

Newfoundland Local Sheep: Is It a Myth or a Mystery?

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Origin of Newfoundland Local Sheep

There have been speculations of the origins of the Newfoundland "Local" Sheep (NLS) in this province. It is, however, clear that sheep were favoured by sailors of the high seas and early settlers of the New World as a source of meat and fibre due to its small size, ease of transportation over the sea and land, and little dependency on inaccessible grain. It would be conceivable that sheep were brought to Newfoundland by the early settlers some 500 years ago.

The report of the Royal Commission on Newfoundland Agriculture (1955) is one of first documents that accurately described these sheep. According to this report, Border Cheviot was possibly the predominant breed contributed to NLS. This conclusion was based on the resemblance (general appearance, type of fleece) of Border Cheviot to local sheep distributed over a wide area. Beside the physical similarities, the fact that Border Cheviot is a hardy breed and is capable of surviving under difficult conditions was another reason for this conclusion. Other breeds, including Suffolk, Border Leicester, Black-Faced Highland breeds, North Country Cheviot and Dorset have also been imported and mixed with NLS in recent years. Although there is no mention of Black Welsh Mountain and Icelandic sheep in the Royal Commission report, some Newfoundland sheep breeders strongly believe that these breeds constitute the original population of NLS.

Despite the introduction of so many breeds into the province, it has been claimed by many that, at least in some flocks, no breeding with other breeds has taken place for over two centuries. Despite the fact that NLS are not uniform by any stretch of the imagination, it has been called a "breed" by many, and attempts have been made to protect it as a rare breed, and even register it as a distinct breed in Canada.

For many years, sheep in Newfoundland roamed natural pastures that surrounded communities and had to fend for themselves, a practice which is still ongoing in several places. There has been no fencing of natural pastures, and sheep in many communities were left without any supplemental feeding for many months during the year. Lack of predators, except dogs which are a rather recent problem, and the trust among the members of a community, have made this management system successful. Hand-feeding was practiced only when there was nothing for sheep to eat outdoors.

Sheep that have been kept in Newfoundland over the years under these conditions have, therefore, been under an intense natural selection pressure, and have become adapted to their environmental conditions and the management system.

Objectives

Recently, there has been an interest in the protection of NLS as a rare breed. The questions that have not been clearly answered yet are:

- The number of different groups of sheep that exist in this province,
- The degree of differences (or similarities) among these groups, and
- Are these groups of sheep distinctly different from common registered breeds of sheep in Canada?

The objectives of this study were to answer these questions:

1. To investigate whether NLS belong to one uniform population, or are there several distinct groups.

2. To determine whether this population(s) is distinctly different from other Canadian breeds of sheep.

Methods

The project was divided into three parts:

- NLS were identified and ear tagged in 52 flocks by interviewing farmers and a morphological assessment made. Mr. Charles Kelsey Jr, Agricultural Representative, accepted the responsibility of identifying and tagging of the NLS. These sheep were then classified into 14 regions based on movement of breeding animals among the farms, i.e., those farms that have exchanged rams or ewes were grouped into one region.
- Blood samples were collected from sheep that were thought to be NLS. One hundred sixty-nine (169) blood samples were collected from 32 farms. DNA was extracted from the blood and genetic profiles were identified. The DNA profiles were studied using the "microsatellites" method, that were extracted from the blood samples.
- In order to find out which breeds have possibly contributed to NLS, DNA profiles of other breeds were required. It is believed that Icelandic, Suffolk, North Country Cheviot, Border Cheviot, Dorset, Scottish Blackface and Black Welsh Mountain have been major contributors to the NLS, and were included in this study. As a reference, DNA samples from breeds that have never contributed to NLS were needed. Chosen were Red Maasai (from Kenya), Romanov (originally from Russia), Finnish Landrace (originally from Finland), and Texel (from the Netherlands).

Twenty-five (25) registered sheep from each of these breeds were required. These animals were not to be related to each other for at least two generations, to ensure that the samples were representative of the breeds. It was thought that the collection of blood or semen from these sheep could take a month or two. It took more than 15 months to collect the necessary samples. Finding 25 unrelated sheep from these breeds was a challenge. Because flocks of purebred sheep in Canada are generally small, most sheep within a flock are related to each other (one or two rams are used each year in each flock), and many flocks are genetically related through movement of rams among flocks. It was found that North Country Cheviots in B.C. and Alberta, for example, were related to the sheep at Bill Mathewson's flock in Truro, Nova Scotia. Blood samples were collected from almost 700 sheep from a large number of flocks scattered in most provinces to find 25 unrelated animals from each breed. It was necessary to go outside of Canada in some cases to complete the sampling process, such as Iceland (for Icelandic sheep), US (for Romanov, Finnish Landrace, Suffolk and Texel), and the UK (for Border Cheviot).

A sample has not been taken from Black Welsh Mountain to date. This is a rare breed even in the UK, and collecting samples from 25 unrelated individuals requires travelling to several farms; a time-consuming and expensive process indeed.

Preliminary Results

While all of the results and analysis are not yet completed, there are some general conclusions that can be made at this point.

1. An attempt to determine if the individual NLS flocks across the province have developed into uniform genetic pools. That is to say there should be uniformity within each of the flocks similar to that of other registered breeds. Despite the fact that NLS are kept as small flocks, there was a large amount of genetic variability within each of the 14 regions; more than expected. Large genetic variability means that there is little *within-flock* uniformity. A flock with larger variability will have large genetic differences between its flock mates. The reasons for this high level of genetic variability are possibly the mixing of several ancestral breeds which have been imported to the Island through the years, and/or recent crossing with other breeds.

Sheep from Fortune Bay, Trinity Bay North and Notre Dame Bay had the smallest amount of genetic variability, i.e. they are more uniform than other flocks studied as a result of these small flocks being kept in isolation for 15 to 50 years.

2. The theory that if the NLS identified are classified as one group then there should be relatively small genetic differences among the flocks. The NLS from different regions have different DNA profiles which is consistent with the differences in their sizes, bone structure, face and fleece colours. There was little physical similarities across the flocks. Sheep in Trinity Bay North showed the highest difference compared with those in other regions, particularly with those in Fortune Bay and Notre Dame Bay. Such differences could be the result of different ancestral breeds, differences in climatic conditions under which these sheep have been kept for decades, differences in human selection, chance and/or recent crossing with different breeds. Establishing a flock that uses one or two rams may create differences by chance. Again, it is necessary to have all the data before answering whether there has been any crossing with other breeds in recent years.

3. The DNA profiles of the 10 purebred breeds can be used to correctly assign an individual to its breed of origin with more than 99% accuracy. The only condition is that the animal in question must belong to one of these breeds. It also means that we cannot correctly assign a Hampshire lamb for example, as Hampshire was not used in our study, and its DNA profile was not obtained. If by including other breeds to the study, the identity of the breed of any sheep in Canada can be determined.

4. The only aspect of the project, and the most difficult part, that is yet to be completed is determining if these 14 groups of NLS are distinctly different from other registered breeds. This question can be answered when DNA analysis of Black Welsh Mountain sheep is completed.

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