



# Genetic Research & Development



# **THE TOTAL PACKAGE**

The Genesis research and development program is focused on continual improvement of our products and services.

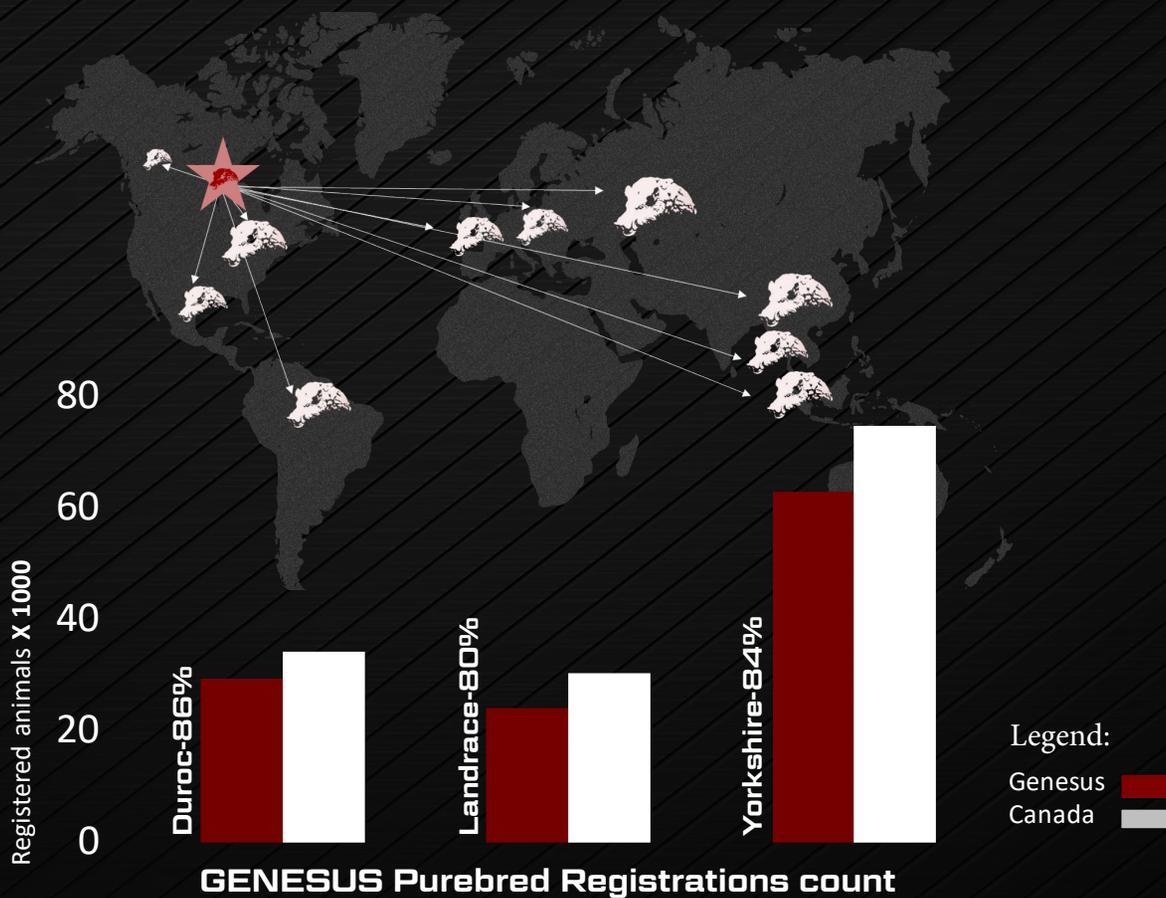
Our use of innovative technologies and time-tested methods ensures that our products and services provide our customers a competitive edge.

Genesis invites you behind the scenes to find out more about our programs and to show that we mean it when we ask you...

**Are you ready to have the best pig in the world ?**



# GENESUS



**A**t the heart of the Genesis genetic program is a globally linked purebred registered nucleus population of more than 15,000 sows

Genesis' uses in-house and collaborators' knowledge and experience to develop genetic, nutrition and management programs that support customers achieving superior performance and maximum profitability.

### How do we deliver the best animals ?

- Registered purebred animals only
- The power of heterosis and breed complementarity
- Profitability-based selection indexes
- Continual investment in our R&D Programs

The Government of Canada Animal Pedigree Act is implemented and certified by the Canadian Swine Breeders Association. Government authorized registered swine breeding stock guarantees purity and a pedigree that ensures a breeding animal that has become a world barometer for quality.

Genesis believes in the value of the registered purebred animal. This commitment ensures that Genesis customers receive only certified purebred and true F1 animals.

**Duroc Nucleus** —————> **5 countries - 11 herds - 4,000+ sows**

**Yorkshire Nucleus** —————> **7 countries - 15 herds - 9,000+ sows**

**Landrace Nucleus** —————> **5 countries - 10 herds - 3,000+ sows**

## THE POWER OF HETEROSIS

The Genesis program utilizes 100% heterosis and breed complementarity. Heterosis results in a bump up in production and reproduction above the average of the purebred parents.

The Genesis Landrace x Yorkshire F1 female exhibits 100% maternal heterosis. The large litter size and sow reproduction of the Genesis Yorkshire is complimented by the superior mothering ability and early puberty of the Genesis Landrace. Genesis has built its breeding program on this simple concept.

**When Genesis F1 female is mated to the Purebred Registered Genesis Duroc boar the package is complete.**

The three breed Genesis commercial pig excels in growth rate, uniformity, survival and pork quality. The consistency of the Genesis commercial pig is a key driver of customer profitability.

Our registered purebred populations allow for uniformity through cross breeding to make “true” F1 females and three breed cross commercial animals.

Uniformity results in easier management and less sorting. Uniformity at the packing plant results in increased profitability for the producer, and that is what counts!

**25% Landrace | 25% York | 50% Duroc**

The final product, a Genesis Duroc sire bred to a Genesis Yorkshire/Landrace (F1), is a powerful combination with:

- **Maximized heterosis**
- **Large, heavy and uniform litters at weaning**
- **Uniform growth**
- **Enhanced livability and feed conversion**
- **Most importantly, MAXIMIZED profitability**

### Heterosis advantage for production traits

Trait	Percentage advantage over multiple crossbred sow
<b>Reproduction</b>	
Conception rate	8.0 %
Pigs Born Alive	8.0 %
Litter Size at 21 days	23.0 %
Litter size Weaned	24.0 %
21-day litter weight	27.0 %
<b>Production</b>	
Days to Market	6.5 %
Feed/gain	2.0 %
<b>Carcass Composition</b>	
Backfat thickness	-2.0 %
Loin muscle area	2.0 %
Marbling	1.0 %



# GENETIC INDEXES AND GENOMIC TECHNOLOGY

**S**election and mating in all breeds utilize specialized indices for the Duroc, Yorkshire and Landrace breeds. These indices use economic and genetic analyses to combine estimates of a pig's genetic value for the economically important traits to maximize the genetic contribution to customer profitability.

Genesis is dedicated to using cutting-edge technology, such as genomics. Genomics is the study of the pigs' genome, or the DNA that makes a pig a pig. Genesis has been conducting research in genomic evaluation and genomic selection since 2009. We studied each trait in detail, followed by evaluation of various genomic selection scenarios that mimicked real population structures and data. These studies helped us to evaluate and predict the benefits and potential challenges that we may face during the implementation of genomic evaluation and selection.

We developed a custom chip that contains more than 55,000 **Single Nucleotide Polymorphisms (SNP)** for routine genotyping in our genomic evaluation system. Genesis uses **Single Step Best Linear Unbiased Prediction (SSBLUP)** for all genomic evaluations. Following years of research, it was determined that SSBLUP provides the highest prediction accuracies for **Genomic Estimated Breeding Values (GEBV)** of young animals. An increase in accuracy of prediction results in increased genetic gain per year.

## 1. Reproductive Traits

For maternal breeds (Yorkshire and Landrace), by using SSBLUP the average litter size at birth GEBV accuracy increased 100%. All these increases in accuracies will be reflected in our genetic response and contribution to maximizing profitability for Genesis customers.

## 2. Growth, Ultrasound and Feed Intake Traits

For age at 120kg (265lb), back fat, and loin depth GEBV the average increase in accuracy was greater than 45%, 100% and 60% for Yorkshire, Landrace and Durocs, respectively. For Durocs the average accuracy increased by 30% for average daily feed intake.

## 3. Meat Quality and Carcass

Similarly, in Durocs, the average GEBV accuracies increased by 76% for pork quality traits (color, marbling, pH.) and by 135% for carcass traits (carcass back fat, carcass loin and hot carcass weight).

These increases in accuracies will result in Genesis Durocs continuing to excel in growth, efficiency, carcass and eating quality traits.

## Average Increase in Accuracy from Genomics

Trait	Accuracy Increase		
<b>Reproduction for Maternal Breeds</b>			
Litter size	100 %		
<b>Production</b>	<b>LL</b>	<b>YY</b>	<b>DD</b>
Age at 120kg (265lb)	100%	45%	60%
<b>Pork Quality and Carcass in Purebred Durocs</b>			
Color, Marbling, pH	76%		
Carcass back fat, loin and hot carcass weight	135%		

# MATERNAL BREEDS

## GENESUS Yorkshire

Genesis Yorkshires have tremendous ability to have large litters, milk well and grow quickly. Their structural capacity and strong feet and legs allows them to maintain high production for multiple litters.

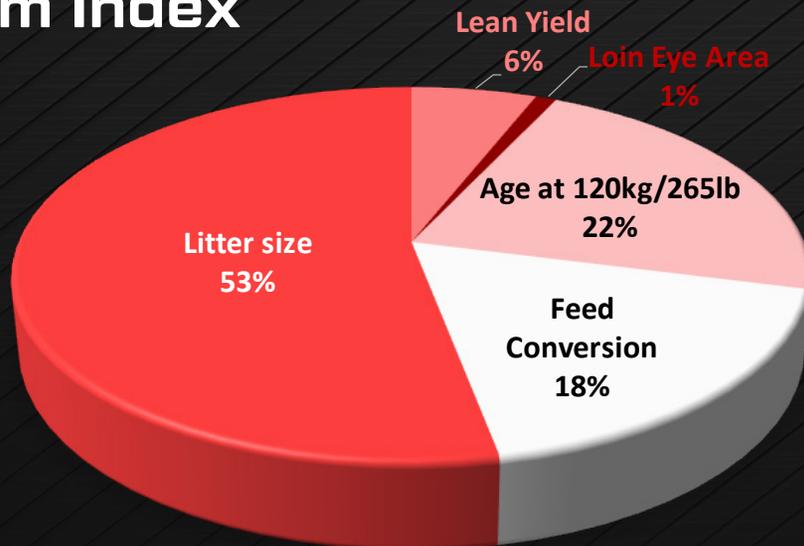
## GENESUS Landrace

Genesis Landrace have large, long frames and their offspring, deliver larger carcasses. They have unrivaled milking capacity and mothering ability, combined with excellent litter size and growth.

## Maternal Breed Genetic Improvement

Genetic improvement of maternal breeds needs to focus not only on the traits important for sow production but also for growth, efficiency and carcass quality traits since the maternal breeds provide half the genetics for the commercial 3-breed pig. The Genesis Dam Line Index (DLI), used for selection in the maternal breeds emphasizes litter size, growth rate, feed conversion and carcass quality traits. The DLI is developed such that the GEBV for each trait is multiplied by its' economic importance and then summed to produce an index value that directly relates to maximizing the profitability of Genesis customers.

## Dam Index



## Genesis Yorkshire Performance

Top%	Age (days)	Fat Depth (mm / inch)	Loin Depth (mm / inch)
5	145.3	13.1 / 0.51	77.6 / 3.05
25	153.2	14.7 / 0.58	74.9 / 2.95
50	158.5	15.9 / 0.62	73.2 / 2.88

9,625 records, adjusted to 120kg (265lb)

## Genesis Yorkshire Litter Size

Top %	Total Born	Born Alive	Alive 24 hours
5	22.1	20.0	18.9
25	19.7	17.5	16.4
50	18.3	16.3	15.2

5,155 litters - nucleus herds

## Genesis Landrace Performance

Top %	Age (days)	Fat Depth (mm / inch)	Loin Depth (mm / inch)
5	144.7	14.6 / 0.57	78.1 / 3.07
25	154.0	16.2 / 0.64	74.5 / 2.93
50	159.9	17.2 / 0.68	72.3 / 2.84

13,873 records, 120kg (265lb)

## Genesis Landrace Litter Size

Top%	Total Born	Born Alive	Alive 24 hours
5	19.9	18.7	17.9
25	17.4	16.3	16.2
50	16.2	15.0	14.9

3,496 litters - nucleus herds

# MATERNAL BREEDS

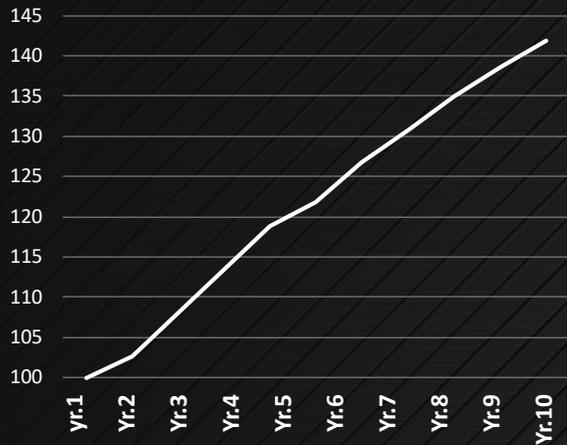
# SOW EFFICIENCY

**S**ows nursing large litters, require a substantial amount of energy to support growth of their piglets. Lactation is the most energy demanding phase of the sow production cycle. Understanding the genetic and physiological components of lactation is critical in understanding sow efficiency and will lead to increased profitability. If milk production is not sufficient then piglets will have reduced growth during lactation which can impact growth rate throughout the nursery and grow-finish periods.

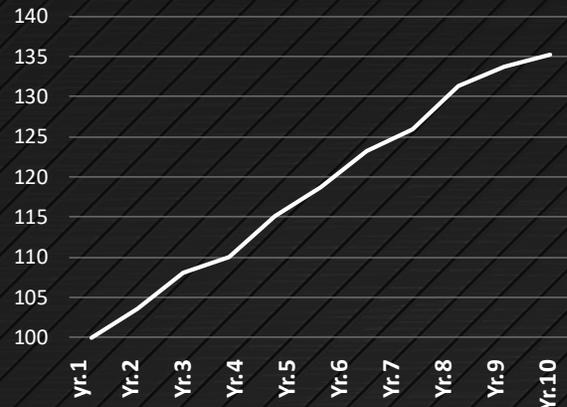
Genesis has invested heavily to understand sow efficiency. Since 2010 we have been collecting significant amounts of individual lactation feed intake data using electronic feed intake equipment. Additionally, collection of other sow efficiency data includes sow weight and body composition changes from farrowing to weaning, sow rebreeding intervals, individual piglet weights, individual piglet survival and growth to weaning plus genotyping thousands of females. These compliments detailed litter size, sow longevity, gilt puberty, growth rate, feed efficiency and carcass data.

Genesis also knows that efficiency of the F1 sow is of key importance to our customers. Therefore, we need to combine purebred and F1 data to ensure we are providing the most advanced genetics to our customers. To this end, we have been collecting sow efficiency data and genotypes on over 1400 Genesis F1 sows in collaboration with a Genesis customer. This will allow us to merge the purebred and F1 data to enhance the understanding and selection for sow efficiency.

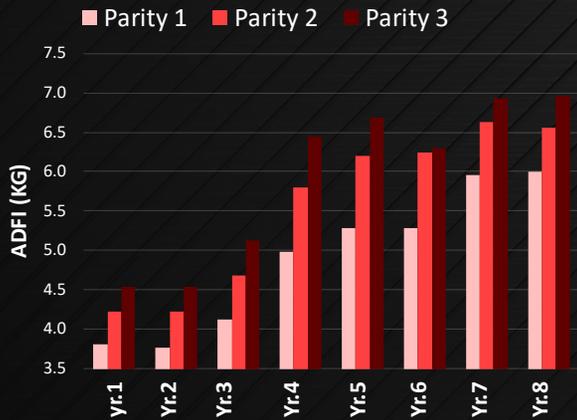
Genesis Yorkshire Dam Index (DLI)



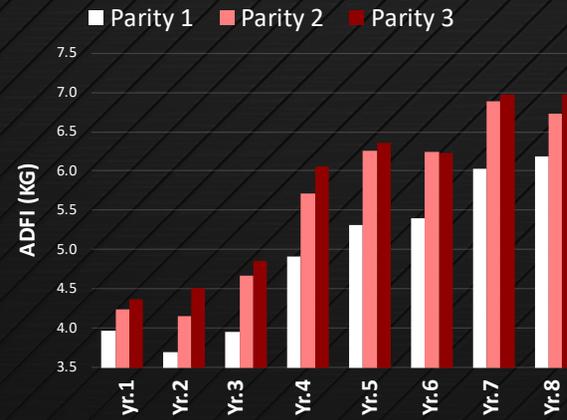
Genesis Landrace Dam Index (DLI)



Average Daily Lactation Feed Intake Evolution for Genesis Yorkshire



Average Daily Lactation Feed Intake Evolution for Genesis Landrace



Pedigree-based genetic evaluation methods have been very successful for selecting animals for easy-to-measure traits.

However, most of the traits associated with sow efficiency are either less heritable, appear later in life or are difficult to measure on a routine basis. So, for these traits, genomic selection can be an attractive alternative to pedigree-based evaluation methods.

At Genesis, we continue to develop a detailed understanding of sow efficiency and are developing advanced genomic evaluation and selection procedures for key sow efficiency traits.

## **SOW & PIG HEALTH**

Health can have a significant impact on producer profitability. While health outbreaks are certainly devastating, a significant cost is also associated with disease through its impact on performance.

Increasing a pig's resilience to disease can impact not only its performance in stable but lower health environments but also during a disease outbreak.

### **Genesis understands the significant impact of health and has been involved in health-focused projects since 2009.**

Genomic technology offers great potential for genetic improvement of disease resilience. The need to keep nucleus and multiplication systems at a high-health level has always hampered opportunities for genetic improvement of health traits. Genomic tools are being developed that can link differences in performance under disease challenge or low health environments to selection for disease resilience at the high-health

nucleus level. The overall goal of this R&D area is to increase a pig's disease resilience by developing and implementing genetic improvement programs incorporating disease resilience.

### **Nursery Pig Project**

During the "Nursery Pig Project" an important region was identified that affected performance of pigs during a PRRS challenge. Pigs with the favourable genotype shed less virus and grew faster than pigs with the unfavourable genotype. This region has been included on our custom SNP chip and the results are used as part of the selection procedures for boars and gilts at the nucleus level.

### **Sow Resilience**

At the sow level Genesis has been involved in projects focusing on both lower health level commercial herds as well as data from herd(s) experiencing a disease outbreak. Herds that break with disease possess a wealth of information and data on disease challenges in the field.

Genesis is involved with studies analyzing genomic and phenotypic litter size information from an outbreak herd. Identifying important genomic markers or genes that impact a sow's performance during exposure to Porcine Reproductive and Respiratory Syndrome (PRRS) virus is an important part of this project.

Another of our related research studies focuses on gilt and sow performance in stable but lower health level commercial farms. In this study high-health F1 replacement gilts were introduced into lower health level commercial herds. The gilt's performance during

the acclimation phase and her subsequent production thru 4 parities was monitored. The genomic information and performance data is being used to determine genetic effects on gilt acclimation and sow performance in a lower health level commercial.

An important objective of these studies is to incorporate identified genomic regions or genes into our genetic improvement program in order to produce gilts and sows that can withstand disease challenges while continuing to perform.

### **Grow-Finisher Resilience**

Many grow-finish pigs are exposed to PRRS and other common swine diseases during their time in the grow-finish unit. Genesis is participating in a project to identify important genomic regions that can be used for selection in the nucleus for pigs that have higher disease resilience and thus perform better during grow-finish.

Genesis participates in these large-scale collaborative research projects revolving around swine disease because of the importance of health to the profitability of our customers. Genesis believes these important projects will make a difference for our customers because these health projects will lay the groundwork for increasing the disease resilience in sows, piglets, nursery and grow-finish pigs.

In addition to Genesis funding, our funding partners include, the Canadian Swine Health Board, Genome Canada, Genome Alberta, US Department of Agriculture, Canadian, USA, European universities and other swine genetics companies.



# TERMINAL BREED PUREBRED REGISTERED GENESUS DUROC

**G**enesus has the largest purebred registered Duroc herd in the world and over 4,500 Duroc sows in production globally and growing. The Genesis Duroc foundation was built on registered purebred Canadian Durocs which have then been selected for over 20+ years. The key selection tool in the Genesis Duroc program is the Sire Line Index (SLI) which combines GEBV into one value based on the relative economic value for traits important to slaughter pig profitability. Our SLI has the significant emphasis on growth, feed intake, carcass and pork quality traits. The profit-driven SLI has ensured that the customers profitability is at the forefront of selection.

This has resulted in a pig with exceptional growth rate, survival, carcass composition and pork quality while maintaining an industry competitive efficiency.

## Rapid, Efficient Growth

All pig producers will agree, feed is the largest component of production costs, accounting for more than 60% of the total cost. Direct selection on FCR may result in some undesired responses in terms of growth, feed intake, health, pork quality, etc. because of underlying correlations between many of these traits.

Considering these issues, Genesis has incorporated this thinking into development of its breeding goal, which has led to significant improvement of overall pig performance.

While feed intake is important, growth rate is also a very important trait since growth rate drives carcass

weight, the major determinant of income from slaughter pigs. So, combining growth rate and feed intake together focuses the emphasis on cost of gain which is a very important indicator of profitability.

Since 2004, Genesis performance testing has used specialized individual feed intake feeders and radio frequency technology to measure individual daily feed intake. Animals are on test for the final seven weeks, approximately 75kg (155lb) to 120kg (265lb) of the grow-finish performance test. Once the animals reach the end of test, they are ultrasonically measured for backfat depth, loin depth, and intramuscular fat.

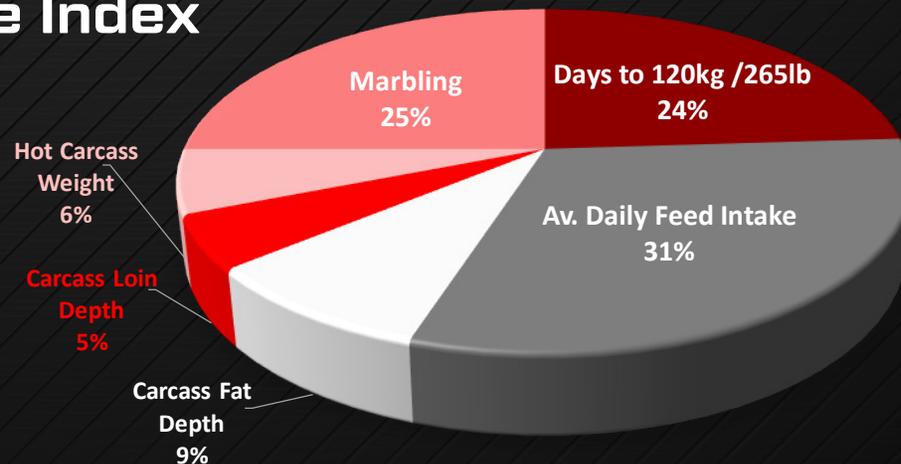
This allows Genesis to identify efficient boars that grow faster with a low cost of gain and are robust throughout production.

## Genesis Duroc Performance

Top %	Age (days)	Fat Depth (mm / inch)	Loin Depth (mm / inch)
5	139.9	10.8 / 0.42	81.2 / 3.20
25	146.6	12.2 / 0.48	77.5 / 3.05
50	151.0	13.3 / 0.52	75.3 / 2.96

12,650 records, adjusted to 120kg / 265lb

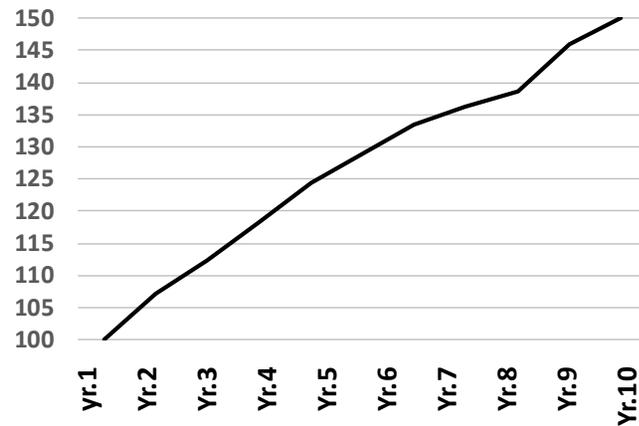
## Sire Index



### 5 Year Annual Genetic Trend Duroc

Trait	Change/Year
Sire Line Index	4.80
Day to 120 kg	-1.40
ADFI (kg)	0.03
LD (mm)	0.20
FD (mm)	-0.10
HCWT (kg)	0.00
Marbling	0.00
Minolta L	0.00
pH 24 hr	0.00
Lean Yield Index	4.20

### Genesis Sire Index (SLI) Duroc



### Genesis Duroc FCR

Top %	Start Age (days)	End Age (days)	Start Weight (kg / lbs)	End Weight (kg / lbs)	ADFI (kg / lbs)	ADG (kg / lbs)	FCR	Sire Line Index SLI (pts)
5	104	149	68.4 / 150.8	118.0 / 260.1	2.10 / 4.63	1.08 / 2.38	2.00	161
25	105	153	69.4 / 153.0	118.0 / 260.1	2.41 / 5.31	1.03 / 2.27	2.42	146
Mean	106	154	68.9 / 151.9	117.9 / 259.9	2.63 / 5.80	1.03 / 2.27	2.64	124



# CARCASS AND PORK QUALITY

Some key associations show that selection for:

- Growth rate will not significantly improve pork quality traits
- Feed conversion decreases pork quality by making pork lighter in color
- Leaner carcasses will reduce marbling, increase cooking loss and paleness of hams
- Marbling will slightly improve other pork quality traits

There is a myth that selecting for pork quality or eating experience causes pigs to be inefficient during production. This is NOT true, rather it is just a bit more difficult than selecting on just FCR, lean growth and lean yield.

It requires genetic companies to collect new and expensive carcass and pork quality phenotypes, understand the relationships between FCR, lean growth, lean yield and pork quality, update the breeding goal/selection index and implement the selection strategy accordingly.

## GENESUS has always had a vision of improved pork quality

- 20+ years of research and development
- 18,000+ pigs tested
- 900+ weeks of data
- On-farm growth and ultrasound data
- In-plant carcass composition and pork quality data
- Genotypes on animals with carcass and pork quality data

We have spent twenty years relentlessly working to develop genetics that have top production characteristics and pork with outstanding marbling, darker colour and excellent pH to enhance the consumers purchasing and eating experience, as we were determined that this is the direction our industry would come too. We are now there, as our industry is beginning to realize the merits of taste and flavor to enhance consumer demand in both domestic and international markets.

The next logical step for us is to examine the opportunities for increasing primal composition and quality to enhance profitability for our customers.

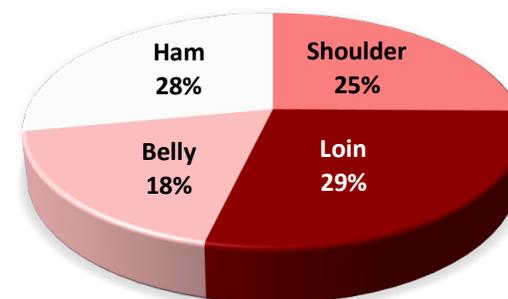
This program focuses on exploiting existing and new collaborations with research and industry partners including new technologies (e.g. Near-infrared Spectroscopy and Dual-Energy X-Ray Absorptiometry). This new focus builds on results from a previous Genesis study that reported options for application of genomic technologies and genetic correlations among performance, pork quality and carcass composition traits in commercial pigs.

At Genesis, the focus has always been to emphasize taste, tenderness or juiciness and never sacrifice them just to achieve quicker improvement in lean yield or a single trait, like FCR.

Genesis includes marbling in the selection index in addition to lean yield and growth efficiency, thus making a product competitive on the production cost side while maintaining an excellent eating experience for consumers.

The Genesis Duroc is widely known for its superior carcass and eating quality traits. Commercial animals sired by Genesis Duroc boars have dominated in independent studies of carcass and meat quality.

## GENESUS CARCASS PRIMAL DISTRIBUTION<sup>1</sup>



<sup>1</sup>Average for Duroc gilts, untrimmed primal cuts  
101kg / 222lb hot carcass

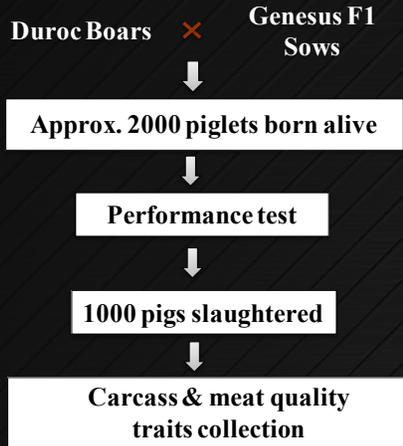
## Genesis Duroc Carcass and Meat Quality

Records %	Marbling Score <sup>2</sup>	HCW kg/lbs	LD mm/inch	FD mm/inch	MinoltaL	pH
12.5	5+	102.2 / 225.3	67.1 / 2.64	17.9 / 0.70	50.0	5.9
32.2	4+	102.1 / 225.1	67.7 / 2.66	17.1 / 0.67	49.5	5.9
66.4	3+	102.1 / 225.1	68.5 / 2.69	16.6 / 0.65	49.1	5.9
100	3.1	102.0 / 225.0	68.6 / 2.70	16.1 / 0.63	48.9	5.9

Duroc gilts, av. Live Weight 130kg / 286.6 lb

<sup>2</sup> NPPC marbling scores are 1 to 6

# GENOMICS OF CARCASS MEAT & EATING QUALITY



- Non-genetic analysis
- Genetic parameter estimation
- GWAS
- Genome prediction and selection



A Genesis, genomic-based research project focused on carcass, pork and eating quality on 1000 Genesis commercial crossbred pigs, indicate that if pork quality is not emphasized in the genetic program then the eating experience will deteriorate.

Pigs were measured for production traits from birth to slaughter, carcass, pork quality and consumer taste traits panel. Data was collected post-slaughter and all pigs were genotyped using the Illumina porcine 60 K SNP chip.

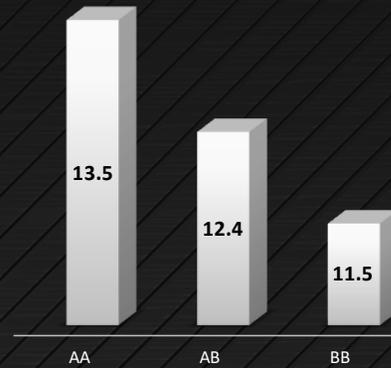
In total over 70 traits, such as growth rates, ultrasound depths, carcass yield, carcass primal weights, pH, colour, shear force, marbling score were recorded.

As a result of this project, Genesis has implemented a genomic evaluation system for carcass composition, marbling, pH and colour. In addition, some of the key results are:

- Consumers preferred pork with higher marbling
- Marbling was more important than pH for consumers preference
- Regions on SSC1 are associated with carcass fat depth and marbling score (Fig 1)
- Region on X-Chromosome was associated with carcass fat depth, loin depth and loin muscle area (Fig 2)
- Region on SSC2 was associated with meat tenderness (Fig 3)

Fig 1

Carcass Fat Depth (mm)



Marbling Score (units)

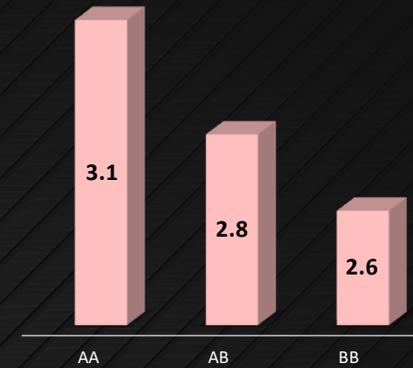
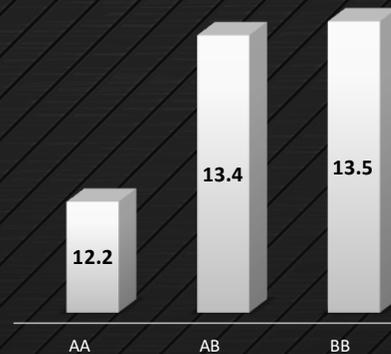


Fig 2

Carcass Fat Depth (mm)



Loin Muscle Area (sq.cm.)



Fig 3

Peak Shear Force (N)



## FEED CONVERSION & FEED INTAKE

There are several ways to improve FCR, including, but not limited to:

- Selecting for faster growth, while holding feed intake constant;
- Selecting for lower feed intake, while holding growth constant;
- Selecting for faster growth and for lower feed intake.

Genesis pigs have a good appetite and thus Genesis has focused on maintaining feed intake at status quo and selecting for pigs that grow faster.

This allows the Genesis pig to improve FCR, yet handle stressors (i.e. diseases challenge, out of feed events, management, etc.) it encounters because of its' good appetite.

Understanding how to feed an animal to its appetite and nutritional needs is critical to profitability.

Since most genetic providers focus on FCR as a main trait they have pushed down the intake of the animal, and these can't be fed the same way as animals that have a higher appetite.

Feed intake is very often overlooked as a production factor in favor of FCR. It is however a vital production parameter and one that is very easy to monitor.

Voluntary feed intake is a trait with significant genetic influence directly related to growth rate.

Genesis expects pigs in finisher to be eating about 2.5kg (5.5 lb) per day on average.

## Advances through applied Nutrition Research & Development

- Focus on optimal diets for Genesis pigs
- Rock Lake Research Center
- 1200 head nursery, 2400 head finisher
- Pen feed intake, serial weight and ultrasound
- 55K SNP genotypes
- Carcass and marbling data (Biotronics Bio Qscan®)

**S**ince 2016 the Rock Lake Research Center near Balaton, MN provided Genesis the ability to measure feed intake, growth rate, and body composition to ensure that Genesis diet specifications are current and focused on cost per pound of gain. At the completion of the grow-finish test animals are harvested at a commercial facility (Tyson Storm Lake) where carcass composition and pork quality data are collected.

Over 24,000 Genesis commercial pigs have been tested in the Rock Lake Research Center. Every eight weeks a group (1200 head) of Genesis full program pigs are placed in the nursery to begin the process of evaluating and updating diet specifications. During the nursery and grow-finish phases, pigs are fed in stages to determine the most profitable diets throughout the life of the pig.

The key is ultra-modern research facilities that utilize automatic feed recording equipment and a research protocol that includes bi-weekly weighing, live pig ultrasound testing, and packing plant carcass evaluation. It is important to understand each stage to ensure the minimum nutrient requirements are met and to

maximize profit by optimizing the balance between the animal's nutrient requirements, performance and carcass value.

Lysine, the first-limiting amino acid, is one of the most important ingredients of a diet. One of the things Genesis discovered in doing its research was that lysine was being overfed using average nutrient requirement recommendations combined with the high appetite of the Genesis pig.

Since that time Genesis has continually updated diet specification recommendations resulting in improved feed conversion and lower cost of gain. However, lysine is not the only factor evaluated in a nutrient recommendation. The lysine/energy ratio and other amino acids are also important and play a critical role in optimizing cost per pound of gain. Pigs deposit protein and fat at different rates as they grow.

Understanding these deposition curves is important to understand opportunities for improvement. Genesis has conducted multiple trials to evaluate protein and fat deposition curves, and more than 15 trials to date to develop and maintain current diet specifications.

Measuring pigs from start to finish is the only way to accurately know the impact of nutritional recommendations.

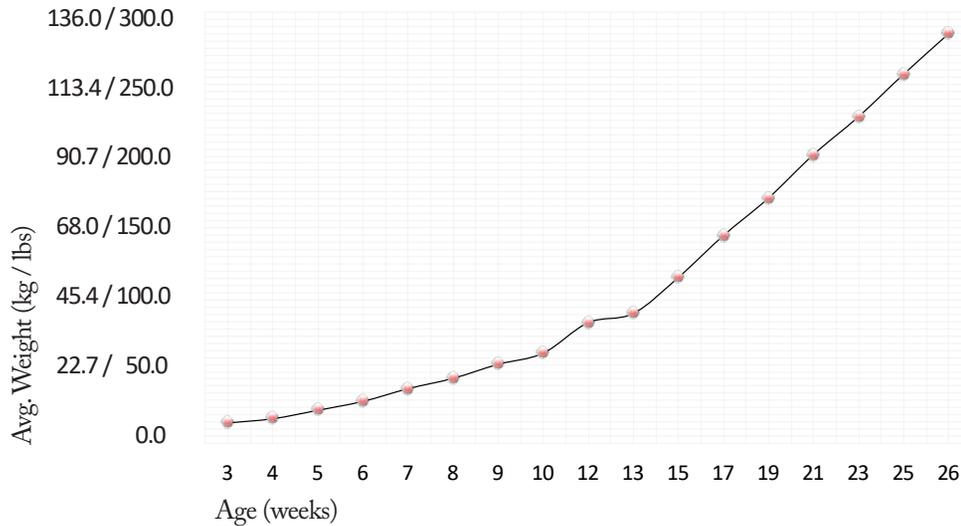
The benefits for Genesis of doing this research are:

- improved growth rate
- optimized diet specifications to minimize cost of gain
- incorporate commercial data into the genetic program
- evaluate carcasses for composition and pork quality

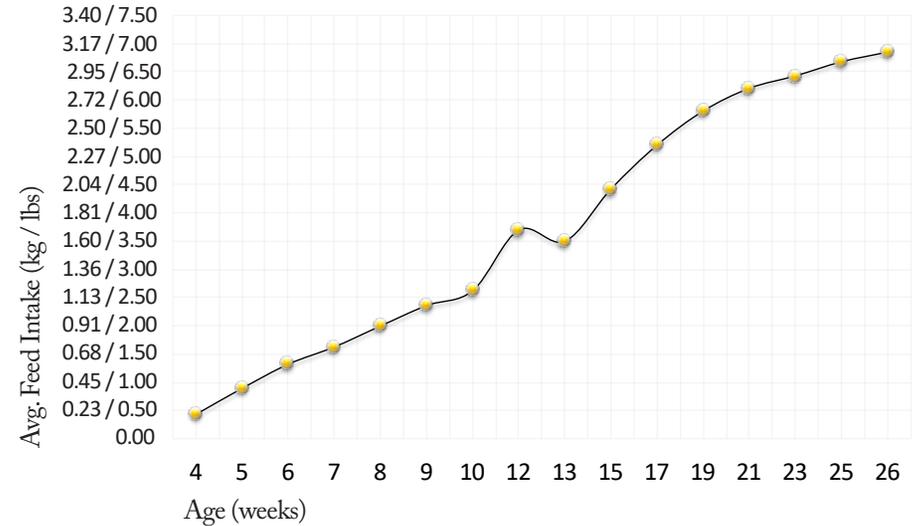
## Nutrient Specification Trials on Genesis pigs

- Lysine titration, tryptophan titration (5 trials)
- Protein and fat deposition curves (3 trials)
- Net energy titration (2 trials)
- Amino acid evaluation (4 trials)
- Nutrient digestibility

## Genesis Commercial Animals Average Weight by Age\*



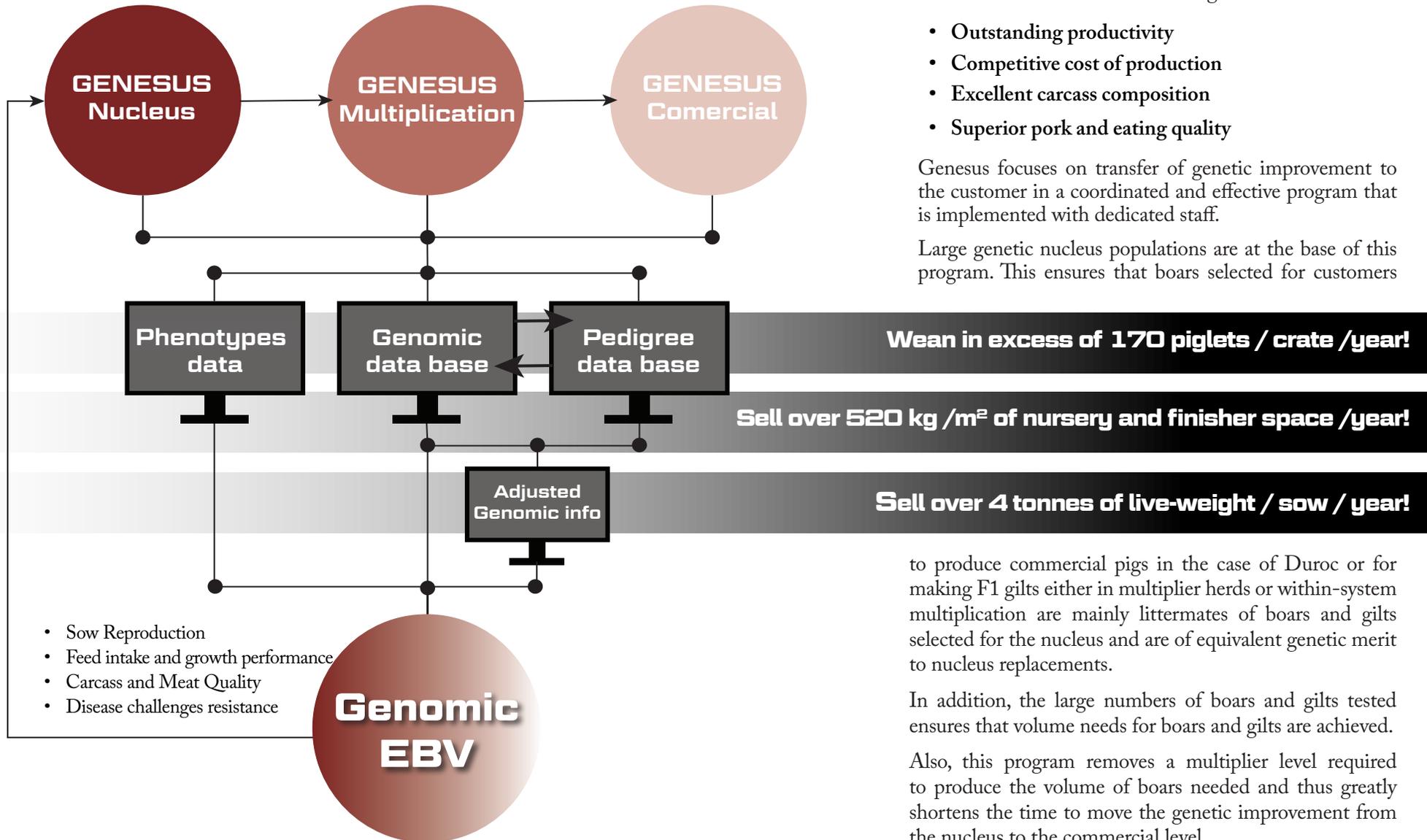
## Genesis Commercial Animals Average Daily Feed Intake by Age\*



\*Average data from 24,000+ Genesis Full Program animals (Genesis F1 x Genesis Duroc) on different diet trials



# GENESUS R&D IMPACT ON THE COMMERCIAL LEVEL



The Genesis genetic program is fully focused to benefit the Genesis commercial pig and thus our customers. Genesis commercial animals are recognized for:

- Outstanding productivity
- Competitive cost of production
- Excellent carcass composition
- Superior pork and eating quality

Genesis focuses on transfer of genetic improvement to the customer in a coordinated and effective program that is implemented with dedicated staff.

Large genetic nucleus populations are at the base of this program. This ensures that boars selected for customers

to produce commercial pigs in the case of Duroc or for making F1 gilts either in multiplier herds or within-system multiplication are mainly littermates of boars and gilts selected for the nucleus and are of equivalent genetic merit to nucleus replacements.

In addition, the large numbers of boars and gilts tested ensures that volume needs for boars and gilts are achieved.

Also, this program removes a multiplier level required to produce the volume of boars needed and thus greatly shortens the time to move the genetic improvement from the nucleus to the commercial level.

### Average Genetic Change Impact on Commercial Pigs

Trait	5 year cumulative
Growth Rate (days to 120kg/265lb)	-7.5
ADFI (kg / lbs)	0.15/ 0.33
FCR	-0.20
Loin Depth (mm at 120kg/265lb)	0.25
Fat Depth (mm at 120kg/265lb)	-0.40
Total Number Born (per Genesis F1 litter)	1.15

**MORE PIGS**

**BETTER PIGS**

**MORE PROFIT FOR YOU**

Additionally, all boars in AI units are controlled by Genesis and all AI inventories are reviewed, and replacements selected on a quarterly basis to maximize genetic value of the boars available in the AI unit.

All of this combines to produce significant benefit at the commercial level. The average genetic change over the last 5-year period for the Genesis commercial pigs are shown in the table above. This genetic impact can be complimented by increased management, nutrition and environmental opportunities to fully maximize the profitability of the Genesis commercial pig.

# GENESUS

## THE TOTAL PACKAGE



## **Genesis Genetic Leading Team**

- Bob Kemp, PhD
- Dinesh Thekkoot, PhD
- Chunyan Zhang, PhD
- Everestus Akanno, PhD
- Bob McKay, PhD
- Ed Sutcliffe, MSc

## **Genesis R&D Collaborators**

- University of Alberta
- University of Guelph
- Iowa State University
- Kansas State University
- University of Nebraska
- Genome Canada
- Genome Alberta
- United States Department of Agriculture
- East 40 Packing Ltd.
- McKay Genstat Ltd.
- Rock Lake Research Centre

## **Genesis Ongoing R&D Projects**

- Genomics of carcass and meat quality
- Growth, feed intake, and feed efficiency
- Sow efficiency and longevity
- Population health
  - a. PRRS
  - b. Sow Robustness
  - c. Disease Resilience
- Genomic Evaluation using commercial and nucleus data
- Genomic Selection Strategies

# the **TOTAL PACKAGE**

More pigs, Stronger pigs, Better pigs

World's **LARGEST**  
registered purebred herd

## MAX GROWTH

**PREMIUM** carcass  
& meat **QUALITY**

