



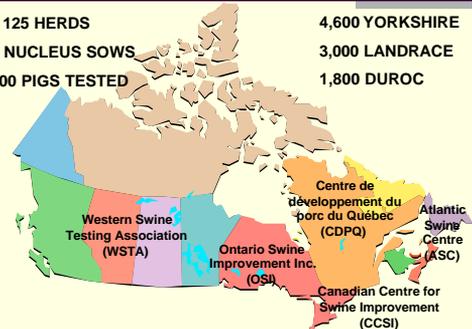
Development of Disease Resistant Pigs

Pramod Mathur
Canadian Centre for Swine Improvement (CCSI)

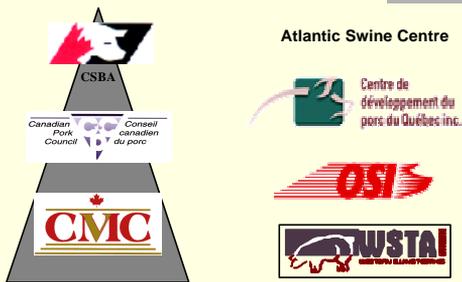
Canadian Swine Improvement Program

125 HERDS
9,400 NUCLEUS SOWS
90,000 PIGS TESTED

4,600 YORKSHIRE
3,000 LANDRACE
1,800 DUROC



Member Organizations



People at CCSI

- General Manager
– Brian Sullivan
Office Manager
– Francine Roy
Genetic services
– Pramod Mathur
– Yuefu Liu
– Laurence Maignel
Computer support
– Jim Groves
– David Bates
– Li Li



Canadian Centre for Swine Improvement

Mission

Enhance the ability of the Canadian swine industry to compete domestically and abroad, by providing leadership, coordination and services for swine genetic improvement

Canadian Swine Improvement Program

- National coordination (CCSI)
- Registration (CSBA)
- Performance recording (Regional Centres)
- Genetic evaluation (CCSI)
- Health (NSHIP, Provincial Veterinary Services)
- Research and development (CCSI, Universities, Federal research labs)
- Training and consultation (CCSI)

The Genetic Evaluation Program

- EBVs calculated for:
 - Age to market
 - Backfat thickness at market wt.
 - Lean yield
 - Loin eye area
 - Loin muscle depth
 - Feed conversion
 - Litter size
 - New evaluations:
 - Piglet survival
 - Meat quality
 - Colour
 - Marbling
 - pH(24)
 - Drip loss
 - Tenderness
 - Conformation
 - Disease Resistance
- ↑ Age at first farrowing
 ↓ Farrowing interval
 ↓ Weaning weight
- Only in Ontario

The Health Program

- National Swine Health Improvement Program (NSHIP)
- Co-ordination of activities through health committee
- Development of health monitoring programs (provincial health programs, plant inspection data, etc.)



Disease Resistance

- General disease resistance
 - Based upon a combination of immune response variables
 - Resistance to a wide range of diseases
 - Difficult to implement
- Specific disease resistance
 - Animals may be susceptible to other diseases
 - Parasite may develop immunity or mechanism of infection may change

General disease resistance

Heritability estimates

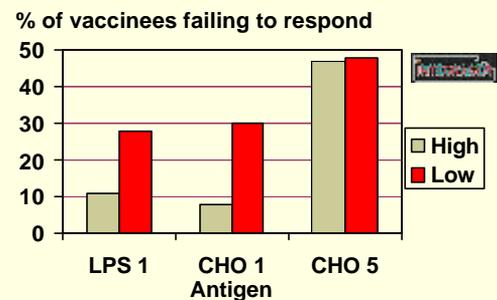
	Joling 1993	Mallard 1998	Edfors-Lijja 1994	Janns 2000
Cell mediated (White cells)	0.68, 0.26	0.16	0.46	0.10, 0.18
Humoral (Blood)	.27, .33	0.07	0.00	0.03, 0.08

Source: Visscher et al (2002), Hurmik (2002)

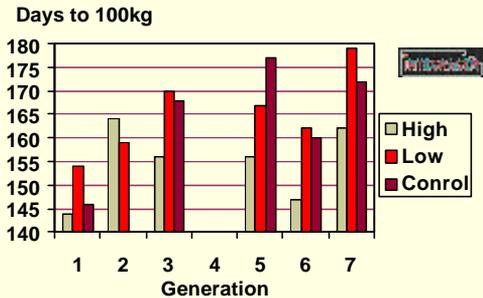
HIR Project

- Collaborations with Drs Bruce Wilkie and Bonnie Mallard et al. U of Guelph.
- High immune response animals
 - Grew faster
 - Responded to vaccines faster
- Test for HIR difficult to organize in breeding farms

Frequency of Non-response to *Actinobacillus pleuropneumonia* Vaccine in High and Low Immune Response Pigs



Days to Market Weight for Yorkshire Pigs Selected for Combined Antibody and Cell-mediated Immune Response



HIR Project – Selection Program

- Recording of HIR tests
- Recording of pedigree, growth and backfat
- Computation of genetic evaluations (HIR-EBVS)
- Selection of top males and females based on a selection index

Pilot Project: Feasibility study

- To develop a process to assess immune capacity of pigs
- New **SDR test** using *in vitro* method to estimate immune capacity
- Simpler at farm level
- No inoculations required



Equi-animal Solutions

IRAP Proposal: PEI

- Phase 1: Assay Optimization and standardization
- PHASE 2 : Test Validation
- PHASE 3: Testing a Sample of 200 Pigs and Identifying superior animals



Equi-animal Solutions



IRAP Proposal: PEI

Phase 1: Assay Optimization and Standardization

- Task 1: Evolution of the control (untreated) cell population growth
- Task 2: Identification and dosage of the specific sub-populations of lymphocytes
- Task 3: Identification of the specific sub-populations that respond to the stimulatory agents
- Task 4: Improvement of the assay to reduce the observed variability

IRAP Proposal: PEI

PHASE 2 : Test Validation

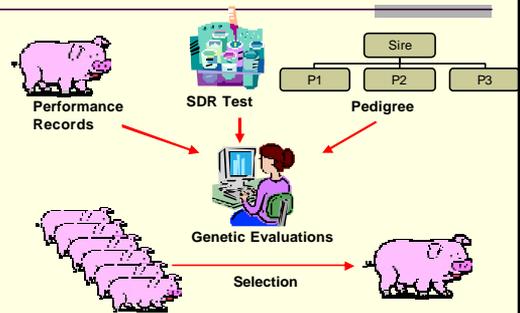
- Task 1: Comparison of the test results with immunological responses of pigs primed with commercial invasive immunological reagents

IRAP Proposal: PEI

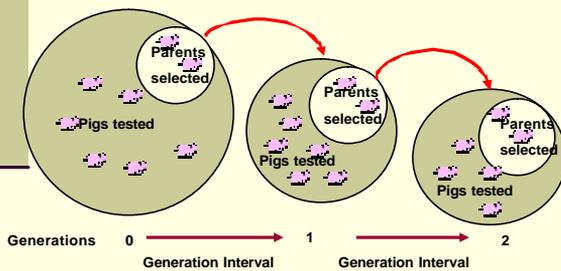
PHASE 3: Testing a Sample of 200 Pigs and Identifying superior animals

- Task 1 Describe pig population
- Task 2. Testing of animal families with a known and suitable genetic background.

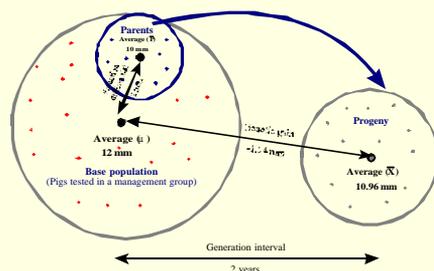
Selection Program



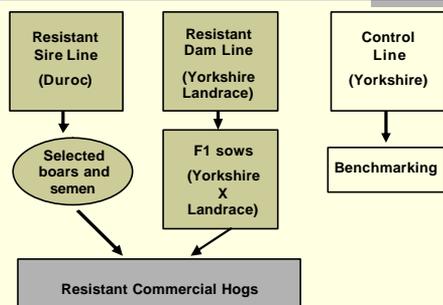
Selection process



Genetic selection



Genetic improvement



Station tests (High health)

- New tests for Viruses
- Development of standard profiles
- Evaluation of differences between breeds, sexes, age groups
- Estimation of relationship with health and growth traits



On-farm tests

- Variation in the health status
- Variation in performance
- Several herds
- Across herd genetic evaluations
- Selection
- Extensive use through AI



National test

- Tests in member herds
- Across-herd genetic evaluation
- Selection
- Validating effects at commercial level



Merci beaucoup ...!



www.ccsi.ca