the INSIDER

TOPIGS Canada Inc. | TOPIGS USA Inc. | Spring 2013

In this issue:

TOPIGS
Progress in Pigs

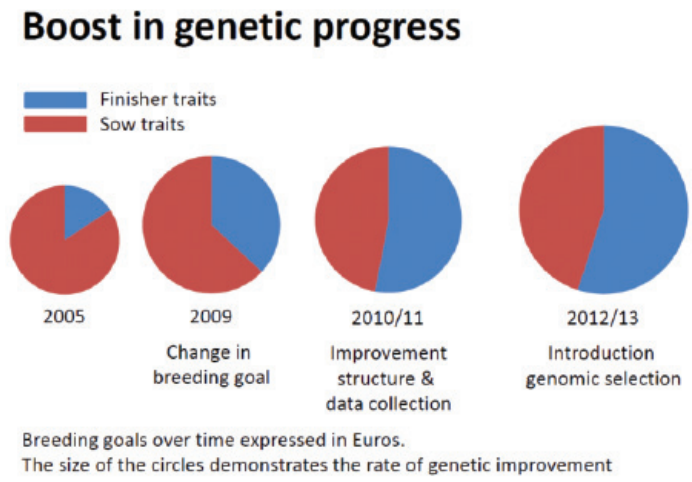
TECHART TOPIGS Breeding Program
Part 1: new selection initiatives cut production costs

By Arjan Neerhof
Arjan Neerhof M.Sc. is Director of Genetics and head of the Genetic Nucleus Group at TOPIGS in The Netherlands

Extremely valuable savings in pig production costs will soon be accessible internationally as a result of important new moves in breeding that make genetic progress both faster and more accurate. With feed prices becoming higher, the really good news is that these initiatives in selection are bringing an even firmer focus on total feed efficiency through genetic improvement. Here at TOPIGS, we believe that the only meaningful way to measure genetic progress is in terms of money. When we do this to assess our own results we find that the improvements in piglet production and growing-finishing performance over the five years from 2007 to 2011 have saved our customers an average of 1.75 Euros ($2.36 CDN) per pig per year on the cost of producing each pig to slaughter weight. To say this in another way, that is the extra profit per pig sold because of better breeding.

Genomic selection in dam lines

TOPIGS has announced recently that it is extending the application of genomic selection to its dam lines, having already introduced this for boars for low boar taint breeding. By our calculations, using genomic selection will boost genetic progress in the dam lines by as much as 30%. This shows how much we expect the cost of production in customers' herds to be reduced when comparing the new breeding plan with the former one without genomic selection. The actual financial benefit for the individual farm depends on its current costs and on future feed prices. But the chart below takes a general look at the monetary impact of our changes in breeding goals over time. The size of each circle in the chart below relates to the value of the genetic progress when expressed in Euros. The blue part of the circle reflects the contribution from improving the traits of finishing performance while the red part relates to the reproductive traits. The circles demonstrate how we have achieved lower pig production costs with each change in the TOPIGS breeding program up to 2011 and the enormous further leap forward that is coming from our initiative to adopt and apply genomic selection on the widest possible basis.



Breeding goals over time expressed in Euros.
The size of the circles demonstrates the rate of genetic improvement

Successful genomic selection needs huge dataset

The key issue in applying genomic selection successfully is to connect the performance of the pig to its genetic make-up. The relationship cannot be determined without access to a large and reliable dataset of results measured on the farm. Fortunately, the dataset available to TOPIGS is huge, with phenotypic information for over 25 million pigs at purebred and crossbred level within both nucleus and commercial environments in more than 25 countries. Over 130,000 pigs are performance tested every year on weight gain and carcass leanness, of which over 20,000 animals have their individual feed intake measured while they are in group-housed pens. Each year, more than 3,300 pigs are dissected and their meat quality aspects are determined, such as loin weight, marbling, meat colour and drip loss. Annually, too, we weigh over half a million piglets individually at birth and then follow them so that individual records of growth and mortality can be maintained.

Continued on page 3...

TOPIGS experts visit North America

In recent months, two members of TOPIGS International have visited the USA to meet with customers and to deliver invited presentations in their respective fields of expertise.

Dr. Pramod Mathur, Senior Geneticist at TOPIGS Research Center IPG

Selection for Robustness

Dr. Pramod Mathur was invited to present *Selection for Robustness at the annual meeting of the National Swine Improvement Federation (NSIF)* in Kansas City, Missouri in November. "Robustness" is the ability to maintain production levels even in the presence of environmental stressors. Disease tolerance and heat tolerance are examples of indicator traits for robustness. Dr. Mathur especially captured the attention of his audience, comprised mainly of swine geneticists from the US and Canada, when he described TOPIGS' novel approach to "Problem-Free" sow and finisher production, which tracks an animal's ability to perform across several, sequential phases of production rather than focusing on a single trait.

Genomics of Disease Resistance

In December, Dr. Mathur provided an update on the field of *Genomics of Disease Resistance* to members of the *Indiana Swine Veterinary Group* in Danville, Indiana. "Disease resistance" is described as an animal's ability to resist becoming infected whereas "disease tolerance" is an animal's ability to maintain production despite being infected. Dr. Mathur provided the group with the latest data regarding genetic variation in response to PRRS and the roles of genetics and genomics to combat this disease. Pramod also attended the *International PRRS Symposium* as he represents TOPIGS participation in a USDA-sponsored research trial designed to identify genes that make pigs less susceptible to PRRS. The trial is a five-year effort, is being conducted by researchers from multiple universities, and includes participation from multiple genetic companies. Additionally, Pramod represents TOPIGS participation in PigGen Canada's research to evaluate the impact of swine genetics on gilt and sow health in commercial herds. The PigGen Canada group presented an update of their research at the Banff Pork Seminar in January, which is also the collaborative effort of multiple universities and genetic companies.

Breeding for Consumer Acceptance

At Purdue University, Dr. Mathur shared European experiences with animal welfare legislation and how TOPIGS has responded to the challenges of regulations concerning sow housing, castration, and tail docking. Pramod noted that the swine genetics has a long history of successfully responding to the needs of producers, consumers and society. The 20th century began with a need for fat hogs and lard for cooking. By the end of the century, large advancements were made in back fat reduction, increased growth rate, and increased litter size. The 21st century has begun with an emphasis on piglet survival and continues with demands for improvement in total feed efficiency, disease resistance, and proper care and handling of animals.

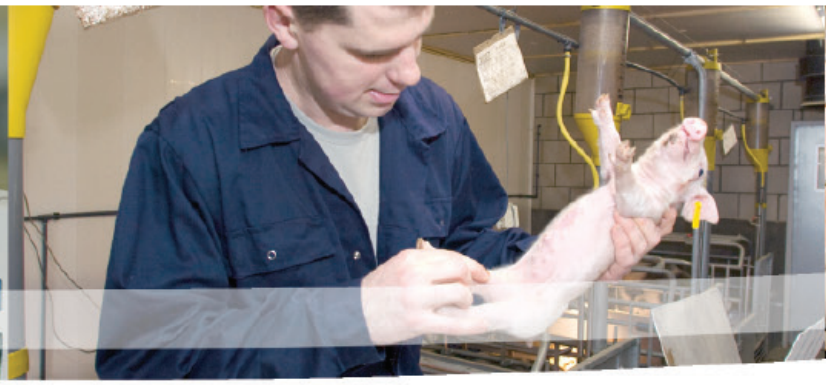
Paul van den Oever, TOPIGS International

Breeding Herd Management

Paul van den Oever, of TOPIGS International, is a worldwide specialist on breeding herd management. Although based in the Netherlands, Paul assists TOPIGS clients around the world to achieve better production on their farms. Paul was the keynote speaker at a TOPIGS' Reproduction Seminar conducted at Watertown, South Dakota in February. Paul's seminar focused on three topics:

- Fertility and production results.
- Total breeding herd management to increase technical results.
- The use of TOPIGS' **PigSis** software for farm-specific determination of ovulation and corresponding optimal timing of insemination.

As always, Paul's knowledge and advice was welcomed by producers and everyone walked away with ideas that they could implement to improve production on their farms. We look forward to future reproduction seminars with Paul in the USA and Canada.



Record Attendance at TOPIGS Ontario Banquet

On November 28, 2012 a record number of TOPIGS customers attended the annual TOPIGS Ontario awards banquet. The growth of TOPIGS in Ontario (and across North America) reflects on the number of producers attending TOPIGS events. Just over 150 guests were hosted for the event and treated to a delicious pork dinner at the Arden Park Hotel in Stratford. Many new faces as well as many long term customers were in attendance to enjoy the evening. This event is always a good opportunity to enjoy good company, meet old and new friends and discuss industry topics.

The evening began with a social hour allowing guest to mingle and visit. Then after a delicious pork dinner, Cam McGavin (TOPIGS Canada General Manager) addressed the crowd. Cam gave an overview of the advances being made with TOPIGS genetics as well as the changes that occurred over the past year. As a very progressive and forward thinking company, TOPIGS always has some news to share. Cam's highlight was the recent development on the use of Genomics. Genomics has become a key component of the TOPIGS breeding program and will greatly enhance the on-farm performance customers will see on their farms in the years to come.

To end the formal part of the evening, the TOPIGS production awards were presented. Several farms in Ontario qualified this past year for the TOPIGS 26+ Club. This award is given to sow farms that achieve 26 or more pigs weaned/sow for the one-year period ending June 30. Award winners this year were:

Tenth Line Swine - 27.98
HiHoJo Farms – 27.20
Adare Pork Ltd. – 27.71
Belview Acres – 26.20

Congratulations to the winners on their well-deserved achievement.

...continued from page 1.

No less important than the number of measurements is the fact that the data are collected in a wide range of conditions for farm environment and health status – not just in high-health pure-line nucleus farms. The task of connecting measured performance to genomic selection starts with the genotyping of a representative sample of slaughtered pigs for which carcass and meat quality traits have been collected. TOPIGS also genotypes other traits of finishers, piglets and sows. Next, animals that are candidates for selection are compared genetically with the top-performing members of the slaughter group in order to estimate their genomic breeding value. Those boars known to have a good genetic make-up can therefore be selected even before they have their own performance data or offspring. This availability of early and reliable breeding values boosts the selection response and the rate of genetic improvement.

Also more accurate

It is accurate, too. We see that the accuracy of selection of candidates at the end of testing at five months old is as high as for choosing a sow on the basis of her first litter. Making this work in practice demands some quite sophisticated software for data analysis and also the tools for genotyping. To determine a genotype we take a tissue sample from the pig's ear while inserting its identity tag and put this into a test-tube marked with a bar-code for identification. The tubes are processed automatically using a micro-chip that is able to check for 60,000 individual DNA sequence variations or single-nucleotide polymorphisms (SNPs) on each of 12 pigs per chip.

Biotech companies have developed both high-density and low-density SNP chip assays. The density of the LD chip is approximately 150 times smaller than that of the HD chip and this in turn is about 17 times smaller than the full genome density --- on the basis that, because of repetitions in sequencing, approximately one million SNPs would cover the full genome even though its complete size amounts to 2.6 billion base pairs or nucleotides. An HD chip is quite costly, but only the parent animals of each generation need such an assessment. Their offspring can be assessed using a less expensive LD chip and the 'missing' information filled in from the parental data by a process known as imputation.

Although we limit the density of the genotyping in the selection candidates in order to save costs, we still manage to obtain an accuracy of 95% because of this process. Our aim is to LD genotype 1500 boars and 2000 gilts per line per year at TOPIGS as the company extends its use of genomic selection to dam lines with effect from the middle of 2012 after introducing it for the breeding of finisher boars at the end of 2011.

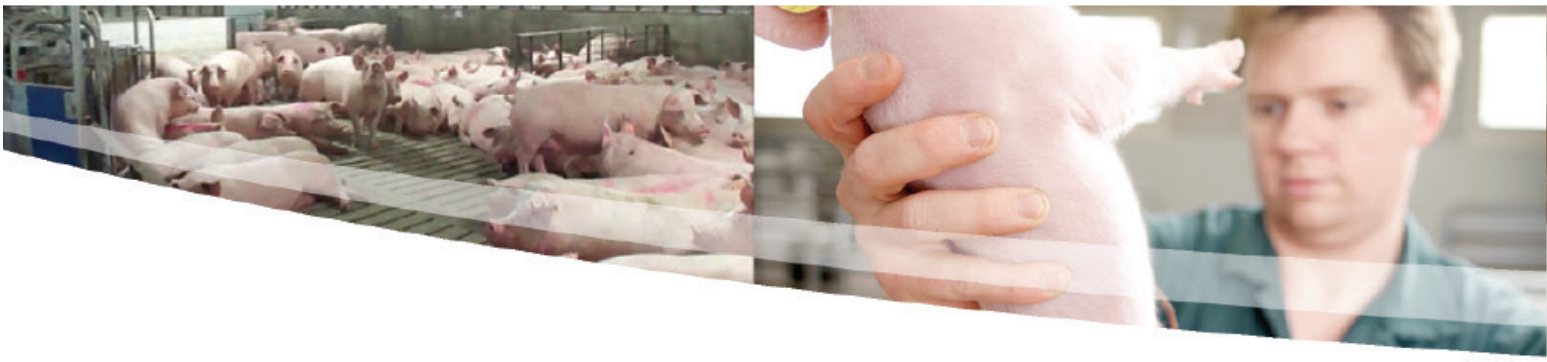
Kalmbach Feeds – 50 Years & Growing

Kalmbach Feeds was founded in 1963 by Milton and Ruth Kalmbach and began as a grind and mix plant in Upper Sandusky, Ohio. Their goal was to design quality feed products, manufacture those products with the highest quality control procedures in the most efficient facility, and provide the product to the customer at the best possible value. The staff included Milton, Ruth, and one man to produce feed.

Today the plant produces a full line of products to meet the needs of every livestock producer. Milton and Ruth's son, Paul, continues to lead the family owned business while focusing on the initial founding goal. Kalmbach Feeds has grown to consist of over 250 employees and is a regional leader in the animal nutrition industry serving seven states. The Kalmbach Family's traditional core values have provided a compass for the company's direction and success over the past five decades.

Since 2008, Kalmbach Feeds has been a valued customer and multiplication partner with TOPIGS USA. "Today's highly productive swine industry has expectations for genetics that can get producers to 30 PSY (pig/sow/year)," comments Ben Zientek, Swine Production Manager for Kalmbach's, "and the TOPIGS 20 has been able to do it. Our best TOPIGS farm reported 32.02 PSY for all of 2012."

And the advantages of TOPIGS continue beyond the farrowing house. "TEMPO-sired animals excel in wean-to-finish growth, uniformity of piglets, and durability from farrowing to finisher," adds Zientek. Kalmbach Feeds is in the process of doubling their multiplication herd to make TOPIGS 20 gilts for both internal use and external sales. TOPIGS congratulates Kalmbach Feeds on their 50th anniversary and looks forward to a future of working together.



TOPIGS finds SNPs for litter birth weight and litter uniformity

TOPIGS has found several SNPs (pronounced Snip's -Single-nucleotide polymorphism) which explain genetic variation in litter birth weight and litter uniformity and can be used to breed sows that farrow large, heavy and uniform litters. These SNPs have a correlation of almost 0.5 with the animal's true breeding value. This means that almost 50% of the genetic variation for birth weight and uniformity can be explained by these SNPs. The reliability of breeding values of young male selection candidates increases by almost 30% compared to cases where SNP information is not used.

The newly found SNPs speed up genetic progress

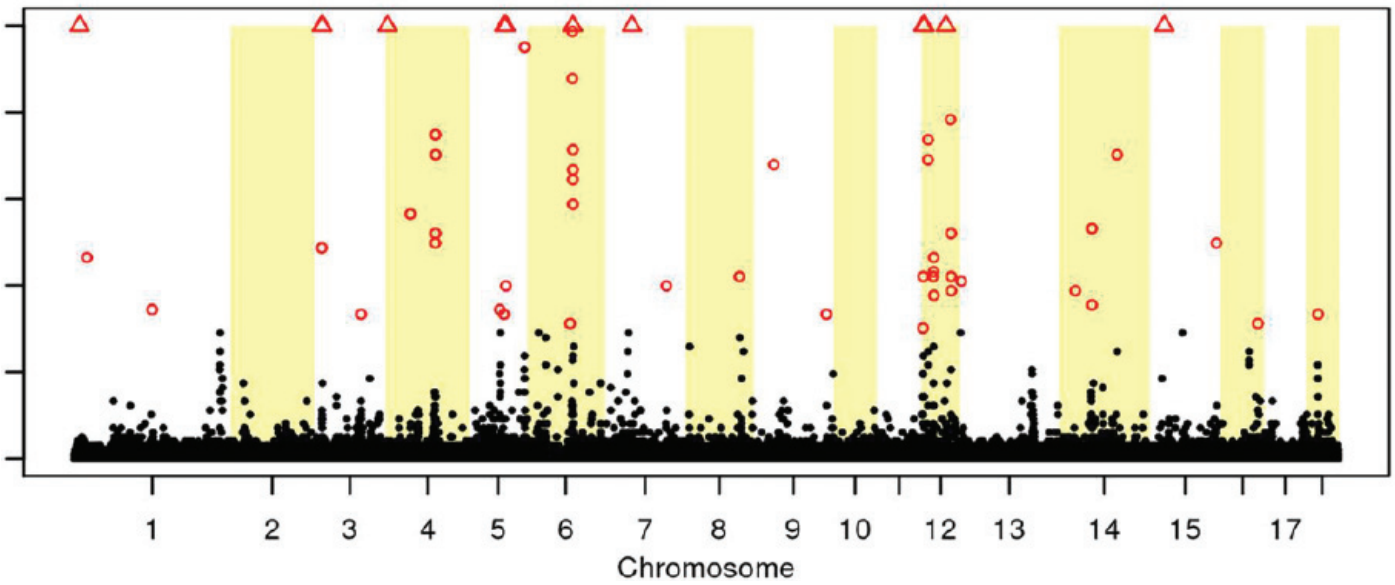
The genetic quality of young boars for litter birth weight and litter uniformity can now be predicted before the end of their performance test. In the past, genetic quality could only be differentiated between full sibs for these traits based on the results of their offspring.

Piglets that start with a high birth weight perform better

High litter birth weights and uniformity in birth weights within litters are therefore highly advantageous for modern pig production systems. Piglets with a higher birth weight are marketed earlier without detrimental effects on carcass quality. Heavy uniform litters make production easier and require less labour.

Heavier piglets are more profitable

With genomic selection technology TOPIGS is able to speed up the genetic progress for these highly relevant economic traits. TOPIGS has a unique dataset in which over 500,000 individual birth weights and survival records are collected yearly. TOPIGS has collected birth weights for several years and now has a database with over 5 million birth weights. Combining this dataset with genomic selection technology offers unique opportunities for creating extra genetic progress.



This Manhattan plot shows the SNPs for litter uniformity on the pig's 18 chromosomes. The red circles show SNPs significantly correlated with the trait litter uniformity; red triangles represent SNPs with a very high significant correlation.

TOPIGS AI Stations

TOPIGS terminal and maternal line boar semen is available throughout North America. Please contact TOPIGS or one of the suppliers listed below.

TOPIGS USA Boar Studs

AiPARTNERS
Morris, MN
Contact: Bruce Zierke
Lab/Office: (320) 760-3504
Email: bzierke@outlook.com

DUTCH SIRES
New Carlisle, OH
Contact: Gene Isler
Lab/Office: 937-846-1528
Email: piggene@aol.com

TOPIGS Canada Boar Studs

Magnum Swine Genetics Inc.
Fort Macleod, Alberta
Contact: Andrew Buesekom
Lab/Office: (888) 553-4844
Email: andrew@magnumswine.com

Ontario Swine Improvement Inc.
Innerkip, Ontario
Contact: Marlow Gingerich
Lab/Office: (800) 493-2627
Email: mgingerich@osi.org

Alberta Swine Genetics Corporation
Nisku, Alberta
Contact: Gregory Leboa
Lab/Office: (800) 691-3060
Email: gregasgc@gmail.com

Total Swine Genetics Inc.
Tillsonburg, Ontario
Contact: Stuart De Vries
Lab/Office: (800) 844-9913
Email: sdevries_shadeoak@sympatico.ca

Carlo Genetics Inc.
Ste. Anne, Manitoba
Contact: George Goossen
Lab/Office: (204) 355-4012
Email: georgegoossen@carlogenetics.com

C & M Genetics
Lucan, Ontario
Contact: Dr. Corneliu Oltean
Lab/Office: (888) 259-7594
Email: corneliu-oltean@cmgenetics.com

HOW TO PLAY

Please answer the questions in our Insider Quiz. All the answers are in this newsletter. Then fax, mail or email your answers, along with your name, address, and phone number. Entries to be received by April 30, 2013. Winners will receive a $20 Walmart gift certificate, and the TOPIGS rep in your area will deliver the prize. Employees of TOPIGS and their subsidiaries are not eligible.

Please contact us for more information:

John Sawatzky, Sales Manager
(204) 981-0243

Gord Edwards, Ontario Sales Manager
(519) 440-8128

Rick Beunen, Ontario Business Development
(519) 317-7403

Ron Musick, Manitoba Business Development
(204) 223-3193

Art Friesen, Alberta & Montana Business Development
(403) 382-9741

Craig Jarolimek, USA Business Development
(701) 866-4444

Brent Eyler, Eastern USA Business Development
(937) 733-8532

TOPIGS INSIDER Quiz

How many pigs are performance-tested every year on weight gain & carcass leanness?

How many pigs/sow/year were produced by the best herd in the Kalmbach system in 2012?

What is the name of the TOPIGS software for farm-specific determination of ovulation?

By what percent will genomic selection boost genetic progress?

Name:

Farm Name:

Address:

Phone #:

Email:

TOPIGS INSIDER Quiz Winners
Here are the winners from last issue: Theodore Hofer, Starlite Colony, MB; Shawn Waldner, Parkview Colony, MB; Steve Mandel, Shamrock Colony, SK; Shalom Voskamp, Apex Family Farms Inc., ON; Elias Henry Wipf, Parkland Colony, AB; Michael Hofer, Spring Lake Colony, SK; Jason Stahl, Westwood Colony, SD; Ike Entz, Rock Lake Colony, AB; Ken Hofer, Enchant Colony, AB, and Michelle Hofer, James Valley Colony, MB.
Each winner receives a $20 Walmart gift certificate. The TOPIGS rep in your area will deliver your prize. Congratulations!

TOPIGS Canada Inc.
201-1465 Buffalo Place, Winnipeg, MB Canada R3T 1L8
Toll-free: 1-866-355-5132, Fax: 204-489-3152, Email: topigscanada@topigs.ca www.topigs.ca

TOPIGS USA Inc.
P.O. Box 897, Demotte, IN USA 46310 www.topigsusa.com

TOPIGS
Progress in Pigs