POST CERVICAL ARTIFICIAL INSEMINATION IN SOWS – WHAT, WHY, HOW?

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INTRODUCTION

As production costs continue to rise due to several factors, the swine industry is no different than any other and is turning to new and innovative ways to improve reproductive performance while decreasing cost of production in order stay competitive worldwide. Optimizing semen usage from superior sires combined with new breeding methods, Post-Cervical Artificial Insemination (PCAI) techniques and reduced sperm cell count may be some of the tools needed to achieve that goal. Visiting with many well respected and hard working Ontario farmers I am privileged to be able to present some experiences, observations and findings of this new way of breeding. In the literature about PCAI from different areas of the world and local farm trials, here are some of the questions listed below to which we are hoping to provide you some answers:

1. What value does PCAI bring to my operation?
   a. What is your reason for choosing PCAI?
      1. ↓ Reduced labor cost
      2. ↓ Reduced semen cost
      3. ↑ Improved reproductive performance
      4. ↑ Improved grow-finish-carcass performance by optimizing genes of superior sires
   b. Grow-finish-carcass opportunities
   c. Sow herd opportunities

2. How is PCAI done?

3. What are the results?

4. Other questions

WHAT VALUE DOES PCAI BRING TO MY OPERATION?

Grow-Finish-Carcass

Some Genetic companies have recognized and provided some type of sire categorization to their customers for many years, while others are at the discovery and implementation stage. Producing and delivering the best of the best sires to Gene Transfer Centres (GTCs) does not come cheap. It requires large breeding herd populations to achieve the desired selection goals.
When speaking about this topic with local farmers some key question arise in the conversations:

1. What are the opportunities of using “The Superior Sires” Is there enough of them?
2. What are the financial implications we could expect using higher value sire on 1 sow vs. dividing the ‘Superior Genes’ on 2 or 3 sows? How does that change the grow finish population management and what are the realities of capturing economic opportunities?
3. What if we reduce the cell count and volume per insemination while increasing the value per piglet heading to N/G/F and packer?

Let’s take a look at the following 3 diagrams:
1. What Sires make it to GTCs? (Table 1)
2. What is the return on genetic investment? (Table 2 and Table)

Table 1. Population % making to GTC

![Diagram 1]

Table 2. Genetic Investment and Return per Sire Classification

![Diagram 2]
Table 3 Return on Genetic Investment

<table>
<thead>
<tr>
<th>Sireline Classification</th>
<th>Top 20%</th>
<th>Top 10%</th>
<th>Top 5%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Genetic Investment value per service</td>
<td>$2</td>
<td>$2</td>
<td>$4</td>
</tr>
<tr>
<td>Genetic return per market hog</td>
<td>$2.32</td>
<td>$1.85</td>
<td>$4.17</td>
</tr>
<tr>
<td>Total Genetic return per service</td>
<td>$23.20</td>
<td>$18.50</td>
<td>$41.70</td>
</tr>
<tr>
<td>(ROI%) Return on Genetic Investment</td>
<td>1160%</td>
<td>525%</td>
<td>1043%</td>
</tr>
</tbody>
</table>

Sow herd opportunities

Heat-checking and timing of insemination **still the king.**

Time spent breeding:
Practical experience of European systems estimate improved PCAI efficiency of 1 person per 1000 sows. It is known that with Traditional Artificial Insemination (TAI) it can take 7 to 15 minutes to inseminate. PCAI takes 1-2 minutes. Six hundred sows breeding 32 sows per week gives a time savings of 4 hours, 26minutes per week. Some questions came from this time saving calculation: How consistently are these savings realised? Would this be a tool for batch farrowing farms? What benefit/value would a farm capture using time saved and time used in other production areas?

Semen cost savings:
Semen cost per piglet weaned represents 3.7% of total cost while feed represents 43%. Per hog marketed it is less than 1% and 65 – 75% respectively. While looking and comparing known breeding techniques with what is around we should be looking at number of cells and volume used to produce a litter with increased piglet genetic value. Currently there are producers using 9Billion cells to produce a litter while others use 1.5Billion to achieve the same.

Farmers that know their herd performance well; that have consistent parity structures; predictable wean to service intervals; are applying best industry known management practices and work with very good breeding managers are currently capable of capturing savings. However, sometimes to get to that point is challenging but very much worth it.

**IMPROVED REPRODUCTION PERFORMANCE:**
While learning about PCAI the assumption is that this type of process should improve reproductive performance: if anything the expectation should be to see performance equal to TAI. We have found results to be variable. Some producers noticed farrowing rate and litter size increases, some decreases and some saw no difference. (Schematic 1)
HOW IS PCAI DONE?

There is no boar present during insemination. It is all about giving time to allow reproductive organs to relax. Be patient and gentle (those that decide to learn, will learn with time and PCAI will become just as normal as TAI). This is not yet bullet proof system, it is still a technology that requires human feeling and, touch.

Heat-checking, identification and timing is still the king.

From industry meetings and research trials we understood that breeding gilts was not recommended. We excluded gilts from some trials, however in another instance we bred gilts with good success. We also found heavier body weight gilts 150-160 kg bred on 3rd known heat were easier to perform PCAI on. We also found that P1 are also challenging to breed PCAI due to intensity of uterine/smooth muscle contraction. (There are some interesting experiences being gained as this article is written.)

Ontario Farm experience:
We set a goal of breeding only predictable sows
We agreed to breed only 10 sows per week
We agreed to breed sows that came to heat on day 4
We agreed to breeding single insemination with 75 ml and 3 billion cells.
Option 1.
Heat-checking was performed according to farm’s usual protocol (once per day in the morning). Sows found in heat on day 4 would be marked and then left in their location to be bred first thing next morning. After insemination we would go ahead and breed any day 5 sows immediately then 24 hours later. While day 5 sows are being bred the day 4 sows bred PCAI are getting additional stimulation.

Option 2.
Heat-check sows routinely, mark the sows in heat, then go ahead and heat-check repeats and opportunity rows. Some managers also go ahead and heat-check and breed their gilts. Once all heat-checking is done then go back and breed sows found in heat earlier PCAI. “Relax” time given is recommended by industry professionals who have done this for a while - approx. 45 min to 1 hour. From our observations a good way to be sure when sows are ready to be bred PCAI is after the heat-checking is done to see sows lying down and relaxed. (We observed that behaviour after 30 min post boar exposure.)

Results
See Tables 4-6:

Table 4 - Reproductive results

<table>
<thead>
<tr>
<th>Traditional AI</th>
<th>PCAI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TB</td>
</tr>
<tr>
<td>Farm 1</td>
<td>13.6</td>
</tr>
<tr>
<td>Farm 2</td>
<td>13.3</td>
</tr>
<tr>
<td>Farm 3</td>
<td>12.5</td>
</tr>
</tbody>
</table>
Table 5 - Total Born distribution by parity by breeding method

Table 6 - Litter distribution (variation) by breeding method

Other questions
What is the impact of stimulation after PCAI?
What are the differences in capacitation timing?
Who defines inner catheter length?
Influence of back-flow?
What are the differences in timing?
What is the optimum cell count and volume per insemination?
What impact does sire line fertility have when working with reduced cell counts?
What are the desired characteristics of a breeding technician willing to learn the breeding technique of PCAI:

- Patience
- Respect for animals
- Desire to learn
- Persistence
- Careful approach
- Monitoring and understanding progress

ACKNOWLEDGEMENTS

University of Alberta - Dr. George Foxcroft, Dr. Michael Dyck, Jennifer Patterson (April - 2011 Alberta Swine Technology Workshop)

Inspiration: Dr. Julie Menard and Danbred NA( Dr. John Sondermans)

Producers:
- Farmer in Northern Ontario
- Dwight Davies and Production Manager of Greenwood Pork Lucio Leite
- Arnold Ypma(Producer)
- Stuart DeVries(General Manager, Total Swine Genetics)
- Greg Simpson(Swine Nutritionist, OMAFRA)
- Insem Inc.(Paul Chessman)
- Camera Crew for support and encouragement