The Influence of Oxitocyn Added to Diluted Boar Semen on the Main Reproduction Parameters Calculated for Large White Sows that were Artificially Inseminated

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Abstract
Oxitocyn has been used to improve reproductive performance in swine, especially farrowing rate and litter size. The objective of this study was to investigate whether the main reproduction parameters calculated for sows improve when Oxytocin (Oxitocyn®; 10 U.I./ml) was added to diluted semen. The scope of this experiment was to test the efficiency of adding oxitocyn in the diluted semen tubes over the main reproduction parameters (fecundity rate, gestation rate, farrowing rate and litter size) for Large White sows.

Sows from one large production unit were artificially inseminated; semen was either enriched with oxitocyn (group 1, n=315), either untreated (group 2, n=351). Fecundity rate, gestation rate, farrowing rate and litter size were recorded. After adding 0.4 ml oxitocyn to diluted semen right before artificial insemination of Large White sows, fecundity rate was 80.95%, while the group inseminated with untreated semen had a fecundity rate of 74.93%, the difference being statistically uninsured. Regarding the gestation rate, for the experimental group was 78.10%, while for the control group was 70.09%, this difference being significant (p<0.05). The farrowing rate calculated for the experimental group was 76.19%, while for the control group was 68.95%, this difference being also significant (p<0.05). Litter size was 13.36 piglets/sow for the experimental group, with 1.18 piglets/sow higher than for the control group (12.18 piglets/sow), this difference being very significant (p<0.001).

Keywords: sows, reproduction parameters, semen, oxytocin

1. Introduction
Oxytocin is released from the brain of the sow at the time of mating in response to stimulation by the boar. It is assumed that it enhances sperm transport to the oviduct [1]. Several investigators have showed that injecting oxytocin into semen before artificial insemination improves farrowing rate and litter size, especially when low sperm concentration is used [2].

With artificial insemination, the reduction in the sperm cell reservoir may result from poor timing of semen deposition relative to time of ovulation or inadequate stimulation of the sow during and after insemination resulting in reduced myometrial contractions and a poorer sperm cell transport to the oviduct [3]. Also, excess semen reflux (backflow) during insemination may reduce fertility, presumably by reducing the potential size of the sperm cell reservoir [4].

The boar ejaculate contains high levels of estrogens and improvements in sow fertility have been noted following insemination of semen doses containing supplemental estrogen [5]. Estrogen stimulates myometrial contractions via an estrogen-induced local release of prostaglandin F2α (PGF) [6]. Additionally, the presence of a boar during estrus stimulated the endogenous release of oxytocin and enhanced uterine contractions [7]. Increase of oxytocin concentrations in peripheral blood plasma occurs in immediate response to
boar presence and lasts for approximately 10 min [8]. This effect can only be partially mimicked by a robot teaser boar which emits olfactory, acoustic and visual boar cues [9].

The scope of this experiment was to test the efficiency of adding oxtocyn in the diluted semen tubes over the main reproduction parameters (fecundity rate, gestation rate, farrowing rate and litter size) for Large White sows.

2. Materials and methods

The researches were carried out on three breeds of primiparous sows raised in intensive system with controlled microclimate. The aim of this study was to investigated whether the main reproduction parameters calculated for sows improves when Oxytocin (Oxitocyn®; 10 U.I./ml) was added to diluted semen. The scope of this experiment was to test the efficiency of adding oxtocyn in the diluted semen tubes over the main reproduction parameters (fecundity rate, gestation rate, farrowing rate and litter size) for Large White sows.

Waiting for breeding sows accommodation was made with a capacity of 10 to 12 sows/pen. Sows in pig accommodation were made in common pens, with a capacity of 8 to 16 heads/pen. Heat detection was done daily, after the back pressure test response during the boar exposure. Estrous sows has been mated during the morning period of the day when the heat check was made and repeated the next day, also at morning time. Artificial insemination was made using 80 ml semen tubes, with 2.5 billions sperm cells/ml, processed with 1 to 3 days ahead; the extender used was M III (long term extender, Minitube). The insemination technique was made thru cervical insemination, using a foam type catheter. Right before the artificial insemination, 0.4 ml of Oxitocyn product (Pasteur, Filipesti) was added to the diluted semen. 1 ml of solution contains 10 U.I. and excipients: sodium chloride, chlorobutanol, glacial acetic acid and distilled water.

Sintethic oxtocyn, compared to the natural oxtocyn, doesn’t contain vasopressin, but has the same effect over the uterus smooth muscle. This decreases the frequency of contractions myometrium, but their amplitude increases. After 18 days from breeding, heat detection was made in order to detect the sown not in pig thru the back pressure test response during the boar exposure. At 28 days after artificial insemination was performed the first pregnancy check, thru ultrasound.

Second ultrasound check was performed at 5 days after breeding; the ultrasound equipment used was Echoscan T 100.

During the gestation period, sows and gilts who aborted or have been culled where removed from the herd. At 112 gestation days, the sows were moved to the farrowing barns. The results obtained after determining the main reproduction parameters were keyed and statically analyzed. Analysis of variance has been used as data processing method. The significance of difference between the variance was determined by $\chi^2$ test. Statistical processing was performed using computer software SPSS for Windows.

3. Results and discussion

The goal of this study was to determine the main reproductive parameters of artificially inseminated sows, after 0.4 ml of oxtocyn has been added to diluted semen right before artificial insemination. Table 1 presents the main reproduction parameters (fecundity rate, gestation rate, farrowing rate and litter size) calculated for Large White sows, separated in two groups; the experimental group was breed with diluted semen enriched with 0.4 ml of oxtocyn right before artificial insemination, while the control group was breed with untreated diluted semen.
Table 1. The main reproduction parameters calculated for artificially inseminated Large White sows

<table>
<thead>
<tr>
<th>Specification</th>
<th>Sows artificial inseminated (n)</th>
<th>Sows in pig at 28 days</th>
<th>Sows in pig at 56 days</th>
<th>Farrowing rate</th>
<th>Litter size (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>n</td>
<td>% fecundity</td>
<td>n</td>
<td>% gestation</td>
</tr>
<tr>
<td>Control group</td>
<td>351</td>
<td>263</td>
<td>74.93&lt;sup&gt;a&lt;/sup&gt;</td>
<td>246</td>
<td>70.09&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Experimental</td>
<td>315</td>
<td>255</td>
<td>80.95&lt;sup&gt;a&lt;/sup&gt;</td>
<td>246</td>
<td>78.10&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

From Table 1 it can be observed that adding 0.4 ml of oxitocyn in the diluted semen tubes, right before artificial insemination of the Large White sows, the fecundity rate was 80.95%, while the sows from the control group, inseminated with untreated semen, showed only 74.93%, the difference being statistical uninsured (p>0.05).

Regarding the gestation rate, for the experimental group was 78.10%, while for the control group was 70.09%, this difference being statistical significant (p<0.05).

The farrowing rate calculated for the experimental group was 76.19%, while for the control group was 68.95%, this difference being also statistical significant (p<0.05).

Litter size was 13.36 piglets/sow for the experimental group, with 1.18 piglets/sow higher than for the control group (12.18 piglets/sow), this difference being statistical very significant (p<0.001).

Figures 1 and 2 suggest the differences regarding the main reproduction parameters calculated for the control and the experimental group formed by Large White sows.

4. Conclusions

Most of the experiments performed by researchers conducted to the idea that the sows fertility is improved when oxitocyn is added to the diluted semen, right before breeding, but the results obtained had varying degrees of success. Their variety comes from a unknown cause, but it is assumed that derives from the management of the reproduction activity [10]. It can be also assumed that another cause of the results variance between field trials is semen backflow, which appears to the majority of the sows, which seems to intensify when oxitocyn is present in uterus and to limit the amount of active hormone stimulation [11].

Field trials in which oxytocin or prostaglandins are injected in sows during insemination or used in the insemination dose seem to indicate that these treatments may improve reproductive results in sub optimal conditions [1], for example when inseminations are performed by inexperienced inseminators [12], when using old semen [13] or during summer infertility [14].

Levis (200) [1], affirm that adding 4 U.I (0.4 ml) or 5 U.I. (0.5 ml) of oxitocyn to the diluted semen at ten minutes before insemination, farrowing rate and litter size can be significant improved,
especially for multiparous sows. In this sense, he has studied the influence of 0.4 ml oxytocyn added to the diluted semen that showed a significant difference between the control group and the experimental group regarding farrowing rate, litter size and fecundity rate.

Our researches showed that after adding 0.4 ml oxytocyn to diluted semen right before artificial insemination of Large White sows, fecundity rate was 80.95%, while the group inseminated with untreated semen had a fecundity rate of 74.93%, the difference being statically uninsured. Regarding the gestation rate, for the experimental group was 78.10%, while for the control group was 70.09%, this difference being significant (p<0.05). The farrowing rate calculated for the experimental group was 76.19%, while for the control group was 68.95%, this difference being also significant (p<0.05). Litter size was 13.36 piglets/sow for the experimental group, with 1.18 piglets/sow higher than for the control group (12.18 piglets/sow), this difference being very significant (p<0.001).

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