



Bringing Precision to Semen Evaluations

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A computer-automated, semen analysis machine, used in hundreds of human and animal applications worldwide, was introduced this spring into two commercial boar studs in the U.S.

Minnesota's TLC and TLC2 Boar Studs were the first two commercial studs to put in place high-tech, automated semen analyzers.

Many of the current tests used to ensure high-quality, fresh-extended semen have limitations in their subjectiveness to predict sperm motility and sperm concentration, explains Gary Althouse, DVM, Veterinary Medical Teaching Hospital at the University of Illinois.

The TLC studs' \$40,000 Integrated Visual Optical System (IVOS) from Hamilton Thorne Research, Beverly, MA, is a combination computer/calculator/microscope that experts anticipate could greatly improve boar semen analysis and repeatability.

Capturing images at the rate of 60 frames/second, it quickly provides a high level of accuracy for analysis of sperm concentration, motility (activity), velocity and morphology (structure). It precisely counts and analyzes each individual sperm in a sample, observes Kate McLaughlin, company biologist and animal markets manager.

Althouse validated IVOS for use in boar studs. He first compared it to the industry standard, the hemacytometer. IVOS was found to consistently be within 10% of the actual sperm concentration when compared to the hemacytometer.

In contrast, published reports have stated that the spectrophotometer, commonly used to measure sperm concentration, can be up to 40% off on actual sperm concentration. The spectrophotometer uses light transmittance or brightness as a means of measuring semen. By this method, non-sperm matter in boar semen can also block light, leading to inaccurate readings, explains McLaughlin.

On the other hand, the IVOS only detects and counts sperm, she says. "It actually counts individual sperm in a sample. We know that boar semen is exposed to a lot of contaminants, so we have three levels of quality control in IVOS for a positive identification of sperm — brightness, size and elongation," states McLaughlin.

A typical dilution for boar semen is 3-3.5 billion sperm/dose with a dose volume of 80 ml., she adds.

"An error in the sperm concentration measurement will result in a



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corresponding error in the number of sperm per dose," points out McLaughlin. "If the concentration were overestimated by a factor of two, one would conclude that twice as much dilution of the ejaculate was required. The result would be that only 1.5 billion sperm would be present per dose, instead of the nominal three billion," she adds.

In this scenario, if semen is not used soon after collection, the fertility and litter size could be reduced, stresses Althouse.

If you plan to use semen within 72 hours, you should have at least 3 billion sperm/dose of high quality semen because the rule of thumb is loss of a billion sperm/dose/day of storage, he explains.

Impact at the Stud

For TLC Boar Stud at Harmony, MN, (and TLC2 at Jackson, MN), implementation of the IVOS will take a lot of the guesswork out of measuring sperm motility and concentration, says co-owner Roxi Thompson. It greatly simplifies semen processing. It is programmed to take the total number of cells in the ejaculate, divide by the desired number of cells per dose and calculate the correct number of doses.

In the past, TLC, like many boar studs, has used a standard phase contrast microscope for conducting semen evaluations. That also means jotting down semen analysis results and then transferring that data to spreadsheets. That takes a lot of time and can result in human transcription error, notes Thompson.

The IVOS shortens up that time frame and is automatically programmed to record and categorize semen samples and export the data directly to computerized spreadsheets.

"Right now we maintain limited amounts of information on boars. Now that we have IVOS, we expect to generate very solid numbers on many different things," says Thompson.

For instance, suggests McLaughlin, TLC can save their daily production data to spreadsheets, while behind the scenes the IVOS computer can look for subpopulations.

"They may want to look for sperm with a certain head movement that will help get to the sow's reproductive system faster," says McLaughlin. "We may find at the end of the year that certain velocity parameters have a high correlation to the number of piglets that they see from their customers. Next year, TLC may follow that up and sort for semen with certain velocity patterns," she says.

Upgrading Quality

The IVOS also will benefit TLC customers as new technologies emerge, says Thompson. "This technology puts us in a real position now to objectively measure semen quality. If, as an industry, we are going to a low-dose semen concentration, you better know what you are starting with, and IVOS documents quality," she adds.

Employee Review, Training

At the end of each month, TLC Boar Stud analysts can go into the IVOS and track the work done by their employees. The multi-species computer program logs technician time and performance.

And, because only a few steps are needed to analyze semen with IVOS, new

technicians can learn how to operate the program in about half an hour, says McLaughlin.

"This system can help a new technician do the same analysis of a semen sample as the stud's top quality control engineer. This simplified system would be valuable with the turnover rate of employees at some studs," she notes.

For more information on the IVOS, log on to Hamilton Thorne's Web site, www.hamiltonthorne.com. Contact Kate McLaughlin at (800) 323-0503, or e-mail katemcl@hamiltonthorne.com.

Birth of a Boar Stud

Jeff and Roxi Thompson had no hog experience when they ventured into the business in 1990 in the rolling hills of southeastern Minnesota near Harmony.

They bought 20 bred gilts from a neighbor and farrowed in A-frame huts for two years. They depopulated and repopulated with better genetics, moving sows inside.

By 1994, they started collecting semen for artificial insemination (AI) from their own herd boars. The following year they had their first custom-collect customer, housing the boar and collecting the semen.

They phased out their hog operation and built a 26-stall AI stud in December 1996. By July 1998, the couple expanded the AI barn to its current 100-boar capacity.

Then they opened a second boar stud, TLC2, which has capacity for 160 boars, at Jackson, MN, in February 1999.

New boars spend 30-60 days at an isolation unit several miles from the Harmony site before flowing into one of the two studs.

Currently, very few of the boars are custom-collect. TLC and TLC2 are two of four boar studs in the country that are sanctioned as Outsource AI Centers by Dekalb Choice Genetics.

Customers range in size from 120 sows to 25,000 sows.

"That's the beauty of AI," says Jeff. "All sizes of producers can use it."

The Thompsons pride themselves on service and flexibility. Some 90% of their customers in the Upper Midwest receive same-day service.

Most semen suppliers follow a set schedule outlined in a contract, limiting changes in orders to 48 hours notice.

At TLC, farms can call as late as 3 p.m. the day prior to their regular delivery day and get their order changed, explains Jeff, though he says they try to discourage last-minute changes.

The Thompsons have also gone out of their way to help other studs. They belong to a peer network group that comes to the aid of one of the studs in an emergency.

"One stud in our group depopulated and repopulated," explains Jeff. "That


took a lot of dollars and cooperation from the other studs to get them through that."

TLC also uses an internal backup plan. They keep 15% of the semen in reserve. "There are about a billion different things that are going to affect semen quality," says Jeff. "For instance, you wouldn't think a sore foot would affect semen quality, but it does."

TLC pads that cushion in summer because boars produce less semen in summer and orders always seem to increase.

Contact TLC Boar Stud at (888) 567-4852 or e-mail tlcstud@means.net.
— *Joe Vansickle*

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