) began to salivate slightly and soon afterwards vomited a small amount of food. This is not surprising in view of the effect of the drug on the smooth muscle of the gut. Following this, such sows appeared to show no further adverse effects. There was no apparent difference in general activity of sows following treatment with neostigmine and frequency of defaecation did not appear to increase.

Conclusions

1. Treatment with neostigmine was associated with a 9 per cent reduction in birth interval following injection and a 20 per cent reduction in stillbirth rate. However, these differences were not statistically significant.
2. A proportion of sows (10 out of 52) vomited a small amount of food about 30 minutes following treatment with neostigmine but thereafter behaved normally. No other deleterious side effects were noticeable.
3. The suspicion (in percentage although not statistical terms) from this trial that treatment with neostigmine tended to improve the efficiency of the later part of parturition will have to be substantiated (or otherwise) in a larger trial.
4. In subsequent work it may be worth examining in large litters the effects of a second injection with neostigmine following the delivery of the tenth or eleventh pig.

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