

# Diminishing Diversity in Canadian Swine

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## Canadian Swine Industry

The Canadian pork industry enjoys a solid reputation world wide for superior quality and health status. Canadian pork exports have jumped to over 2.3 billion dollars during the recent years and Canada ranks among the top pork exporting countries in the world. Domestically the pork industry is recognised as a major industry sector in Agriculture, contributing to the trade surplus.

The number of hogs marketed in Canada has doubled over the past 20 years from 15.6 million in 1985 to about 31 million in 2005. There were about 13,000 farms in 2005 with an inventory of about 14.7 million pigs. The sale of slaughter hogs in 2005 totalled \$3.9 billion in farm cash receipts that was almost 11% of total farm cash receipts in Canada.

Canada also has a long history of maintaining records for purity of swine breeds. The Canadian national swine registry has been operating for more than 100 years. The Canadian Swine Breeders Association (CSBA) is responsible for registration of purebred pigs according to the Animal Pedigree Act. The actual registrations are done through the Canadian Livestock Records Corporation (CLRC) which

also issues the Certificate of Registration as a key document that verifies the parentage, purity and performance of a registered pig. The certificate is recognised as a key document for breed purity in many countries around the world.

## Genetic improvements in Canada

Genetic improvements are made mainly through selection of superior pigs by nucleus breeders and through the optimum use of the improved genetics by producers. The benefits of this genetic improvement are long lasting and are passed on along the whole market chain from breeders to multipliers, from multipliers to producers and then to packers, retailers and the consumers.

## Reduction in genetic diversity

Traditionally, genetic improvement in swine industry is based on the selection of boars and sows that have a high genetic value for characteristics of economic interest e.g. for faster growth rate, higher lean meat content or a certain type of pork. The breeds that do not meet those requirements get neglected and the individuals within the used breed are culled for economic reasons. This reduces the genetic diversity in terms of breeds and unrelated individuals within a breed.

The Canadian swine industry has witnessed a reduction in the number of major breeds over the recent years. There are only three major breeds that are used currently: Yorkshire, Landrace and Duroc while there are fewer pigs from the other breeds such as Berkshire, British Saddleback, Chester White, Hampshire, Lacombe, Large Black, Pietrain, Poland China, Red Wattle, Spotted, Tamworth and Welsh. Among them Berkshire, Hampshire, Lacombe, Large Black and Tamworth are now considered as endangered or at critical status according to Rare Breeds Canada. The more recent example is the Hampshire breed which was one of the major terminal sire breeds used in the national swine improvement program. However, the number of purebred Hampshire pigs tested has reduced so drastically that hardly any effective genetic improvement can be made. One of the reasons was also the higher frequency of the RN gene known to have an adverse effect on pork quality, especially higher cooking losses. Berkshire is an example of a breed that has been neglected by the swine industry but has recently found a lot of interest especially for the export markets because of its exceptionally good meat quality. The loss of genetic variability has made it difficult to find enough Berkshires to meet the emerging demand.

Like the dairy and other livestock industry, the swine industry is also facing reduction in variability within the existing major breeds in Canada mainly due to excessive use of certain boars through artificial insemination. A recent study by the Canadian Centre for Swine Improvement has revealed the current population of pigs in Canada has originated from a small number of founder ancestors. Therefore, there is an urgent need for managing the variability, even within the populations that are currently in use.

The main problems with excessive use of certain boars are the reduction

Canadian genetics, in the form of breeding stock, are exported to over 40 countries around the world and exports have been increasing continuously in recent years. Genetic improvement in Canada is supported by the Canadian Swine Improvement Program which is one of the largest of its kind in the world.

The program is operated by the Canadian Centre for Swine Improvement (CCSI) which is a national non-profit corporation created by the swine industry in 1994. The Board of Directors of CCSI is made up of key associations in the Canadian pork industry.

Active members of CCSI are the Canadian Pork Council, representing the interests of commercial producers, the Canadian Meat Council, representing packers; the Canadian Swine Breeders Association, representing breeders; and regional swine improvement centers in Western Canada, Ontario, Quebec and Atlantic Canada. This provides a variety of services to breeders and producers in their regions. It serves about 100 herds, with a total of more than 9,000 nucleus sows. About 90,000 pigs are tested each year. The participants include breeding companies, breeder groups and breeders.

in genetic variability, increase in rate of inbreeding and availability of very few boars and sows for the subsequent generation. The boars may have a large impact on the genetic improvement as well. One or few boars can bring significant improvement in some characteristics for which they have been selected but can reduce the rate of progress in some other characteristics. Further, if the boars are carriers of a genetic defect, the defect may get propagated very widely in the population.

#### Management of genetic diversity

There is a need to manage the genetic variability in Canadian swine while keeping up the rate of improvement for economic benefits to the industry members. One of the important steps taken by the Canadian Centre for Swine Improvement is to provide more information and internet based tools to members to manage the genetic diver-

sity. These tools provide information about the inbreeding levels and probabilities of gene origin in their herds and in the whole population. There are reports for each herd showing boar usage, inbreeding trends, effective population size and main ancestors contributing to their herd.

The Canadian Farm Animal Genetic Resources Foundation (CFAGRF) has a mandate and strong interest in addressing the issue of genetic variability in farm animals. The Foundation has recently undertaken a research project to inventory science-based approaches and develop an action plan for reducing the speed of the current decrease in the genetic diversity of Canadian livestock including swine. The swine industry is especially delighted to know that the recently created Centre for Animal Genetic Resources (CAGR) in Saskatoon has identified swine as the first species for estimation of genetic

variability and for research on conservation methods.

#### Faster to Market

The Canadian Swine Improvement Program is one of the most successful in the world and has made significant contributions to the swine industry. For example, in the last 20 years, the age to reach market weight for an average pig from the National Program was reduced by almost 1 month, resulting in significant savings in feed and overhead costs. The current rate of genetic change is 1.7 days faster to market every year. Considering about 31 million hogs were marketed in Canada in 2005, this alone represents \$14 million. At the same time, improvements have been made in litter size, lean yield and feed efficiency which together represents an annual benefit of \$54 million.

## Gloucestershire Old Spots Coming to Alberta

Sue Humphreys, Delburne, Alberta

The Alberta Chapter of RBC are very excited and looking forward to welcoming in September the arrival of Three Gloucestershire Old Spots to the farm of Glynn and Susan Humphreys in central Alberta. Although there are already two Old Spot sows in British Columbia, and a rumoured small group in Quebec, these will be the first 'GOS's in Alberta. The arrival of a boar is believed to be the only registered 'GOS' boar in Canada. The boar already weighs about 200lbs; the gilts are just weaned being born on the 4th July. The Humphreys already have orders for piglets. These pigs are unrelated to the others in British Columbia imported by Glamorgan Farm in 2004 and recently sold.

The first pedigree records of pigs began in 1913, much later than it did for cattle, sheep and horses because the pig was a peasant's animal, a scavenger and was never highly regarded. No other pedigree spotted breed was recorded before 1913, so today's GOS is the oldest such breed in the world!

The breed originated around the Berkeley Vale on the southern shores of the river Severn in southwest England. It was usually kept in the cider and perry (pear cider) pear orchards of the area and on the dairy farms. Windfall fruit and waste from the dairies supplemented its grazing habit. Local folklore says that the spots on its back are bruises from the falling fruit. Besides its correct title and variations such as Gloster Spot or just Old Spot, the breed is also known as The Orchard Pig and The Cottager's Pig. Little is recorded of the breed's development but Victorian writers such as William Youatt in 'The Pig' and HD Richardson in 'The Pig - Its Origins and Varieties' seem to conclude that it was derived from crossing the original Gloucestershire pig - a large, off-white variety with wattles hanging from its neck, with the unimproved Berkshire, a sandy-coloured prick-eared pig with spots. This is reinforced in William Marshall's 'The Rural Economy of Gloucestershire' ca.1780 and 'The Complete Grazier' by a Lincolnshire-

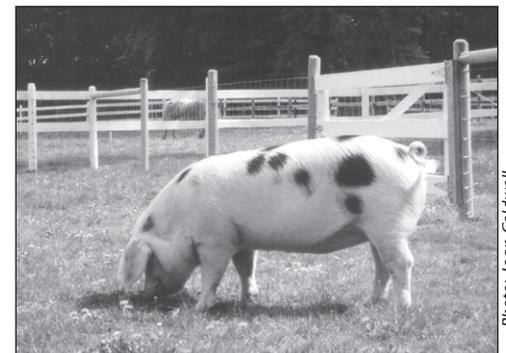


Photo: Joan Caldwell

Gloucestershire Old Spot at Glamorgan Farm, 2004.

Grazier of 1816, among others. A pair of GOS pigs, The King of England and The Queen of England, were exported to America and were used in the development of the Spotted Poland China breed. Others were used to develop the Minnesota No.3 breed. In the mid-1990s, twenty examples of the breed were exported to the States to help re-establish the breed there in its pure form. Since then, another batch has been exported to the Falkland Islands for the same purpose