



Ramping up research

Disruptive technology continues to reshape the genetics industry. Artificial insemination was the first 'game changer' and there have been many more to follow - from embryo transfer to IVF, in vitro fertilization (IVF), genomic selection and semen sexing to emerging technologies such as artificial intelligence and gene editing.

"It really is a case where we have to innovate or we lose ground," says Dr. Mike Lohuis, Vice President of Research & Innovation at Semex, who notes the company is committed to further strengthening its leadership role in technology development. In 2018, Semex increased research and development spending by 50% and will add a further increase in 2019.

The dairy industry is unforgiving, and with shrinking margins on milk, farmers need better tools to increase output while minimizing their costs. "That's why Semex is working to produce genetics that have high productivity while minimizing the costs associated with health, reproduction and well-being," explains Lohuis.

FOCUSING ON THREE RESEARCH PILLARS

"It's very important for us to understand what drives the bottom line for dairy producers because those are the areas we need to invest in," says Lohuis. "The industry has done a good job increasing productivity, but there are many costs that occur - cow longevity, health, lameness and pregnancy rates are just some of the challenges dairymen deal with on a continual basis."

To address these challenges, Lohuis explains how Semex focuses on three pillars of research and development to meet industry needs:

- **Semen Research** - "This is really fundamental to the genetics business," notes Lohuis. The Semex research team works to maximize availability of high-genetic quality bulls while ensuring that the semen released for sale will meet industry standards for fertility. Advanced diagnostics are used in the lab to predict and ensure high performance in the field.
- **Embryo Research** - Semex's Boviteq business is a world leader in IVF performance and quality. "We're able to produce embryos with very high quality and very high success rates, but we're not going to rest there," says Lohuis. "New IVF tools and techniques are continually being tested to push the envelope on how we can produce more pregnancies per ovum pick up (OPU)."



- **Genomic Selection and Breeding Strategy -**

Semex was an early adopter of genomic selection. This has paid dividends for its bull development pipeline and Lohuis expects further benefits in the future. “We are continuing to discover better tools and techniques to apply this technology and improve success rates in developing bulls that will meet tomorrow’s market demands.”

With support from research partners and collaborators including the University of Guelph, McGill University, University of Laval, Genome Canada, the Natural Sciences and Engineering Research Council of Canada, Agriculture Canada and a host of others, Lohuis believes Semex really does ‘punch above its weight’ in the genomic field. He notes that in August 2018, more than 25% of the bulls in top 1000 GTPI list came through the Semex program.

ADDRESSING INDUSTRY CHALLENGES

It’s also important for Semex to focus research efforts on emerging challenges. “The dairy industry must not lose sight of the ultimate customer - the consumer,” says Lohuis. “The newest generations of consumers are no longer only concerned with price and product safety, they are also interested in the well-being of the animals in our care and the impact that our operations have on the environment.”

With this in mind, Semex is embarking on a gene-editing project that will eliminate the need to dehorn cattle by creating a lineup of ‘hornless’ dairy cattle. “Similarly, by improving the efficiency of feed conversion, we will use fewer natural resources and emit less greenhouse gas,” says Lohuis.

IMPROVING ANIMAL HEALTH WITH ‘HORNLESS’ GENETICS

Semex and Recombinetics, a US genetics technology company, have formed an alliance to implement a precision breeding program that improves animal health and well-being through ‘hornless’ dairy cattle genetics.

By using precision breeding technology, polled genetics can be reliably introduced into elite dairy lines, eliminating the need to dehorn calves. Traditional breeding for this trait, more commonly found in beef cattle, is inefficient and reduces productivity. The alliance’s objective is to seamlessly integrate the polled trait into high-merit dairy genetics through precision breeding.

Using gene editing, small adjustments are made to the genome of an animal to delete, repair or replace individual elements of DNA. In this case, the cell’s natural repair function is used to replace the horned gene with a naturally occurring polled gene. The result is dairy calves that are born naturally hornless.

“This is a solution that benefits dairy farmers and meets the customer’s desire to buy food from animals raised in a safe and healthy manner,” says Lohuis, vice president of research & innovation at Semex.

“We have a long tradition of delivering world-class genetics and reproductive solutions for our customers around the world. This innovation serves the needs of farmers while addressing a long-time welfare issue in the dairy industry.”

