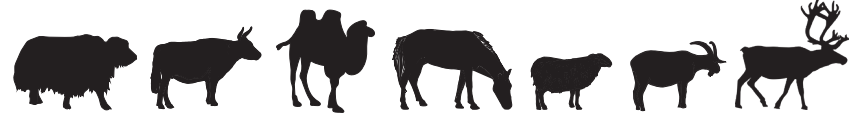


MONGOLIAN DAIRY LIVESTOCK



Mongolia is a land of sheep and...more sheep!



SHEEP

Ovis aries, also known as sheep (хонь), were originally domesticated in the Near East. The first sheep were hairy, but they later acquired a mutation that turned them wooly. Sheep have been important for making textiles and dairy products in Mongolia for 5,000 years.

THE DNA SEQUENCE BELOW IS FROM THE CYTOCHROME C OXIDASE 1 (COX1) GENE IN SHEEP. THIS GENE PERFORMS ESSENTIAL FUNCTIONS IN THE ENERGY PRODUCTION OF CELLS. THE COX1 GENE SEQUENCE IS DIFFERENT IN DIFFERENT ANIMAL SPECIES, AND BY SEQUENCING THIS GENE IT IS POSSIBLE TO DETERMINE THE SPECIES OF AN ANIMAL.



1

A partial sequence of the cytochrome C oxidase 1 (COX1) gene is shown below. Part of the sequence is highlighted in **BOLD**. This part of the sequence is 32 nucleotides long, and it is different in each of the major dairy animals in Mongolia.

Ovis aries, cytochrome C oxidase 1 (COX1) gene sequence (partial):

ATGTTTCATCAACCGCTGATTATTTTCAACCAACCACAAAGATATCGGCACCCTTTACCTTCTATTTGGTGCCTGAGCTGGTATAGTAGG
AACCGCCTTAAGCCTACTAATTCGCGCCGA**ACTAGGCCAACCCGGAACCTCTACTCGGAGATG**ACCAAATCTACAACGTAATTGTAACCG
CACATGCATTTGTAATAATTTTCTTTATAGTAATGCCTATTATAATCGGTGGATTTCGGCAACTGACTAGTTCCTCTGATAATTGGAGCC
CCTGATATAGCATTTCTCGGATAAATAACATAAGCTTTTGACTTCTTCCCCATCTTTCTGTACTCCTAGCATCCTCTATGGTTGA
GGCCGGAGCAGGAACAGGTTGAACCGTATACCCTCCTCTAGCAGGCAACCTAGCCCATGCAGGAGCCTCAGTAGATCTAACTATTTTCT

2

Below, we've shown this sequence again in comparison to the DNA sequences found in other dairy animals. This is called an **alignment**. Differences in the DNA sequences between the different animals are highlighted in pink. This sequence is like a **DNA fingerprint** of the animal species.

Cattle
Yak
Sheep
Goat
Reindeer
Camel
Horse

ATTAGGCCAACCCGGAAC**TCT**GCTCGGAGACG
ATTAGGCCAACCCGGAAC**CT**GCTCGGAGACG
ACTAGGCCAACCCGGAACCTCTACTCGGAGATG
ACTAGGTCAACCCGGAAC**CT**ACTTGGAGATG
ACTGGGCCAAC**CT**GGGACC**CT**ACT**C**GGAGACG
ATT**G**GGACAGCCCGGGAC**G**TT**G**CTTGGAGACG
ATTAGGCCAAC**CT**GGGACC**CT**ACT**A**GGAGAT**G**



3

Can you make a DNA bracelet with the SHEEP sequence? Use your beads and string to make a SHEEP DNA bracelet!

A C T A G G C C A A C C C G G A A C T C T A C T C G G A G A T G