

Title: Comparison of Semen Delivery Systems for Commercial Swine Production in Iowa **NPB# 01-154**

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Summary and Implications

Semen was collected over a five-week period in the summer of 2001 and over a six-week period in the winter of 2002. A total of 50 collections of semen were used in this study. From these semen collections 498 doses of semen was shipped via courier to the five farms and 458 doses of semen was shipped via overnight delivery. Fifty-two doses of semen could not be accounted for in the breeding records, giving a total of 452 sows inseminated for this project. The semen used in the overnight delivery system was on average 28 hours older when used for insemination compared to the semen used in the courier delivery system. In this study no significant difference was found between semen delivery systems for farrowing rate. Both semen delivery systems produced farrowing rates in excess of 85%, a very competitive level in the swine industry today. The difference in total pigs born per litter was also non-significant in this study. However, the semen delivered via courier did produce a small but statistically significantly larger litter size born alive.

Introduction

The swine production industry is rapidly evolving into two distinct segments: commodity pork production and value added pork production. Long-term survival and profitability in each of these production segments is extremely dependent on accessing the highest quality genetics in the most cost-efficient manner. It has been demonstrated that the superior genetic lines can now be accurately identified using BLUP based genetic evaluation procedures. Offspring from these genetically superior lines can be widely used in a swine production unit through the implementation of an artificial insemination (AI) program. One production trend that has dominated the recent evolution in the pork industry is the trend towards use of (AI). Over the past few years the percentage of market hogs that were produced from AI mating has increased from less than 10 percent to more than 75 percent. However, the success of AI has been quite variable between swine producers. Recent research has shown that semen collected and processed in a professional AI stud has on average a higher farrowing rate and litter size compared to semen collected and processed at the farm. However, not all farms are located sufficiently close to a professional AI stud for fresh semen to be delivered during the week. The

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option exists to deliver this semen to the farm via overnight delivery carrier. What is not known is the relative fertility of the semen after it is handled through the overnight delivery system compared to semen that has been delivered fresh to the farm.

The objectives of this study are to evaluate the differences in reproduction on commercial swine farms when using semen that is delivered from a professional AI stud by a) courier delivery system within eight hours of collection, versus b) overnight delivery system within twenty eight hours of collection.

Materials and Methods

Five swine producers cooperated in this project. These producers had established AI programs and kept their reproductive data management records on a computerized data system (such as PigChamp or PigWin) that allows for extraction of data for analysis. These producers were also eligible for semen delivery by courier from a participating AI stud.

Two AI studs that operate courier semen delivery systems participated in this study. Their role was to collect and process semen from terminal Duroc boars using the normal procedures of the AI stud. The experimental unit was one collection of semen from one Duroc boar. Each collection was required to pass all normal semen quality checks (concentration, motility, and abnormalities) and have a minimum of 12 functional doses after extension. The semen collection was then randomly allocated into six doses that would be delivered via courier, and six doses delivered via overnight delivery to the same farm. This would allow the same semen collection to be used at the same farm during the same breeding period, but delivered via the different semen delivery systems. The six-dose minimum would be used to increase the probability that a minimum of three sows would be inseminated with the semen from each delivery system with a target of two litters produced. This was done to avoid confounding sow effects with semen delivery effects and individual boar effects. All matings included in this study were homospermic and were recorded in PigChamp® with date, time, boar and observer recorded.

The project was conducted during two replicates, one during the summer months (July and August 2001) and one during the winter months (January and February 2002). This was done to account for any potential seasonal effects on fertility or transportation.

After a period where a minimum of 50 collections of semen were split and delivered to the farms the results were evaluated.

Traits evaluated at the farm included farrowing rate, litter size born, litter size born alive, percent stillborn and percent mummies. Quality control traits (such as collection amount, percent viable sperm, etc) that are common to each AI stud were also collected.

The traits analyzed included farrowing rate, total pigs born and litter size born alive. Data were analyzed using the GLM procedure of SAS including the fixed effects of farm, season of collection, week within season of collection and parity of sow.

Results and Discussion

Semen was collected over a five-week period in the summer of 2001 and over a six-week period in the winter of 2002. A total of 50 collections of semen were used in this study. From these 50 semen collections a total of 498 doses of semen was shipped via courier to the five farms and a total of 458 doses of semen was shipped via overnight delivery. Fifty-two doses of semen could not be accounted for in the breeding records, giving a total of 452 sows inseminated for this project. Least squares means for farrowing rate, total born and litter size born alive by semen delivery system are shown in Table 1.

The semen used in the overnight delivery system was on average 28 hours older when used for insemination compared to the semen used in the courier delivery system. This difference in semen age would not be expected to result in a performance difference based on previous research. In this study no significant difference was found between semen delivery systems for farrowing rate. Both semen delivery systems produced farrowing rates in excess of 85%, a very competitive level in the swine industry today. The difference in total pigs born per litter was also non-significant in this study. However, the semen delivered via courier did produce a small but statistically significantly larger litter size born alive.

Acknowledgments

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Table 1. Least Squares Means for Farrowing Rate, Total Born and Litter Size Born Alive by Semen Delivery System.

Trait	Courier Delivered Semen	Overnight Delivered Semen	Difference
Farrowing Rate	87.1%	85.0%	2.1%
Total Pigs Born	11.34	11.52	0.18
Litter Size Born Alive	10.48^a	10.28^b	0.20

^{ab}Means with different superscripts differ (p<.05).