

Musk-Ox Wool and Its Possibilities As a New Textile Fiber

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The search for new fiber sources and the improving of the fibers already on the market is occupying the entire time of thousands whose discoveries are quickly appreciated by millions. Especially in the field of synthetic fibers such as the various forms of rayon, these researches brought wonderful results. This progress caused the manufacturers of natural fibers to awake from their dormant state to start an extensive research if only for self-preservation. After the World War, the efforts to lift the whole textile industry out of grandfather's time increased rapidly. Today's business depression demands the best that one has in him to overcome the crisis.

In the kingdom of wool and related fibers, we have met some strangers. The last few years have seen the rise in popularity of the very finest materials, such as cashmere, camel hair, rabbit hair, and soft, shiny, coarse hairs, such as alpaca, mohair, and llama. By blending these different materials with wool, silk, and others, wonderful new effects were secured which found an enthusiastic reception.

Mohair

It is logical that due to the greater demand for these fibers, the output of raw material by the breeder should have been increased. Accurate statistics are available covering only mohair. The following figures show this to be true in the case of mohair.

Year	U.S.A.	Turkey	Cape Colony	Total
1900	961,000 lbs.	..... lbs.	..... lbs.	961,000 lbs.
1902	1,250,000 "	8,500,000 "	7,500,000 "	17,250,000 "
1914	4,500,000 "	..... "	..... "	4,500,000 "
1918	6,000,000 "	..... "	..... "	6,000,000 "
1928	14,522,000 "	10,950,000 "	7,550,000 "	33,022,000 "

The world production has gained 91% within a period of 26 years. The main reason is to be found in the tremendous increase in the breeding of the mohair goats in the United States which rose during the same period over 1,000%. In consequence, the participation of the United States in the world production climbed from 7% to 44%. This truly is a fine example in a particular instance which proves what can be achieved by a well planned and continued effort; not mentioning the benefits derived by those directly connected with it, but also the economic gain for the whole country.

Alpaca

Another estimate of the world production of a related fiber is possible only in the case of alpaca. The figures were obtained from the principal trading place—Liverpool.

AVERAGE	1919-1920	1927-1928
	3,900,000 lbs.	5,700,000 lbs.

The world production of camel hair and cashmere can hardly be estimated for the reason that the producing countries like China and Russia do not furnish reliable statistics and whatever is shipped out is distributed to many countries and through many ports. There must be over a million camels in China and Russia, producing about 8,000,000 lbs. of wool, of which amount more than one-half is exported. The raising of these animals has not been developed on a large scale but is carried on in a haphazard way by nomadic people who can take care only of small numbers of animals and for whom the use of the animal for draft or burden or dairy needs is more important than the production of hair. Another big factor is the transportation difficulties and, besides that, political conditions are unsettled.

Breeding Foreign Animals

According to the "Census of Manufacturers," 1914 (Wool Manufacturers) by the Department of Commerce, the importation of alpaca, camel hair, etc., amounted to 6,620,000 lbs. which at that time represented a value of about \$1,751,000. Not a single pound of these fibers is produced in this country, and we are wholly dependent on the irregular foreign supply. This brings up the question if we should not consider the desirability and possibility of creating a supply within our own country. There are certain definite climatic and food conditions to which especially alpaca and llamas are accustomed and which do not exist in our country. The breeding of camels could receive consideration only if full use could be made of them as a domesticated animal, especially as a beast of burden, which is not possible in the land of the automobile. Similar reasons exist why the breeding of the cashmere goat is hardly feasible in this country. From these facts we see that the possibility of success in breeding foreign animals is very remote.

Musk-Ox

It is to the credit of the famous arctic explorer Vilhjalmur Stefansson who called attention to the musk-ox of Canada and Greenland, an animal which is threatened with extinction, although of the greatest importance for the arctic countries. These animals produce one of the finest wools, if not the finest in the whole world.

The Canadian Government for the past several years has been making vigorous efforts to preserve the remnant of these interesting animals, having established several game reservations for them, one of the most important of which is the Thelon sanctuary, east of Great Slave Lake in Northwest Territories. Here about 250 musk-oxen still exist where adequate range has been set aside for them, and the most effective

Under the supervision of the Biological Survey of the Department of Agriculture during the summer of 1930, 34 heads of musk-oxen were brought to New York and then shipped via Seattle to Fairbanks, Alaska. There they are kept in a large inclosure under the care of men from the experimental station of Fairbanks College, Alaska.

It is the hope of all concerned that these rare animals may be successfully domesticated and their numbers increased to utilize part of the vast food resources of Alaska that are now largely wasted, and to afford a stable source of meat as well as valuable robes and other products.

Before we go into detail about the musk-ox wool, and its value to the textile industry we would like to know a little more about the animal itself.



Courtesy N. Y. Zoological Society

Fig. 1. Musk-Ox

protection possible is being afforded in the hope that they may not only maintain themselves but also increase materially in numbers.

These efforts of the Canadian Government for the preservation of the musk-ox have received wide attention in our country, as Alaska was formerly a habitat of theirs. The result of this was that in 1927 the Legislature of the Territory of Alaska decided to memorialize Congress to acquire a herd of musk-oxen for introduction into Alaska for experimental purposes with a view to their domestication and utilization in this territory. Under the energetic leadership of Representative L. J. Dickenson of Iowa and Senator Peter Norbeck of South Dakota, Congress in 1929 appropriated \$40,000 to provide for the establishing of an experimental herd of musk-oxen at the Reindeer Experiment Station near Fairbanks, Alaska.

Origin.

Musk-oxen are the most truly arctic of all the large mammals occurring in North America. At the time of the earliest exploration they inhabited the vast territory north of the great transcontinental forest, roaming from the northwestern shores of Hudson Bay to the Mackenzie River and over most of the arctic islands and northern Greenland. They formerly existed in some numbers in northern Alaska. Fortunately they have persisted to the present time in limited numbers in northern Canada, eastern Greenland and some of the arctic islands, though they are much reduced from their former numbers.

In appearance musk-oxen resemble somewhat a small-sized buffalo or bison (see Figure 1), to which they are probably more nearly akin than to any other

American animal. There is a distinct hump on their shoulders, though it is not so conspicuously developed as in the bison, and the head is carried high when the animal is on the alert. Their general color is a dark brownish black with a lighter brown or cream color on the back, and the legs are much lighter colored. In animals of the more northern herds there is a lighter area on the forehead. The tail is short and does not extend beyond the hair on the rump. There is an undercoat of thick wool through which grows a protective coat of long black guard hairs that may sweep almost to the ground and that gives the animal a low stocky appearance. Both sexes of the musk-ox have horns. The average weight of the animal is 400 lbs., the largest male up to 600 lbs. The bull varies from six to eight feet in length of body and its height is from four to five feet at the shoulders.

Life of the Musk-Ox.

The musk-ox is usually seen in herds numbering from a dozen or so to eighty or a hundred head. In Autumn the herds are largest. They have a special method of combining for defense; they round up in the middle of a plain, with tails together and heads toward the enemy. This system of defense proved exceedingly effective against all natural enemies such as the wolves, but left them hopelessly powerless against the attacks of men armed with firearms. Hunters are thus enabled to shoot down an entire herd, which because of the animals' gregarious habits may represent all the musk-oxen within many miles, a fact that accounts in part for the rapidity of their extermination from much of their range, after improved firearms were employed in their pursuit.

The total number of musk-oxen alive today can only be estimated. R. M. Anderson, chief of the Division of Biology, National Museum of Canada, estimates about 13,000 musk-oxen remaining on Canadian territory and approximately 1,500 animals in Greenland, so we have from fourteen to fifteen thousand animals alive today, which gives approximately one per cent of the original estimated stock of somewhat less than a million in 1800.

Physical Properties of the Hair Coat

Through the courtesy of Dr. W. Reid Blair, Director of the New York Zoological Garden, and L. J. Palmer, Senior Biologist, Fairbanks College, Fairbanks, Alaska, I secured different samples of musk-ox hair which enable me to give you the following data: There are four known species of the animal. In our case the samples are taken from the *White Faced Musk-Ox*—*Ovibus moschatus wardi*. Main

characteristics: White space between horns and on face, also generally whitish on sides of head, more white on feet. General color—dark grey; homeland—eastern Greenland. As already mentioned the coat consists of an outer covering of coarse brown or black beard hair which curls and is matted on the back, but elsewhere is very long and conceals the upper half of the legs. Next to the skin is a growth of fine light grey wool (down) so dense as to be impervious to moisture. The wool hair is very soft and has a silky gloss. It is whitish grey towards the skin and changes to a grey. The point of change is very sharp. The length of the white zone varies from one sixteenth of an inch to over one inch, depending on the place where the hair grew. Some samples from the New York Zoological Garden didn't show any white zone at all. No regular staples are formed since the down grows nearly evenly over the whole skin. On some places, especially on the back part the wool hairs have the tendency to grow into beard hair. The lower part of such hairs is very curly, however the upper part is wavy like the regular beard hair. The beard hairs are brown or black mixed with a few white ones, the percentage of beard and wool hairs in the different samples and their length is seen from Table I.

TABLE I

1. Length of Hair Sample, New York, 1930. Age of animal—1 yr.

Wool Hair		Beard Hair	
Variation	..... ½-6"	Variation	..... 1-16"
Under 2"	..... 3%	Under 4"	..... 30%
From 2-5"	..... 89%	From 4-8"	..... 60%
Over 5"	..... 8%	Over 8"	..... 10%

2. Length of Staples Samples, New York, 1931. Age of animal—2 yrs.

	Male		Female	
	Shoulder	Back	Shoulder	Back
Wool Hair	1¼-1½"	1¼-1¾"	1½"	1¼-1¾"
Beard Hair	4 -7 "	2½-4"	3½-4"	2½-3½"

3. Length of Staples Samples, Alaska, 1931. Age about 9 months.

	Male		Female	
	Shoulder	Back	Shoulder	Back
Wool Hair	2¼-2½"	2-3"	2½-3½"	2½"
Beard Hair	3-4 "	3½"	3 -4 "	3½"

4. Percentage of Wool and Beardhair. Samples, New York, 1931.

	Male		Female	
	Shoulder	Back	Shoulder	Back
Wool Hair	..... 60%	70%	85%	80%
Beard Hair	..... 40%	30%	15%	20%

5. Percentage of Wool and Beardhair. Samples, Alaska, 1931.

	Male		Female	
	Shoulder	Back	Shoulder	Back
Wool Hair	..... 95%	60%	95%	60%
Beard Hair	..... 5%	40%	5%	40%

(To be continued)