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## CHAPTER 5

# ARID AND SEMI-ARID ZONES: SYMBIOSIS BETWEEN LIVESTOCK KEEPERS, THEIR ANIMALS AND THE ENVIRONMENT

**O**ver the centuries, the Navajo-churro and Karakul sheep breeds have adapted to a climate with long, hot, dry and windy summers, and cold, snowy and windy winters. Both breeds are exceptional foragers in arid and semi-arid zones and will go through a season of scarce food or graze marginal land where ordinary sheep would not survive. They contribute to weed control and fire suppression and recycle nutrients into the soil through hoof action. The Navajo-churro sheep, raised by the Navajos in New Mexico, spend less time grazing than commercial breeds and therefore have less negative impact on the sparse vegetation. Karakul sheep are known as Uzbekistan's "ecological pelt" because their grazing habits are supposedly less damaging to the environment than those of other breeds.

As reflected by initiatives such as the establishment of a specialized research institute for Karakul sheep or the collection of semen from Navajo-churro rams by the National Animal Germplasm Program, both sheep breeds are being recognized for their unique characteristics and for their adaptability to their habitat. Activities in favour of the Navajo-churro breed have expanded from simply preserving the breed to restoring its natural habitat and developing communities to safeguard the culture with which the breed is interdependent. The key to the success of the various activities undertaken to conserve the Navajo-churro sheep is the continuous involvement of Native Americans.

As for the conservation of the Karakul sheep, there are some major challenges. More than 30 percent of Uzbekistan's desert rangelands have been seriously degraded through overgrazing, causing economic and environmental problems. Management, preservation and control of natural resources, as well as reorganization and economic reform of Karakul sheep production, are still essential issues for the government to address.



**Map below:**

The Navajo Sheep Project has its base in the Navajo Reservation in New Mexico, the United States of America

# NAVAJO-CHURRO SHEEP: AN ANCIENT BREED IN THE NEW WORLD, USA

Donald E. Bixby

## SUMMARY

Churro sheep became the mainstay of the Navajo economy for meat, fibre and income. Their numbers were greatly reduced during the late nineteenth to mid-twentieth centuries, largely by government policies and action; they were also subject to crossing with exotic breeds which reduced hardiness and produced fleece unsuited to artisanal weaving. Starting in 1977, the Navajo Sheep Project assembled survivors of the breed and multiplied them while selecting for traditional breed characteristics in collaboration with a network of breeders. The Navajo-Churro Sheep Association now maintains its own registry. The Project has increased the participation of Native Americans and moved its base to the Navajo reservation in New Mexico.

**T**he Navajo-churro, the oldest North American livestock breed, stems from Spanish sheep introduced over 400 years ago. The “churro”, small rugged animals, fine boned and long legged, with a coarse, dense fleece, were integrated into the agriculture of missions, and Spanish colonists. Native labour learnt animal husbandry and textile skills which, with the sheep, spread rapidly and the indigenous population changed from hunting and gathering to shepherding and weaving. Sheep provided a dependable source of food and fibre for the nomadic Navajos. Weaving produced practical items, such as blankets, rugs and garments, and became an important expression of artistic creativity and spiritualism.

The churro adapted to an arid climate with hot, dry, windy summers and cold, snowy, windy winters. A double-coated fleece of long coarse hair, helped to shed rain, dust and snow, while a downy undercoat provided protection against cold. The long, open, nearly greaseless fleece was ideal for hand spinning. Some

rams have four to six horns and were considered to have spiritual power. Ewes may have multiple horns, two horns or be polled. Mature rams weigh 77 kg and ewes 45 kg and produce vigorous lambs each season. The sheep prosper on sparse vegetation. Together with intense



PHOTO 1. Side view of a Navajo-churro ram belonging to Tim Johnson.

D.E. Bixby

natural selection for hardiness, reproductive efficiency and foraging ability, Native Americans selected sheep for a wide range of fleece colours, which energized the patterns of the tapestries that were developed as hallmarks of individual artisans or of their tribe. Weaving was done by women, apart from the men in the Hopi tribes.

During the “golden age” of New Mexico’s sheep industry (1788 – 1846), master weavers from Mexico promoted their skills, and trade in textiles and livestock was significant. In 1807, Zebulon Pike reported that a flock of Navajo sheep could number 20 000. South-western churros grazed up the Chihuahua and Santa Fe trails and travelled to California. In the mid-nineteenth century hundreds of thousands of Navajo sheep grazed in New Mexico and Arizona. By the 1860s, Native American livestock were savaged by the military as part of the government campaign to resettle their lands (i.e. westward expansion).

In the late nineteenth and early twentieth century, the Bureau of Indian Affairs introduced “improved”

rams of British origin aiming to produce an improved grade of white fleece and increase carcass quality. Cross-bred fleece was coarse and too short and crimped for hand weaving, and the increased lanolin held a lot of dirt. Cross-breeds did not thrive on range, fell short of market requirements and began to lose the hardiness of purebred Navajo.

During the 1930s, livestock reduction government programmes to increase prices by reducing supply were especially well implemented among Native Americans. Thousands of sheep were shot and left to rot. The annihilation was an enormous economic and cultural disaster and a genetic loss to the sheep. By 1952, the Navajos had only 36 percent of the livestock held in 1930 and had been forced into austere poverty, which still persists.

While the plight of the Navajo people was of little apparent concern, the federal government became interested in Navajo sheep and established the South-western Range and Sheep Breeding Laboratory in 1935, at Fort Wingate, New Mexico. The laboratory was



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PHOTO 2. Entrants proudly present their Navajo-churro sheep for judging at Sheep Is Life Celebrations. This breed comes in a rainbow of colours that are prized by Navajo weavers.



stocked with 800 ewes and 20 rams of “old-type” Navajo sheep. Research focused on the characteristics of the breed for wool production and quality. Titles of the published papers indicate a strong emphasis on studies of cross-breeding. The laboratory was closed in 1965.

By the 1970s fewer than 500 Navajo sheep could be found in the entire country. Traditional weaving skills among Native Americans were disappearing, and those who still practised the art were using Karakul fleece from Pakistan.

Dr Lyle McNeal, of Utah State University, founded the Navajo Sheep Project in 1977; the first goal was to increase their numbers. A breeding flock was gathered including some descended from Fort Wingate stock, then selected for traditional breed characteristics. Other breeders joined the effort. With the Navajo Sheep Project, and cooperation with a network of breeders, the breed was brought back from the brink of extinction. The goals of the Project expanded to restoring the breed, its natural habitat and

development of the culture with which it is interdependent. Outreach education helps to improve sheep and wool resources for Navajo sheep producers. Nearly half of all Navajo on the reservation are involved in livestock production. Most flock owners use management practices developed by their forebearers, but are eager to learn new ways. The Project has increased the participation of Native Americans and moved its base to the Navajo reservation in New Mexico.

A group of Navajo women formed *Diné be' iiná* Inc., a non-profit organization which promotes the return of the Navajo-churro sheep, that once was the foundation of the *Diné* (the people), their culture and economy. “Sheep is Life” honours the role that sheep play in Navajo spirituality, philosophy and daily life; this annual event offers a range of workshops and free events for the whole family: sheep and wool marketing workshops, sheepdog demonstrations, livestock health care clinics, grazing management for arid lands and marketing strategies.



PHOTO 3. Twelve-year-old Althea Theresa Johns proudly displays her weaving featuring traditional yei figures.

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American Livestock Breeds Conservancy (ALBC) supports the Navajo Sheep Project. An important task was the analysis of breeding records and the publication of a flock-book. The Navajo-Churro Sheep Association now maintains its own registry and serves breeders across the country. It issues a regular newsletter for communication among breeders and sponsors an annual national show and sale.

Training and workshops on the reservation have returned fleeces to Native American artists and sheep to Native American flocks; this has been a powerful tool for economic and community development. A tribal leader stated: "It's not about making money.



D. E. Bixby

PHOTO 4. Master weaver Roy Kady displays a handsome shoulder blanket designed and woven by TahNibaa Natani, an accomplished weaver in her own right.

Raising animals is about disciplining children, teaching them responsibility and planning for the future. Navajo values and family systems are dependent on sheep". The number of breeders is increasing and is scattered from Vermont to Washington, from North Carolina to Arizona. The breed represents a conservation success story.

#### FOOD AS WELL AS FIBRE

The Navajo like the Churro for its excellent flavour, its low fat content, its small size and its ease of home slaughter. The meat can easily be consumed before spoilage, by an extended family. All parts are used; Navajos prefer mutton to lamb. Churro sheep are sacred, so eating them is a great privilege and honour. Mutton is reserved for special occasions and as part of selection. Churras are good milkers and sometimes used to make cheese.

Aggressive marketing from was done from 1990 to 2000. Sheep that thrive on natural vegetation are useful for weed control, fire suppression and recycling nutrients. When the Navajo people have healing or blessing ceremonies, they prefer churro and sometimes four-horned sheep that are perceived to have more strength to give to the rituals.

#### NAVAJO-CHURRO SHEEP IN THE US DEPARTMENT OF AGRICULTURE NATIONAL ANIMAL GERMPLASM PROGRAM (NAGP)

The five laws of genetic conservation are set out in Fowler and Mooney's *Shattering* (1990):

- > *Agricultural diversity can only be safeguarded through the use of diverse strategies.* A strategy of ALBC is to collect and cryopreserve genetic materials that can be used to rescue or enhance a threatened breed.
- > *What is saved depends on who is consulted. How much is saved depends on how many people are involved.* For this reason ALBC has been firm in its resolve to involve as many breeders as possible in the collection of materials for the gene bank.
- > *Diversity will not be saved unless it is used.*
- > *Diversity cannot be saved without saving the community in which it was developed.* Reintroducing Navajo-churro sheep into the traditional Navajo

weaving culture meets the need for using the resource and supporting the community in which it was developed.

- > *The need for diversity is never-ending.* Therefore, our efforts to preserve this diversity can never cease.

A recent focus of activity for NAGP is collection of semen; involving Native Americans in this project was a priority. Staff visited the wider Navajo sheep area,

consulted local breeders and developed a continuing relationship between leaders of the Navajo Nation and the National Animal Germplasm Program.

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Map below:

Habitat of Karakul sheep



# MANAGEMENT, USE AND CONSERVATION OF KARAKUL SHEEP IN TRADITIONAL LIVESTOCK FARMING SYSTEMS IN UZBEKISTAN

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## SUMMARY

Karakul are well adapted to the sparse desert pastures, the transhumant production system and climate of the Uzbek desert. Removal of many new-born lambs for pelts allows them to survive on scanty feed. Under the Soviet Union selection was for size rather than for pelt quality. With decollectivization, breeding support and the marketing system for pelts collapsed; herders are still coming to terms with the market economy. Support in marketing is needed. There is a need to build up regional networks among the stakeholders involved in Karakul sheep production to facilitate development of conservation strategies.

In 2000, ruminant livestock in Uzbekistan included 5.3 million cattle and 9 million sheep and goats. About half of the sheep were Karakul, which are believed to be native to Uzbekistan and whose history goes back over a thousand years. The Karakul, which evolved through centuries of selection in its natural habitat, is highly adapted to climate and local management. Previously, their coat was predominantly black because sheep were selected for the quality of their pelt. During the Soviet period however, the selection criterion was size, causing colour variety to increase.

Karakul sheep have been economically important for centuries; they provide meat, milk and wool, and their pelts are highly valued. With the country's shift to a market economy, their production, processing and marketing was privatized and reorganized; new companies specialized in processing high-quality pelts have since entered the market.

Natural pasture is the breed's major feed. Their grazing area covers about 17.5 million ha, including 3

million ha of shifting sands. More than 30 percent of desert range is seriously overgrazed. The management, preservation and control of natural resources and the reorganization and economic reform of Karakul sheep are important issues for the government.

## CLIMATE AND TOPOGRAPHY



PHOTO 1. Karakul sheep products at the market

Y. Ibragimov

Uzbekistan, with a population of 26 million, lies between the Syrdarya and Amudarya rivers and borders with Kazakhstan, Kyrgyzstan, Tajikistan, Afghanistan and Turkmenistan. It covers 458 000 km<sup>2</sup> and is divided into 12 provinces with Tashkent as its capital. Deserts cover the west and northwest of the country, while the south and southwest consist of foothills and mountains. The climate is dry and continental, with long, dry, hot summers, cool, wet autumns, and cold winters with thaws. Strong, cold air masses sweep through the country in winter. The country is divided into four belts: the foothill plains, the moderately high mountains, the high mountains and the desert. The desert is the zone of irrigated farming and the habitat of Karakul sheep. Annual precipitation varies between 100 and 250 mm and average annual temperature is about 15 °C. The desert is mostly natural grazing. Its surface layers are mainly loose soils or consolidated sands. Carbonates are uniformly spread in the top layer of the soil and are underlain by a gypsum layer. Groundwater is usually very deep.

### STOCK REARING

Dairy cattle are found on irrigated cropland; beef cattle on mountain pastures; Karakul in deserts; other sheep breeds and horses belong to the foothills and mountains around the Fergana valley. Pigs and poultry are raised industrially near urban centres.

There are three main types of livestock system:

- > state-run agricultural cooperatives;



PHOTO 2. Karakul ram: Nishan ecotype

Y. Ibragimov

- > *shirkat* farms: cooperatives which have replaced collective farms;
- > *dehkan* or family farms.

Sixty-five percent of sheep and goats are on *dehkan* farms. Of Karakul sheep, 55 percent are in cooperative structures and 40 percent on *dehkan* farms.

Karakuls for pelts are kept in arid zones, while those raised for meat and wool are kept on the foothills in the Fergana valley. In better pastures the common sheep breeds are the dual-purpose Jaidara and Gizzar; their live weight is 63 and 75 kg respectively, while fleece weight ranges between 2 and 2.5 kg.; the country has more than 3 million of these breeds.

### PASTURE RESOURCES

Karakul sheep migrate seasonally and according to feed availability on 18 million ha of grazing lands, 14 percent of which have no fresh water sources. They graze four types of pasture: shrub grass, subshrub-ephemeral, ephemeral-ephemeroïdal and salty grass vegetation.

- > **Shrub grass** occupies 9 million ha; its yield is 200 - 700 kg of dry matter/ha. It provides grazing the whole year round; in spring they graze green fodder; in summer, dry fodder and dry salty vegetation; in autumn they find shrub-subshrubs and small grasses.
- > **Subshrub grass** covers nearly 7 million ha and is in all regions where Karakul sheep are kept.
- > **Ephemeral-ephemeroïdal pastures** are found in



PHOTO 3. Karakul ram: Tandin ecotype

Y. Ibragimov

arid lands of the foothills and plains.

- > **Salty grass vegetation** has a growing period of 200 to 236 days. Seed-heads and leaves are its most nutritive parts.

Pastures and land in the Karakul zone are state-owned, but are used by *shirkat* farms on a long lease. The state is responsible for the rehabilitation of low producing lands, for guaranteeing water supply and for the maintenance and repair of water sources. In the Kizilkum valley the vegetation is diverse and year-round grazing is possible. Especially developed are sand-loving plants such as *Calligonum*, *Ammodendron*, *Haloxylon persicum*, and *Aristida karelini*, the most valuable fodder. In Zeravshan and Lackaday there are large zones of desert grazing where Karakul sheep and goats are raised.

#### HISTORY AND BREED CHARACTERISTICS

Karakuls, considered to be the oldest domesticated sheep breed, are named after a village in the emirate of Bokhara which has a high altitude, sparse desert vegetation and a limited water supply. There is archaeological evidence of the existence of Persian lambskin as early as 1 400 BC and carvings of a Karakul type have been found on Babylonian temples. Over time, Karakul herding spread through Central Asia, including Kazakhstan, Turkmenistan and Afghanistan. In the twentieth century, Karakul sheep were sold to Russia, Ukraine, Moldova, Southwest Africa and Argentina. They were introduced to the USA between

1908 and 1929, but United States breeders introduced other breeds into the bloodlines which resulted in inferior pelts and eventually the industry and the flocks were dispersed.

Karakul sheep tolerate extremes of heat and cold, from 46 to -36 °C, but need access to dry cover and should be kept out of marshy pastures. They forage up to 35 km each day and are the only sheep capable of drinking the very salty water found in most pastures in Uzbekistan. Karakul is supposedly less damaging to the environment than other sheep. They are resistant to internal parasites and Foot rot. They respond to good feed and care, but are excellent foragers and will go through a season of scant food or graze marginal land where ordinary sheep would not survive. Karakul sheep possess a strong flocking instinct, but are likely to scatter or fight a dog trying to herd them. Karakul sheep breed out of season, making three lambings in two years possible. Single lambs are the rule, although twins do occur. Ewes are very protective and attentive, resulting in high lamb survival.

#### KARAKUL SHEEP TYPES

Karakul sheep differ radically in conformation from other breeds; they are of medium size and of the fat broad-tailed type. Rams average 100 kg and ewes about 65 kg. They stand tall, with a long, narrow body. The top line is highest at the loin with the rump long and sloping, blending into a low-set broad-tail. The head is long and narrow, slightly indented between the eyes



PHOTO 4. Female Karakul sheep



PHOTO 5. Karakul rams





PHOTO 6. Pasturing Karakul sheep

and often exhibiting a Roman nose. Their long ears always point down and slightly forwards and vary from a long U-shape to a small V-shape. The long neck is carried semi-erect. The legs are medium to long, and light in bone. Rams can be polled or horned; horns vary from short to large with outwardly curved spirals. Ewes are generally polled. Wattles are not unusual. The breed consists of groups that are genetically related but have different phenotypes. Sheep of 15 different colours, 30 shades, four wool wave types and more than 20 wave forms can be distinguished.

### PRODUCTION AND TRADE

Karakul are known as a "fur" sheep, but in Uzbekistan they produce 3.5 million tonnes of milk, 0.8 million tonnes of meat, 16 000 tonnes of wool and 700 000 pelts annually. These are consumed locally and sold to state and private procurement organizations. Before the breakdown of the Soviet Union most pelts were sold to the Red Army. After decollectivization there were no marketing structures and thereafter not even 6 percent of pelts were exported.

### PELT CHARACTERISTICS

Most lambs are born coal-black with lustrous wavy curls, with face, ears and legs usually showing smooth, sleek hair. As the lambs grow, the curls open and lose their pattern. The colour begins to turn brownish or bluish-grey, becoming greyer with age. Other colours include a wide range of shades: silver, blue, grey, golden,

reddish-brown, white with flecks of other colours that include a wide range of shades: silver-blues, greys, golden-tans, reddish-browns, white with flecks and occasionally pure white. Many adults have a double coat – a fine down undercoat, covered by a coat of guard hair. The best performing sheep have a glossy fleece as their lamb coat, but there is a great variability in the fleece type of both coats, from "horse tail" coarse to silky soft. Karakul sheep produce a light, high-volume, strong-fibre fleece that at its best is long and lustrous, usually with no crimp. Long-stapled (on average 15 to 30 cm per year), the fleece has a low grease content and is easily spun with little preparation. It produces a superior carpet yarn, is often used for rugs, saddle blankets, outer garments and wall-hangings. It has excellent felting ability and is the wool from which the art of felting evolved.

Texture is the most important characteristic of broadtail (foetal lamb) and Karakul pelts. The most valued qualities, durability, silkiness and shape of curls, are all concentrated in black Karakul sheep. To preserve the gloss and curl of the fur, the lamb must be killed within a few days of birth. In the fur trade it is desirable that curls be distributed uniformly. Pelts are matched for size of curl, pattern, lustre and other qualities. Broadtail pelts have no true curls, the hair is shorter than that of the Karakul, with a wavy, flat pattern. This texture is often described as "watered



PHOTO 7. Karakul lambs are highly valued for their glossy and curly fur

silk” or “moiré”. The qualities of the pelts vary according to the age at which the lambs are slaughtered. This may be 30 (galach), 14 (karakulcha), 10 (Karakul / karakulcha) or 0 (Karakul) days after birth.

### RURAL COMMUNITIES AND KARAKUL SHEEP

Karakul sheep are the main source of livelihood for more than two million people in Uzbekistan and provide employment where there are no sources of income. The whole family is involved in sheep raising; children for herding, women for processing milk, wool and pelts and men for lambing, slaughtering, shearing and protecting sheep from predators. Large numbers of people are leaving the villages for the city so Karakul rearing has ceased in some areas. Sheep numbers are declining rapidly and problems such as soil erosion have increased. Karakul sheep supply 20 percent of the country’s meat. In the past, pelts contributed an even larger share to Uzbekistan’s gross domestic product.

Sheep milk is important for nursing children and is made into butter and cheese. Meat is dried on sand and can be conserved for a long period. Fat is processed into tallow. Wool and pelts are used for pullovers, carpets and ropes. Dung is used for heating and cooking. Karakul sheep are the family’s savings, sold when cash is needed and exchanged for other goods.

### INVOLVEMENT OF THE GOVERNMENT AND OTHER PARTIES

The Uzbek Scientific Institute of Astrakhan Sheep Breeding has, over many years, selected a large number of drought and heat-resistant foddors. Research on pastures and breeding Karakul sheep has begun in collaboration with the International Centre for Agricultural Research in the Dry Areas (ICARDA.) The Uzbek Research Institute for Karakul Sheep sets priorities for research on production, breeding and the conservation and breeding of forages in desert and semi-desert regions. The livestock farming central board, the veterinary and scientific production centre of the Ministry of Agricultural and Water Resources, meat- and milk-related institutions and companies, breeding associations, scientific institutions of livestock raising,



Courtesy of Y. Ibragimov

PHOTO 8 and 9. With the country’s shift to a market economy, private high-quality pelts processing companies have emerged, absorbing the largest share of the profit margins in the value chain at the expense of the Karakul sheep farmers. To preserve the gloss and curl of the fur, the lamb must be killed within a few days of birth

Karakul sheep breeders and veterinarians all work on policy development and livestock production.

The disintegration of the Soviet Union severely disrupted the Karakul sheep production chain. Inputs were difficult to obtain, breeding support schemes disappeared and prices stagnated. From the mid-1990s, ICARDA and national research organizations collaborated to understand the socio-economic processes and changes brought about by the new economic reforms. The results of this work, including much information on the effect of decollectivization on the livestock sector and Uzbekistan’s grazing lands are described by Gintzbürger *et al.* (2003). They developed strategies to overcome the production problems faced by farmers. Major activities were framed into the following research components:

- > markets and socio-economics of production systems;
- > on-farm interventions for productivity improvement;
- > efficient livestock production through adequate flock management integrating nutrition, reproduction, breeding and animal health.

### RECOMMENDATIONS

Conservation of a breed without further development or with no expected future use is not sustainable. Before farmers can support the conservation of a breed they

need to know how their efforts will be rewarded. Policy-makers can especially assist farmers by the following:

- > Promote the Karakul sheep, and especially its products, in Uzbekistan and abroad.
- > Build up regional networks among the stakeholders involved in Karakul sheep production to:
  - facilitate development of conservation strategies based on sound cooperation;
  - discuss *in situ* and *ex situ* conservation options and study their feasibility, including the possibility of establishing an open nucleus;
  - establish sustainable monitoring systems to keep records of the status of domestic animal populations in the region.
- > Consider investments in capacity building and

training to strengthen human resources, particularly in breeding strategies.

- > Enhance coordination among the various organizations in Central Asia that currently develop and implement subregional projects and programmes related to animal genetic resources.

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