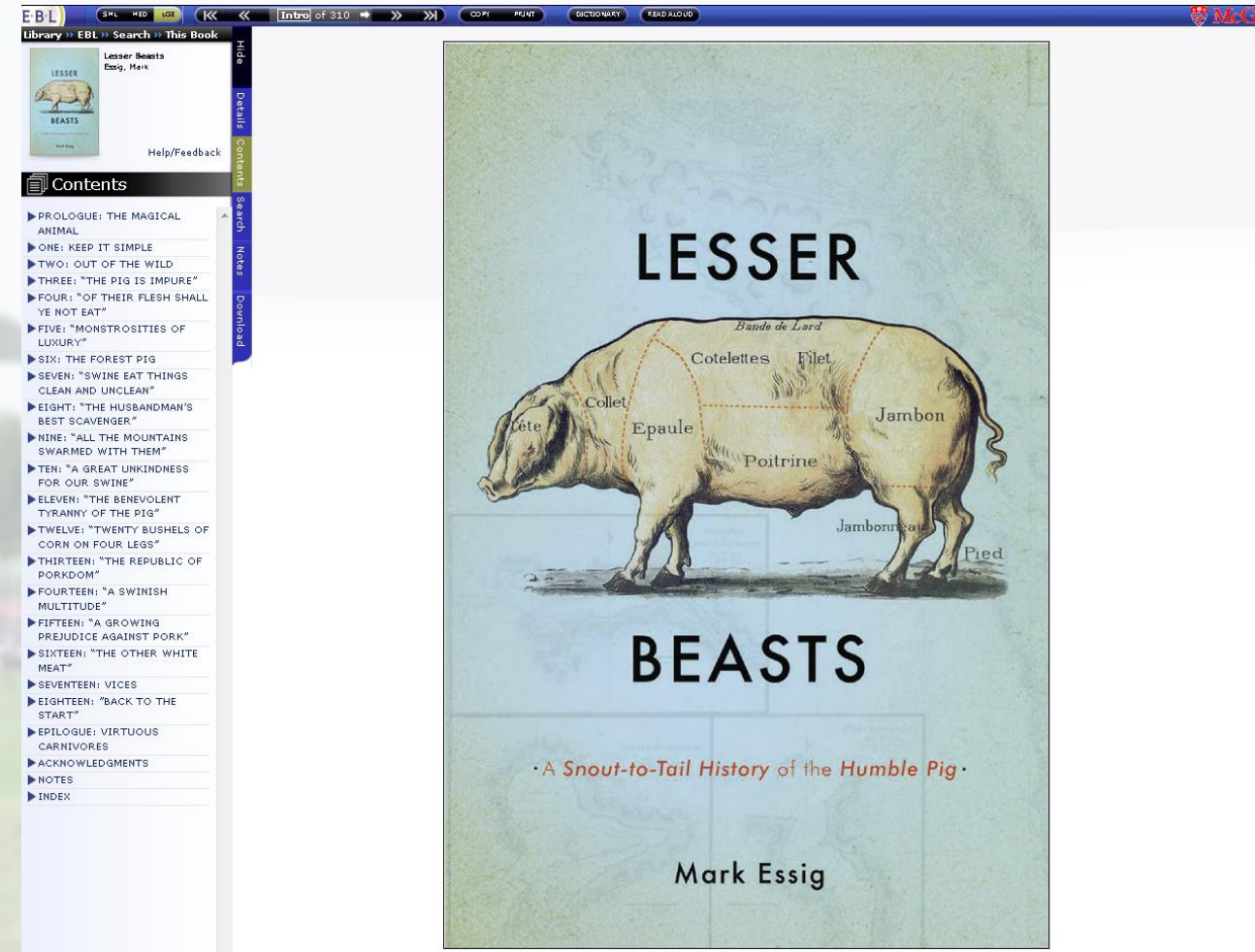


The Canadian Swine Industry



Facts about Canadian Swine

- 🍁 Canada is the world's largest exporter of pork
- 🍁 Pork exported to over 90 countries
- 🍁 Breeding stock exported to over 50 countries
- 🍁 Canada has one of the world's largest purebred nucleus populations
- 🍁 Canada is noted for its health status and freedom from major diseases

Hog Production in Canada

With revenues amounting to over three billion Canadian dollars, the pork sector accounts for 30% of total livestock shipments and for 10% of all farm cash receipts.

Virtually all commercial hog production in Canada takes place in a controlled environment which implies that, at all times of the year, animals are kept in buildings specialized to the farrowing, growing and finishing stages of raising market hogs. The most common hog production unit today is a specialized farrow-to-finish operation of 200 to 250 sows, which can be managed efficiently by a single family.

Farrow-to-finish reduces significantly productivity losses associated with stress of movement, adaptation to new environments, changing feed regimes and transmission of diseases. Also, producers can monitor the performance of animals through to maturity, thereby observing final results of breeding programs and other management practices.

In 1984, Canada introduced a sow productivity and management system and for the last three years, our sow productivity improved 11 % compared to other leading hog producing countries recording increases of 1% to 2%.

MARKET INDICATORS

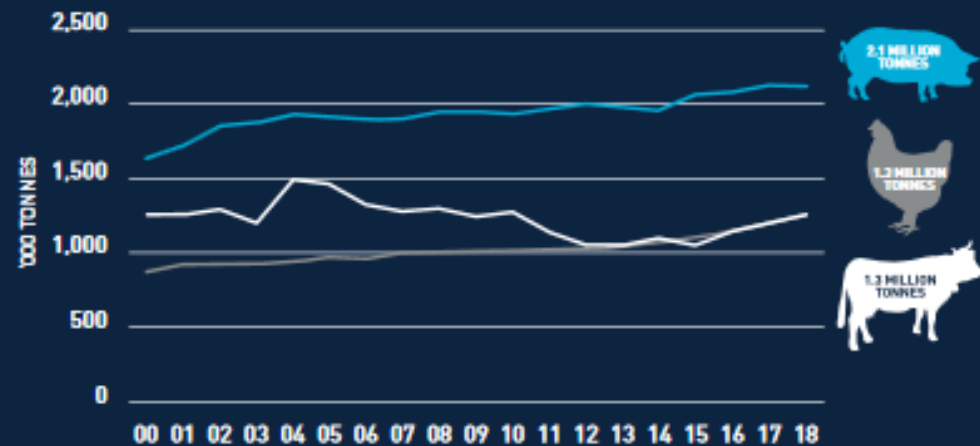
In 2018, Canadian exports of pork and pork products reached 1,262,061 tonnes and pork export value was of \$3.86 billion.

KEY FINDINGS

- Canadian pork export volume has increased by 167,560 tonnes (+15.3%) in the last 10 years
- Canadian pork export value has increased by \$1.12 billion (+41%) in the last 10 years
- The US continues to Canada's largest export market by volume representing 346,834 tonnes in 2018
- China continues to be Canada's second largest market by volume representing 283,350 tonnes in 2018
- Japan continues to be Canada's highest value market accounting for over \$1.27 billion, representing 33% of total export value
- Canada's top ten export markets in 2018 represented 95.8% of total export volume and 96.8% of total value
- Canada's top ten export markets in 2018 (volume): USA, China, Japan, Mexico, Philippines, South Korea, Taiwan, Australia, New Zealand and Hong Kong

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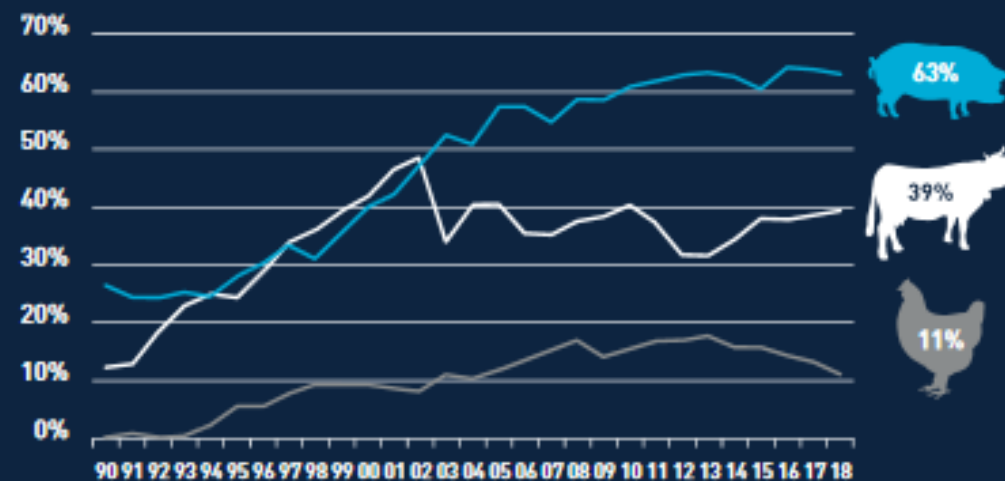
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CANADIAN MEAT PRODUCTION PORK | CHICKEN | BEEF | 2000-2018

Source: Agriculture Canada, Statistics Canada

— PORK — CHICKEN — BEEF & VEAL



CANADIAN MEAT EXPORTS % OF PRODUCTION

Source: Statistics Canada

— PORK — CHICKEN — BEEF

Canadian Hog Slaughter by Province of Origin

Number of Head

	Week Ending		Chg	YTD Ending		Chg
	17-Aug-19	18-Aug-18		17-Aug-19	18-Aug-18	
British Columbia	3,579	4,194	↓ -14.7%	113,502	125,990	↓ -9.9%
Alberta	42,871	41,095	↑ 4.3%	1,380,178	1,396,437	↓ -1.2%
Saskatchewan	34,503	32,643	↑ 5.7%	1,049,427	1,051,427	↓ -0.2%
Manitoba	93,746	90,327	↑ 3.8%	2,980,478	2,908,766	↑ 2.5%
Ontario	108,902	115,660	↓ -5.8%	3,507,238	3,475,968	↑ 0.9%
Quebec	138,905	130,566	↑ 6.4%	4,460,789	4,434,885	↑ 0.6%
New Brunswick	352	324	↑ 8.6%	16,113	16,694	↓ -3.5%
Nova Scotia	128	213	↓ -39.9%	6,174	7,517	↓ -17.9%
Prince Edward Island	1,432	536	-	35,605	30,798	↑ 15.6%
Canada	424,418	415,558	↑ 2.1%	13,549,504	13,448,482	↑ 0.8%

Estimated Sow/Boar Slaughter (includes federal & provincial slaughter)

West	742	496	↑ 49.6%	25,340	14,601	↑ 73.5%
East	820	886	↓ -7.4%	36,562	39,110	↓ -6.5%
Canada	1,562	1,382	↑ 13.0%	61,902	53,711	↑ 15.3%

Source: CFIA and Provincial Governments

Pork Exports

Canadian Pork Exports

Metric tonnes

	Monthly		Chg		YTD Ending		Chg
	Jun-19	Jun-18			Jun-19	Jun-18	
China	26,813	23,596	↑	13.6%	217,193	145,085	↑ 49.7%
United States	24,409	25,682	↓	-5.0%	150,551	177,341	↓ -15.1%
Japan	24,945	22,981	↑	8.5%	129,045	131,939	↓ -2.2%
Mexico	10,588	13,649	↓	-22.4%	64,833	69,100	↓ -6.2%
South Korea	3,349	4,032	↓	-16.9%	22,287	25,161	↓ -11.4%
Philippines	2,868	4,960	↓	-42.2%	15,460	26,811	↓ -42.3%
Taiwan	2,158	4,382	↓	-50.7%	15,156	21,902	↓ -30.8%
New Zealand	1,244	948	↑	31.2%	5,504	5,465	↑ 0.7%
Australia	550	637	↓	-13.6%	5,417	6,747	↓ -19.7%
Cuba	793	383		-	3,186	2,972	↑ 7.2%
EU - 28	98	178	↓	-45.2%	962	973	↓ -1.2%
Other	3,301	4,387	↓	-24.8%	20,329	27,765	↓ -26.8%
Total	101,114	105,814	↓	-4.4%	649,923	641,262	↑ 1.4%

Domestic exports only (excludes re-exports)

Source: Statistics Canada

Canadian Pork Exports

CDN\$ ('000)

	Monthly		Chg		YTD Ending		Chg
	Jun-19	Jun-18			Jun-19	Jun-18	
China	64,777	43,192	↑	50.0%	484,811	260,685	↑ 86.0%
United States	98,735	99,098	↓	-0.4%	594,131	629,057	↓ -5.6%
Japan	132,699	110,472	↑	20.1%	676,454	632,068	↑ 7.0%
Mexico	21,486	22,494	↓	-4.5%	117,134	104,401	↑ 12.2%
South Korea	14,654	14,156	↑	3.5%	85,926	86,706	↓ -0.9%
Philippines	7,758	11,039	↓	-29.7%	35,533	57,755	↓ -38.5%
Taiwan	5,711	10,566	↓	-45.9%	36,544	49,266	↓ -25.8%
New Zealand	3,744	2,961	↑	26.4%	16,356	16,309	↑ 0.3%
Australia	2,097	1,904	↑	10.1%	16,434	21,521	↓ -23.6%
Cuba	2,091	910		-	8,044	7,768	↑ 3.6%
EU - 28	488	508	↓	-3.8%	3,446	2,996	↑ 15.0%
Other	9,130	9,807	↓	-6.9%	54,622	62,413	↓ -12.5%
Total	363,370	327,105	↑	11.1%	2,129,434	1,930,945	↑ 10.3%

Domestic exports only (excludes re-exports)

Breeds...



Landrace

Originated in Denmark; White; Large droopy ears; Longer than most other breeds because of extra vertebrae; More adaptable to confinement.



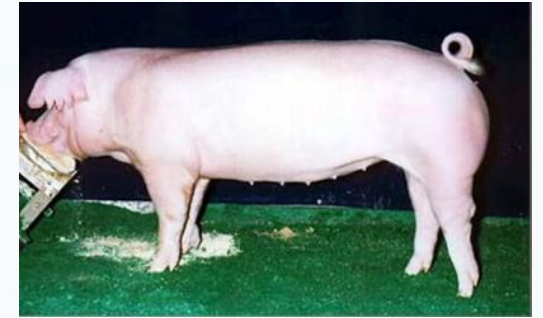
Yorkshire (Large White)

Originated in England; White; Erect ears; Good maternal breed with large litters and milk production; High proportion of lean meat.



Berkshire

Originated in England; Black with white extremities; Erect ears; Early maturing; Known for juicy tender meat.



Chester White

Developed in the USA; White; Droopy ears; Large litters; Good maternal abilities.



Duroc

Developed in the USA; Reddish-brown; Drooping ears; Fast growth rate; Good feed efficiency; Aggressive.



Hampshire

Developed in the USA; Black with white belt; Erect ears; Good Muscling; Rapid growth; Good Carcass quality; Good maternal qualities; Good temperament.



Pietran (Spotted)

Originated in Belgium; Black and white spotted; Erect ears; High proportion of lean to fat; Subject to Porcine Stress Syndrome.; Most often used in cross-breeding programs

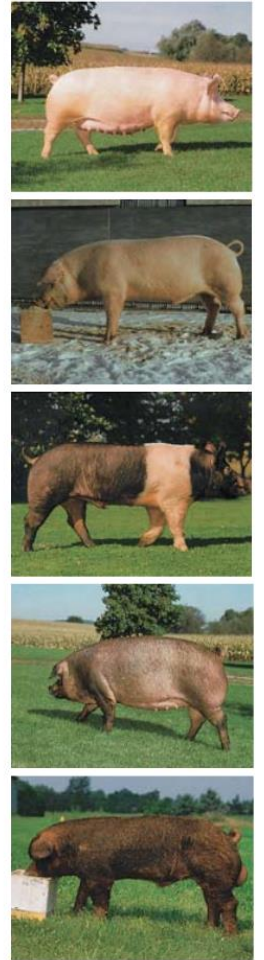


Poland China

Developed in the USA; Black with white patches; Drooping ears; Large; Relatively heaviest for any given age; Rapid weight gain; Good temperament; Hardy.

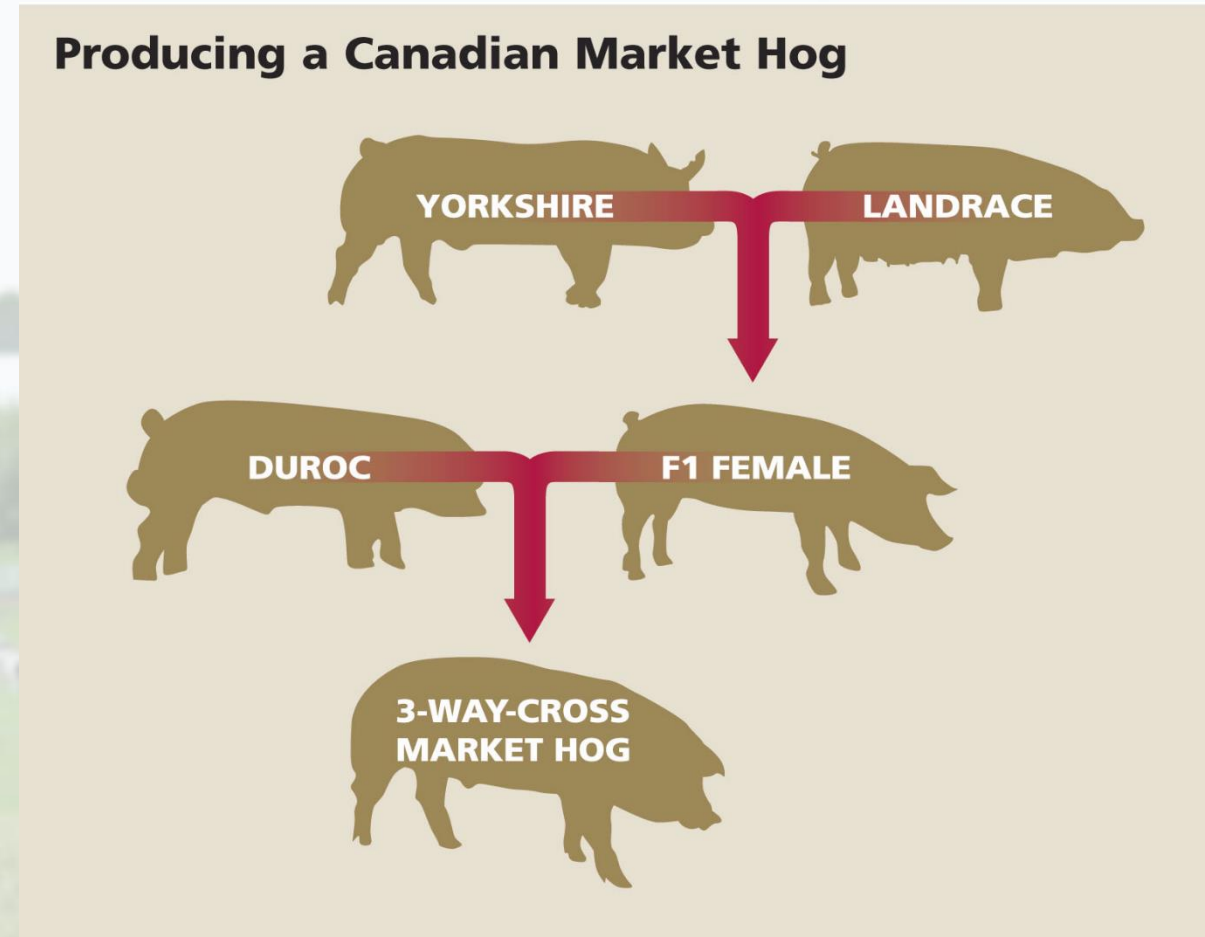
Canadian Swine Breeds

- In Canada, major breeds include the Yorkshire (Large White) (42% of the national herd), Landrace (32%) and Duroc (25%). In addition, there are smaller populations of other breeds such as Hampshire, Pietrain and Berkshire. Each breed is characterized by unique attributes related to litter size, growth rate, feed conversion, carcass structure and composition.
- The most common female lines in Canada are **Landrace-Yorkshire crosses**. The Canadian Yorkshire, which is also called Large White, is used successfully in many crossbreeding programs and has come to represent the ultimate in sow productivity. With its high carcass quality, the Canadian Yorkshire plays an increasing role in maintaining consumer demand for high-quality pork.
- The Canadian Landrace female, used in purebred and crossbreeding programs, is well known for its excellent mothering ability, temperament, longevity and prolific reproduction. This breed is highly desired for its average daily gain, feed conversion and leanness. The Landrace is a well-muscled white breed noted for its high-quality carcass, high percentage of ham and, in particular, for bacon production.
- The Duroc breed dominates male lines. The Duroc is a solid, pinkish-red red meat animal noted for its feed efficiency and for excellent carcass qualities of intramuscular fat, tenderness and juiciness. Strong feet and legs make the Duroc an excellent choice for rugged commercial-feeding conditions. This breed is also noted for large litters, a characteristic retained even when used in a crossbreeding program.



Canadian Breeds

- 🍁 Canadian breeders focus on three breeds to improve hybrid vigor
 - 🍁 Yorkshire, Landrace, Duroc



Sow Productivity

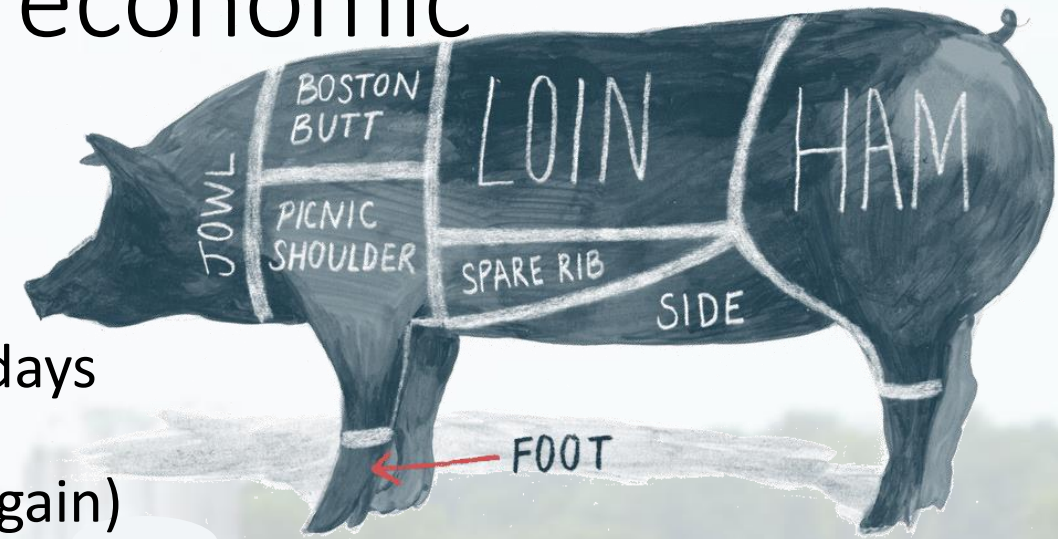


- Litter size
- Number weaned per litter
- 21-day litter weight
- Number of litters per year
- These traits are generally lowly heritable but economically important



Livestock Characteristics of economic importance

- Growth (usually adjusted to a constant basis - like days to finishing)
- Feed Efficiency (kg feed required for a kg of weight gain)
- Carcass Traits (fat depth over loin at 10th rib; loin muscle area; and carcass muscling score)
- Structural Soundness
 - Feet and Legs
 - Cryptorchidism (retention of testicles in the abdomen cavity)
 - Inverted nipples
 - Pale, Soft, and Exudative (PSE) meat
 - Porcine Stress Syndrome (PSS)
 - Both PSS and PSE are linked with selection for extreme muscling



Variation in Fresh Pork Quality

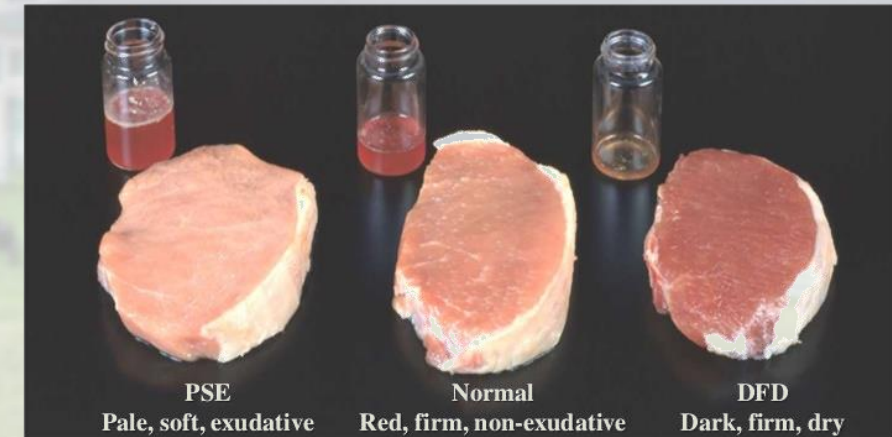


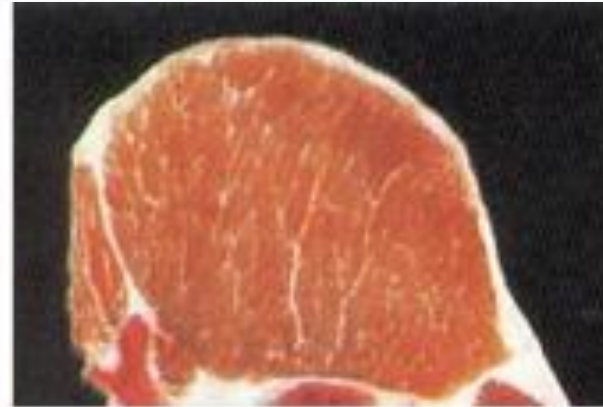
Photo provided by Floyd McKeith

Pale Soft Exudative (PSE) Pork



PSE

A rapid drop in meat pH while meat temperature is still high usually causing a breakdown of muscle protein and the meat becoming very pale with pronounced acidity (pH values of 5.4–5.6 immediately after slaughter) and poor flavor. This type of meat is difficult to use or cannot be used at all by butchers or meat processors and is wasted in extreme cases.



Normal

Muscle glycogen is not depleted prior to slaughter and a slow drop in pH occurs postmortem as glycogen is metabolized into lactic acid. The pH eventually drops 6.0–6.2 (depending upon the meat species) which is the optimal range for water binding.

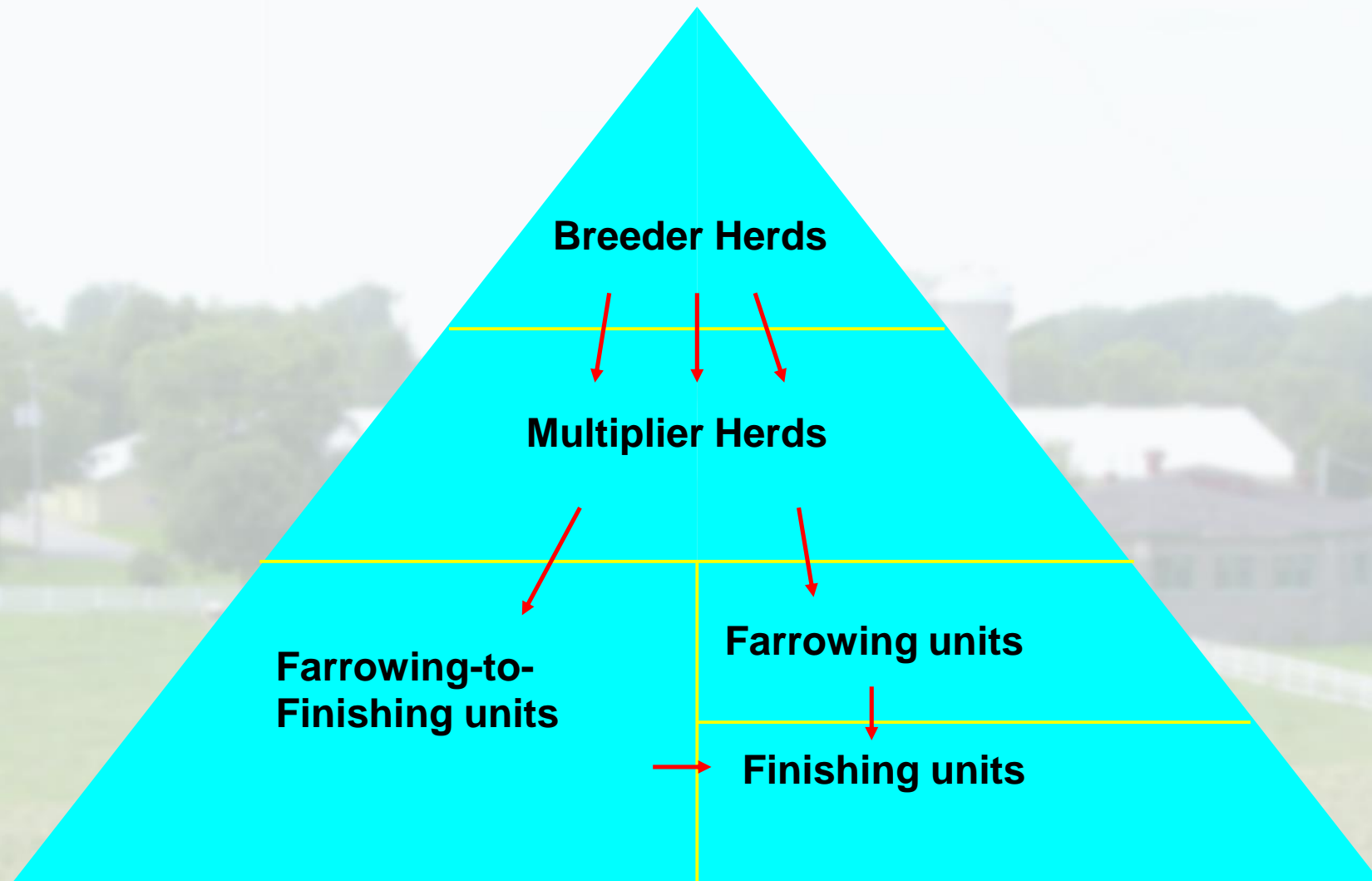


DFD

The muscle glycogen has been used up during the preslaughter period, thus after slaughter, there is little lactic acid production, which results in DFD meat. This meat is of inferior quality as the less pronounced taste and the dark colour is less acceptable to the consumer and has a shorter shelf life due to the abnormally high pH-value of the meat (6.4–6.8).

Factors Contributing to Sow culling rates

- Old Age 37%
- Reproductive Inefficiency 26%
- Unsoundness 15%
- Poor Litter Size / Pig Survival 13%
- Other 6%



Performance Benchmarks – Farrow to Finish

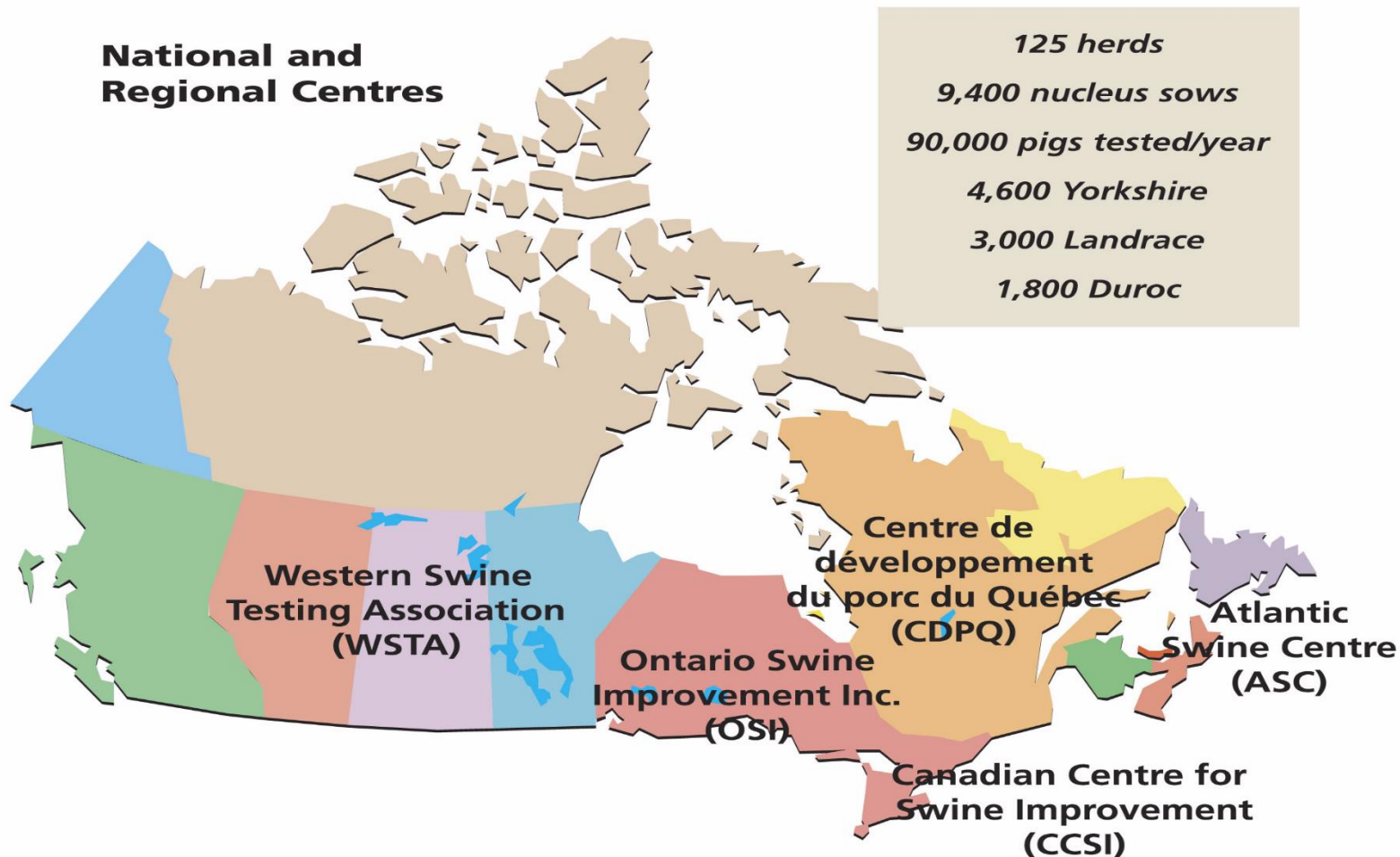
- Litters farrowed / sow / year 2.15
- Pigs weaned / sow / year >24
- Mortality Rates
 - Prewaning <8%
 - Nursery <2%
 - Growing/Finishing <1%
- Days to market <160
- Average Daily Gain – Weaning to Finishing (kg/day) >0.77
- Feed Efficiency – Finishing (kg/day) <1.2

Cost Components of a Farrow-to-Finish Operation

Factor	% of Total Cost
Feed	58
Labor	9
Depreciation	6
Interest	6
Marketing/transport	5
Vet and vet supply	4
Fuel, oil, and utilities	4
Other	8

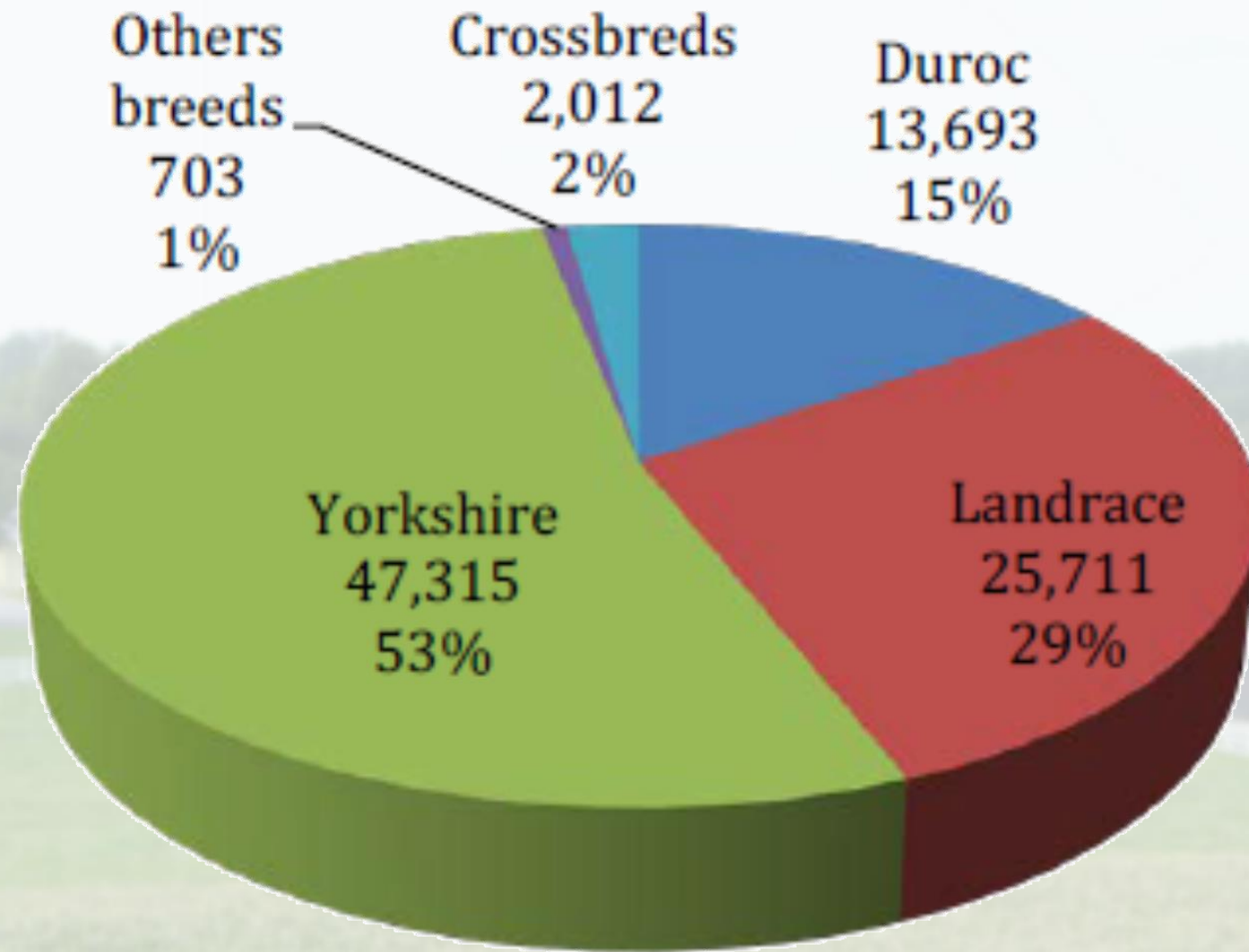
Genetic Improvement

The Canadian Swine Improvement Program



- Canada has a genetic evaluation database with information from over 2.7 million pigs
- Canada's purebred swine herd registry dates back to 1889 and contains almost 2 million animals
- Ancestry of each registered, purebred pig can be traced back generations

Performance tested pigs by breed in 2017



Genetic Change for some key traits evaluated on the Canadian Swine Improvement Program

<i>Traits</i>	<i>Units</i>	<i>Average annual change 2011-2016</i>	<i>Change In 2017</i>
Days to market weight	<i>days</i>	-0.72	-1.00
Lean yield	<i>%</i>	+0.04	+0.15
Loin eye area	<i>cm²</i>	+0.12	+0.33
Feed conversion ratio	<i>kg feed/kg gain</i>	-0.011	-0.016
Backfat	<i>mm</i>	-0.04	-0.20
Loin muscle depth	<i>mm</i>	+0.13	+0.19
Litter size at birth	<i>piglets/litter</i>	+0.11	+0.02
Piglet perinatal survival	<i>%/litter</i>	+0.28	+0.12
Farrowing interval	<i>days</i>	+0.01	+0.03
Functional teats	<i>teats</i>	+0.05	+0.09

** Based on the genetic gains in selection herds active in 2011 and 2017*

Yorkshire

Landrace

Trait	2011		2017		Total change (2011-2017)	Average annual gain (2011-2017)	2011		2017		Total change (2011-2017)	Average annual gain (2011-2017)
	#pigs	EBV average	#pigs	EBV average			#pigs	EBV average	#pigs	EBV average		
Lean Yield (%)	25,567	-0.18	33,155	+0.07	+0.25	+0.04	19,109	-0.12	22,392	+0.11	+0.23	+0.04
Loin Eye Area (cm ²)	25,567	-0.23	33,155	+0.18	+0.41	+0.07	19,109	-0.20	22,392	+0.22	+0.42	+0.07
Age (days)	25,567	+3.60	33,155	-0.90	-4.50	-0.75	19,109	+3.13	22,392	-0.34	-3.50	-0.58
Feed Conversion (kg/kg)	25,567	+0.059	33,155	-0.015	-0.074	-0.012	19,109	+0.051	22,392	-0.010	-0.061	-0.010
Backfat (mm)	25,567	+0.18	33,155	-0.11	-0.29	-0.05	19,109	-0.02	22,392	-0.14	-0.12	-0.02
Lean Depth (mm)	25,567	+0.00	33,155	-0.23	+0.23	+0.04	19,109	+0.08	22,392	+0.31	+0.23	-0.04
Number Born (pigs/litter)	25,567	+0.27	33,155	+0.78	+0.51	+0.08	19,109	-0.24	22,392	+0.40	+0.64	+0.11
Piglet perinatal survival (%)	25,567	-1.06	33,155	+0.51	+1.57	+0.26	19,109	-0.96	22,392	+0.51	+1.47	+0.25
Farrowing interval (days)	25,567	-0.13	33,155	+0.05	+0.18	+0.03	19,109	+0.09	22,392	+0.02	-0.07	-0.01
Functional teats (teat)	19,275	-0.25	19,236	+0.09	+0.34	+0.06	16,927	-0.28	13,560	+0.05	+0.33	+0.06

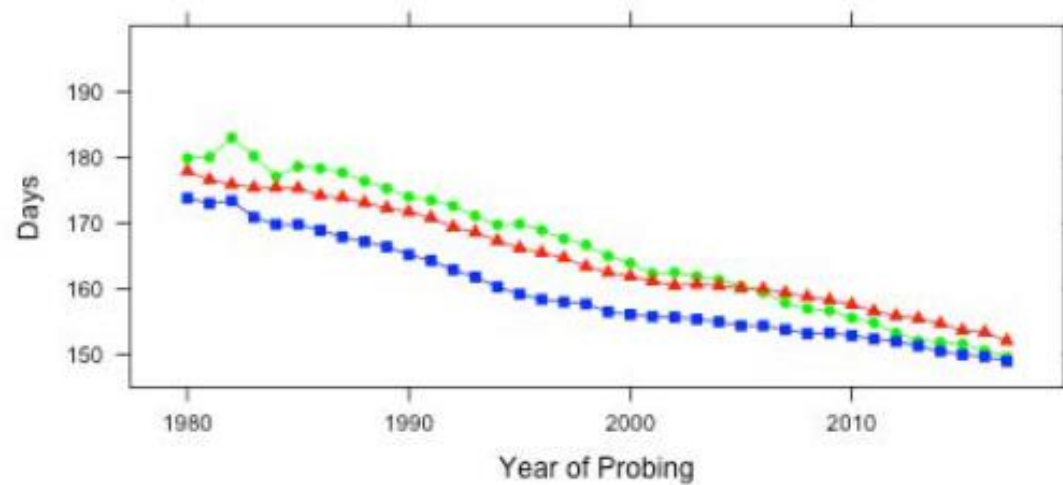
Duroc

Trait	2011		2017		Total change (2011-2017)	Average annual gain (2011-2017)
	#pigs	EBV average	#pigs	EBV average		
Lean Yield (%)	10,373	-0.31	11,890	+0.11	+0.42	+0.07
Loin Eye Area (cm ²)	10,373	-1.07	11,890	+0.33	+1.40	+0.23
Age (days)	10,373	+4.70	11,890	-0.50	-5.20	-0.87
Feed Conversion (kg/kg)	10,373	+0.065	11,890	-0.010	-0.075	-0.013
Backfat (mm)	10,373	+0.46	11,890	-0.18	-0.64	-0.11
Lean Depth (mm)	10,373	-1.08	11,890	+0.34	+1.42	+0.24
Number Born (pigs/litter)	10,373	+0.12	11,890	+0.37	+0.25	+0.04
Piglet perinatal survival (%)	10,373	-0.07	11,890	+0.29	+0.36	+0.06
Farrowing interval (days)	10,373	+0.04	11,890	+0.03	-0.01	-0.00
Functional teats (teats)	3,443	+0.00	227	-0.30	-0.30	-0.05

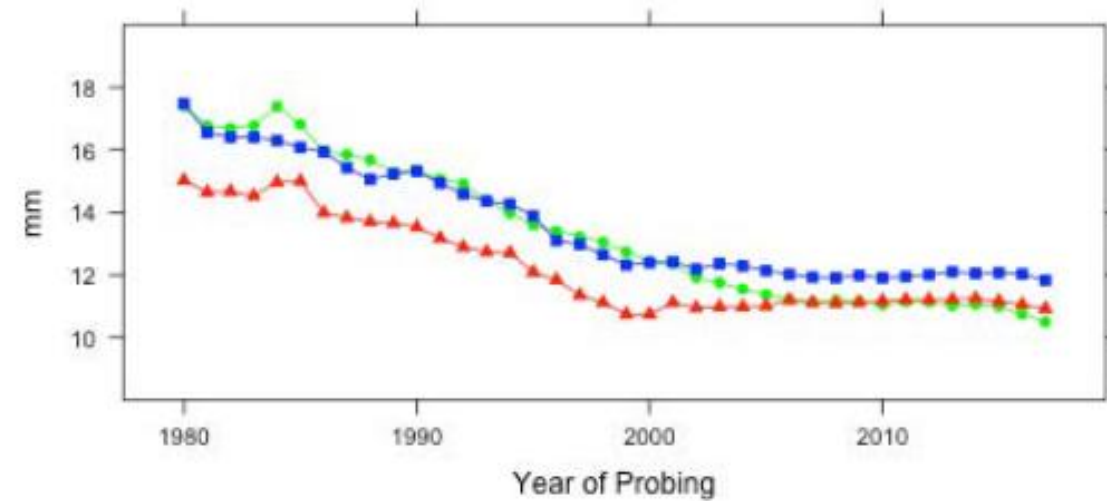
Appendix 5. Economic value for commercial herds

Change in Commercial Sows (F1s) and Hogs due to genetic improvement in Canada from 2011 to 2017					
Trait	Sire Line Duroc	Dam Line			Market Hogs
		Yorkshire	Landrace	F1s	
Lean Yield (%)	+0.42	+0.25	+0.23	+0.24	+0.33
Loin Eye Area (cm ²)	+1.40	+0.41	+0.42	+0.42	+0.91
Age (days)	-5.20	-4.50	-3.50	-4.00	-4.60
Feed conversion (kg/kg)	-0.075	-0.074	-0.061	-0.067	-0.071
Backfat thickness (mm)	-0.64	-0.29	-0.12	-0.21	-0.42
Lean depth (mm)	+1.42	+0.23	+0.23	+0.23	+0.82
Number born (pigs/litter)		+0.50	+0.63	+0.57	
Piglet perinatal survival (%)		+1.57	+1.47	+1.52	
Farrowing interval (days)		+0.17	-0.06	+0.05	
Functional teats (teats)		+0.34	+0.33	+0.33	
Sire Line Index (\$/litter)	\$16.90				
Dam Line Index (\$/litter)		\$15.80	\$16.10	\$31.90	

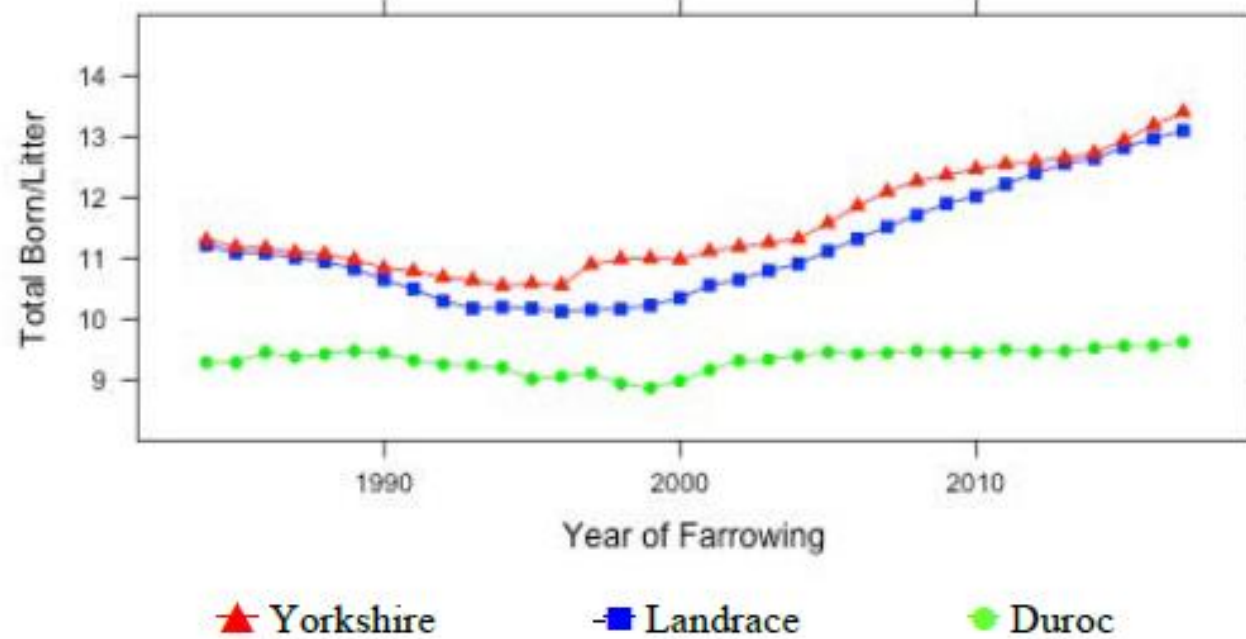
Genetic Trends for Age at 100kg



Genetic Trends for Backfat at 100kg



Genetic Trends for Litter Size



References/Web Sites

Canadian Centre for Swine Improvement (CCSI)

- www.ccsi.ca

Centre de Développement de Porc du Québec (CDPQ)

- www.cdpqinc.qc.ca

CIPQ

- www.cipq.com