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Programmed Farrowing with Prostaglandin and Oxitocin in the Sow

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Abstract: This research was carried out with the objective of studying different doses of clorprostenol and oxitocin to induce programmed farrowing in the sow at the end of pregnancy. For this purpose, 40 Yorkshire multiparous sows with 2-4 previous pregnancies. Divided at random in groups of 10. On day 111 of pregnancy all groups received an injection of 175 mg clorprostenol im. And 20 h later they were injected with 0, 10, 20 and 30 units of oxitocin to groups 1-4, respectively. PG + saline affected 70% of treated sows and the mean time for delivering the first piglet was 24.17 h. With the administration of clorprostenol + 10 units of oxitocin the parturition time increased slightly to 26.2±0.21 h, but remained statistically similar to the control group ($p>0.05$). However, when the oxitocin level was increased to 20 units administered 20 h after clorprostenol, 90% of sows initiated labor at an average of 22.1±0.23 h after clorprostenol. When the dosage of oxitocin was 30 units, 90% of sows initiated the delivering of the piglet in about 22.6±0.22 h after the administration of clorprostenol. As shown by the data, the administration of 20 and 30 reduced in about 14% the time needed to parturition compared to control treatment ($p<0.05$). This difference was higher (16%; $p<0.05$) when compared with the treatment that used 10 units of oxitocin. The presence of MMA was not of significance and 97% of piglets were viable.

Key words: Programmed farrowing, prostaglandin, oxitocin, sow, treatment, significance

INTRODUCTION

The aim of intensive pig production is to decrease losses after farrowing, because of the economic advantages of the number of piglets born. There is an increasing need to control the moment of farrowing, this is due to the fact that some sows farrow out of working hours, time when farrowing supervision is not optimal. If the sow farrows during working hours the producer will have a saving in hand work and also improved handling, hygiene and marketing (Provis, 2003). Another advantage derived from the manipulation of farrowing is that the number of piglets born will tend to be the same and piglets from sows with large litters can be fostered by sows with smaller offspring. It has being observed that it is also possible to reduce perinatal mortality and complications when the delivery of placentas is accelerated with the use of prostaglandins (Cerne and Jochle, 1983; Chantaraprateep *et al*., 1986a, b; Cook *et al*., 2003; Mueller *et al*., 2006; Spencer *et al*., 2004).

When using a Prostaglandin (PG) it is possible to synchronize the time of parturition (Spencer *et al*., 2004), in the other hand, it is recommended that farrowing in pigs must not be induced before the 111 days of pregnancy to avoid the presence of small weak piglets (Butler and Boyd, 1983; Jainudeen and Brandenburg, 1980). When PG is used parturition is present between 24-30 h after injection (Holtz *et al*., 1983; Jainudeen and Brandenburg, 1980; Mueller *et al*., 2006; Straw *et al*., 2008). This variation in time means that there is a 27 h interval from the moment of PG injection to parturition.

Therefore, there is a need to shorten the latter time interval. In previous reports sows were medicated with a PG analog and thereafter, oxitocin was injected 2 h after milk let down (Holyoake *et al*., 1995; Prunier and Quesnel, 2000), this treatment decreased the time between PG injection and the expulsion of piglets. In another work relaxin was used by injection on days 110 and/or 111, followed by the administration of a PG on day 112 (Butler and Boyd, 1983).

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It is known that oxitocin can produce an effect only when the concentration of plasma progesterone has decreased to low levels during parturition (Taverne *et al*., 1979). It is also possible that there are more specific doses of oxitocin in order to achieve the best effect. There is also the possibility of inducing undesirable effects on uterine muscles after the administration of excessive doses of oxitocin (Mueller *et al*., 2006; Straw *et al*., 2008; Taverne *et al*., 1979). Therefore, the objective of this research is to determine the minimum effective dose of oxitocin as an aid to more specifically induce a synchronized farrowing when using PG with the aim of inducing a programmed farrowing with in working day hours.

MATERIALS AND METHODS

This research was carried out in a pig farm with a closed cycle, sows under this study were dewormed, washed 8-10 days before parturition date. Thereafter were taken to their farrowing crates. Feeding was conventional and water *ad libitum*. Sows were fed between 7 and 8 am. And for the purpose of the study 40 sows of 2nd-4th parturitions were chosen at random and allocated to 4 groups of 10. On the 111 day of gestation, referred as day 0, 175 mg of cloroprostenol was administered intramuscularly, followed 20 h later by doses of 10, 20 and 30 units of oxitocin to each sow of groups 2, 3 and 4, respectively. Group 1 (control) was treated with saline solution. Rectal temperature was monitored in a daily basis for three days after parturition. Parameters under evaluation in this study were: time of first piglet delivered after the administration of clorprostenol and oxitocin. Also note was taken of death and live piglets delivered. Statistic evaluation was carried out with a t student test and Xi^2.

RESULTS

The PG + saline affected 70% of treated sows and the mean time for delivering the first piglet was 24.17 h. With the administration of clorprostenol + 10 units of oxitocin the parturition time increased slightly to 26.2±0.21 h, but remained statistically similar to the control group ($p>0.05$). However, when the oxitocin level was increased to 20 units administered 20 h after clorprostenol, 90% of sows initiated labor at an average of 22.1±0.23 h after clorprostenol. When the dosage of oxitocin was 30 units, 90% of sows initiated the delivering of the piglet in about 22.6±0.22 h after the administration of clorprostenol. As shown by the data, the administration of 20 and 30 reduced in about 14% the time needed to parturition compared to control treatment ($p<0.05$; Table 1). This difference was higher (16%; $p<0.05$) when compared with the treatment that used 10 units of oxitocin.

Table 1: Effect of clorprostenol (175 mg) and different doses of oxitocin in sows with 111 days of gestation

Clorprostenol 175 mg Oxitocin IU, 20 h after clorprostenol	0	10	20	30
Sows per group	10	10	10	10
Sows responding to treatment	8	7	9	9
Hours to onset of labor	24.17±0.6	26.20±0.21	22.11±0.23	22.60±0.22
Piglets born alive (%)	88	87	90	97
Presence of MMA	2	1	1	1

DISCUSSION

When comparing the moment of beginning of labor in sows medicated only with clorprostenol, labor initiated 25.8 h after the administration of PG and it should be noticed that 20% of sows did not respond to the luteolytic effect of clorprostenol, however, the response to this treatment was considered satisfactory because 80% of sows from this group initiated labor with in working hours of the attending staff and the outcome of treatment is similar to other reports (Straw *et al*., 2008; Provis, 2003).

It is noticeable that when oxitocin is added to the effect of PG a synergic effect was observed, the number of sows responding to the luteolytic effect of clorprostenol increased. Cook *et al*. (2003) and Spencer *et al*. (2004) reported an increase in the oxitocin receptors at the end of gestation, such observation coincides with the findings of the present study. However, when the dose of oxitocin is 10 units/sow and administered 20 h after clorprostenol. No difference with sows medicated only with clorprostenol (26.2 vs. 25.8 h) was observed. But when the dose of oxitocin is increased to 20 units/sow it was observed an increase in the number of sows initiating labor (90%) and the time of drug effect from injection to first piglet born was also reduced (22.1 h).

When the dose of oxitocin was increased to 30 units/sow, labor was present with more confidence. And the time effect was slightly decreased (22.6 h). It is interesting that the administration of oxitocin in this research is carried out 20 h after clorprostenol, while in other work oxitocin was administered only when the interval between successive pigs exceeded 30 min (Holyoake *et al*., 1995). Sows treated with clorprostenol and oxitocin (30 units) farrowed nearly at the same time after treatment and sows treated with 10 and 20 units of oxitocin after clorprostenol initiated parturition with ample variation in time after medication.

This results are similar to other observations (Cerne and Jochle, 1981; Chantaraprateep, 1986a, b) where PG either synthetic or analogs were used, furthermore, this latter observations also reported a decrease in the presence of MMA syndrome. But this latter effect was not able to corroborate in this research due to the small number of animals used per group of treatment. But it can be reported that the number of live piglets is significant among the groups here studied, when compared with the control group compared to the treated only with clorprostenol. Cook *et al*. (2003) reported that oxitocin facilitates the sequential expulsion of the offsprings, therefore in the present study the amount of piglets death by asphyxia could be decreased, such as it is normal to observe during natural farrowing and/or when only clorprostenol is used to induce farrowing.

When this research was carried out, it was reported that the handling and medication of both the drugs and the sows, was comfortable enough for to recommend this treatment to be used in daily practice. This action also obligates for a more efficient management of the whole pig farm allowing the accommodation of piglets in a more equal numbers between farrowing sows, therefore weaning can be carried out with the maximum number of weaned piglets. In other research, oxitocin is administered 2 h after PG and they found an increase in stillbirths (Straw *et al*., 2008).

In this study, oxitocin was administered 20 h after PG injection and piglet delivering was initiated in average 2 h after oxitocin administration, ion the present experiment this procedure was quite efficient because the number of stillbirths was decreased, the latter due to the presence of optimum staffing levels, in this case programmed farrowing will avoid weekends and other period of activity related to farrowing when staff are less in the farrowing area (Provis, 2003).

CONCLUSION

The use of clorprostenol followed by the administration of oxitocin should be a practice included in pig farms with the aim of making more efficient the industry for pig production.

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