

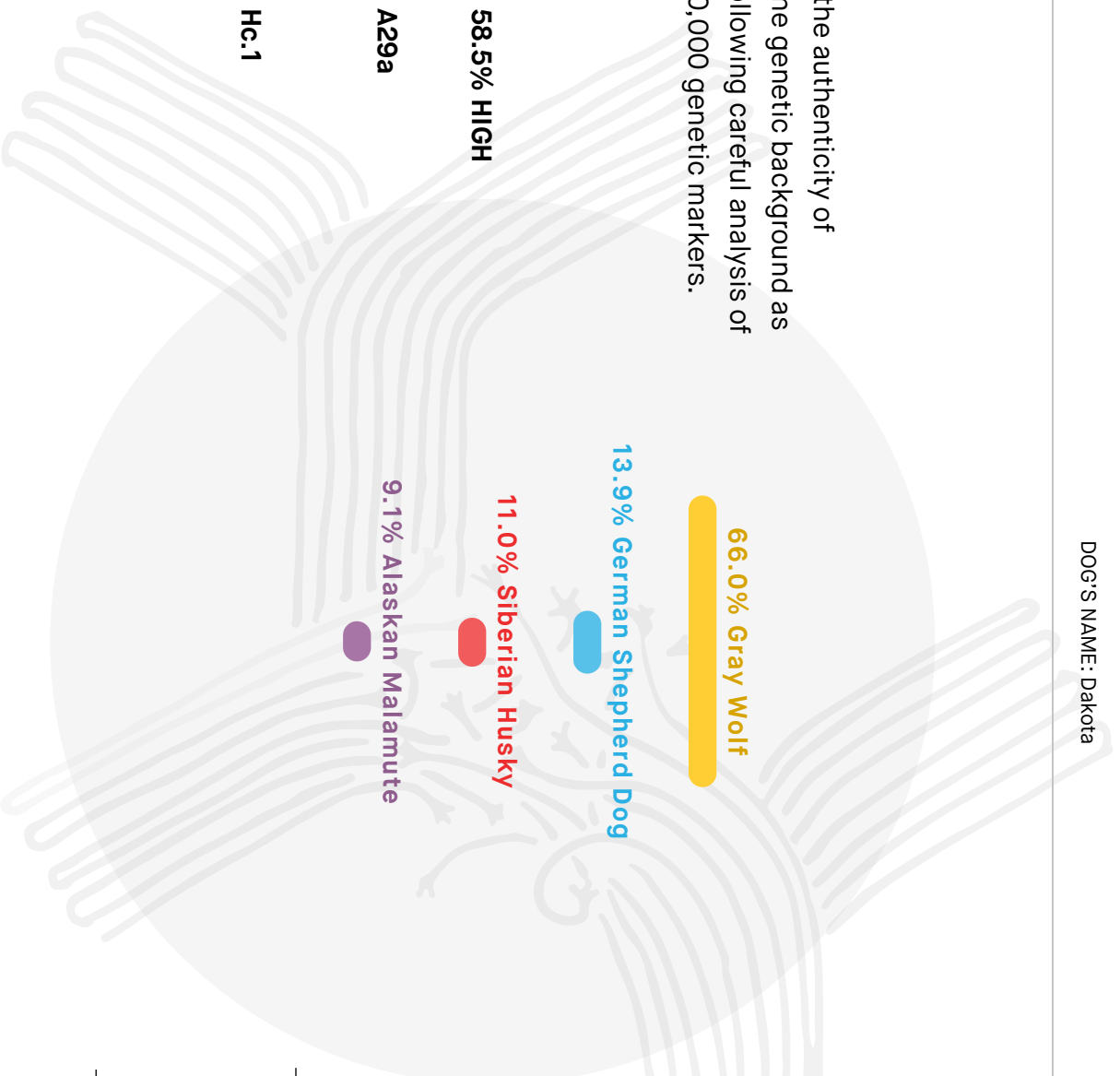
OWNER'S NAME:

DOG'S NAME: Dakota

TEST DATE: July 16th, 2017

This certifies the authenticity of **Dakota's** canine genetic background as determined following careful analysis of more than 200,000 genetic markers.

Welcome to the
Embark family!



WOLFINESS **58.5% HIGH**

MATERNAL HAPLOTYPE **A29a**

PATERNAL HAPLOTYPE **Hc.1**



Adam Boyko, Ph.D.
CHIEF SCIENCE OFFICER



Ryan Boyko
CHIEF EXECUTIVE OFFICER



BREED MIX

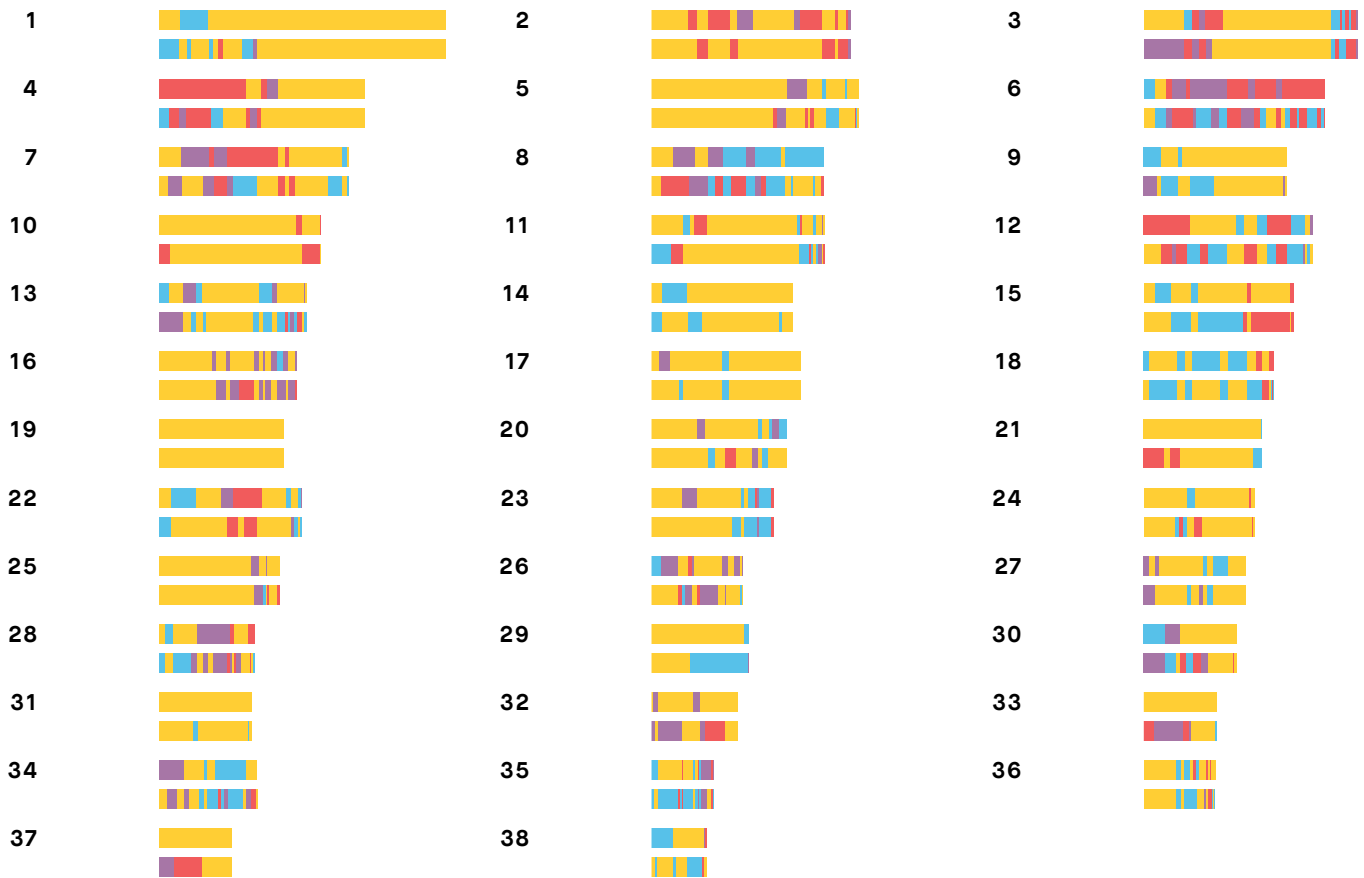


GENETIC STATS

Wolfiness: 58.5 % **HIGH**
 Predicted adult weight: **78 lbs**
 Genetic age: **54 human years**

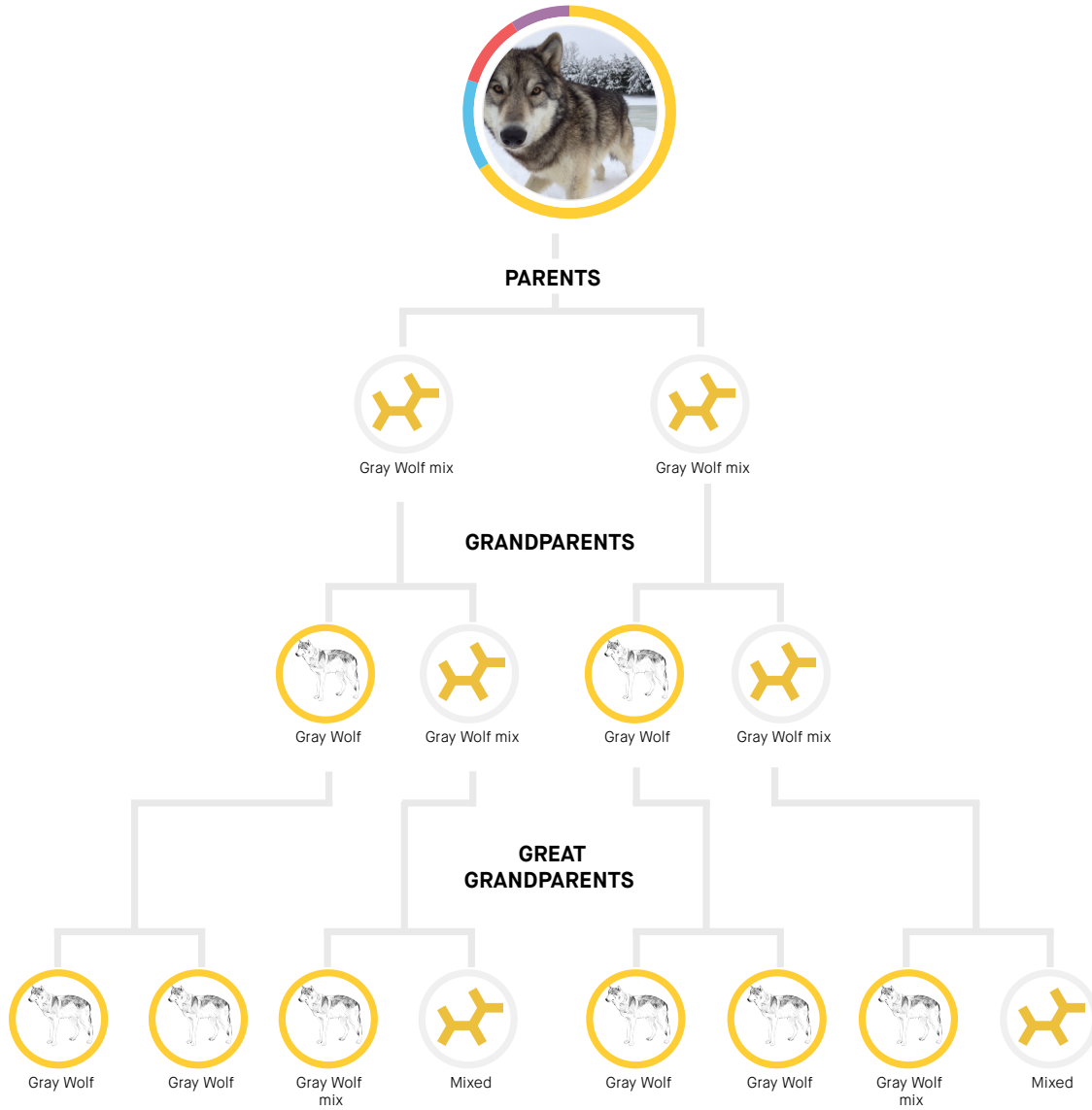
BREED MIX BY CHROMOSOME

Our advanced test identifies from where Dakota inherited every part of the chromosome pairs in his genome.





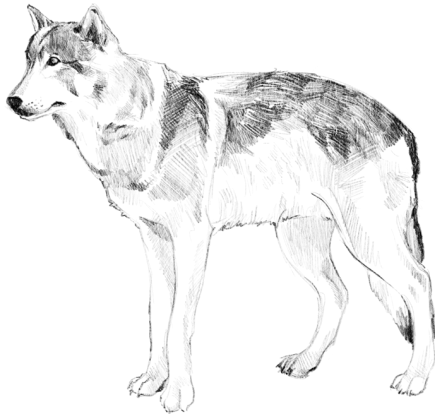
FAMILY TREE



Our algorithms predict this is the most likely family tree to explain Dakota's breed mix, but this family tree may not be the only possible one.



GRAY WOLF



The Gray Wolf is clearly not a dog breed, though these wild animals are the ancestors of the domesticated dog. The Gray Wolf, or Timber Wolf, is the largest wolf species. It is understood that these wolves play an essential part in maintaining balance in their ecosystems, keeping deer and elk populations in check. These are social animals with a complex pack hierarchy. The Gray Wolf is found widespread throughout the Northern Hemisphere. Wolves are typically shy and reserved around people, but can obviously be extremely dangerous. While the Gray Wolf has recently entered the domestic dog gene-pool again through the rising popularity of wolf hybrids, it is important to remember that a wolf is not a pet.

Alternative Names

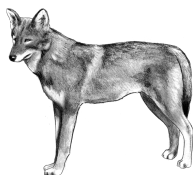
Fun Fact

On average, these wolves will eat 20 to 30 pounds in a sitting, but they can also go up to 14 days between meals with ease.

RELATED BREEDS



Central Asian Village Dog
Sibling breed



Red Wolf
Cousin breed



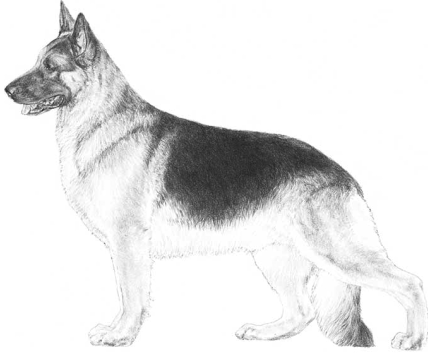
Dire Wolf
Cousin breed



Coyote
Cousin breed



GERMAN SHEPHERD DOG



The German Shepherd dog is the second most popular dog breed in the United States, and the fourth most popular in the United Kingdom (where it is known as the Alsatian). This breed was standardized in Germany at the end of the 19th century from local dogs used for herding and livestock guarding. Their confidence, courageousness and keen sense of smell coupled with their notable intelligence make them highly suited to police work, military roles, and search and rescue. German Shepherds require regular physical and mental exercise and have a heavy shedding coat. They were first recognized by the AKC in 1908 and later became fashionable as soldiers returning from WWI spoke highly of the German dogs and Hollywood popularized the breed with stars like Stronghold and Rin Tin Tin.

Alternative Names

Fun Fact

Despite being sometimes called the "Alsatian wolf dog", German Shepherds are not true wolf dogs, they are 100% dog. Nevertheless, German shepherds were crossed with wolves in the past to form the Czechoslovakian and Saarloos wolfdog breeds. German Shepherds, along with other breeds and sled dogs, were also used in the creation of the Chinook breed.

RELATED BREEDS



White Shepherd
Sibling breed



Belgian Sheepdog
Cousin breed



Belgian Tervuren
Cousin breed



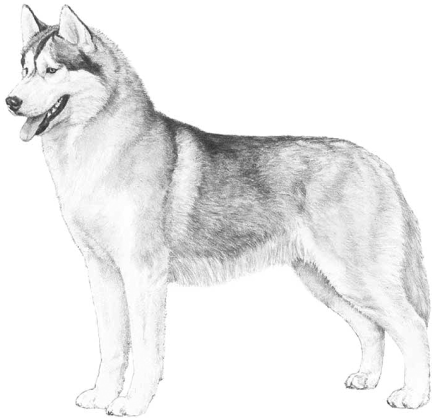
Belgian Malinois
Cousin breed



Transmontano Mastiff
Cousin breed



SIBERIAN HUSKY



The Siberian Husky originated from the extreme north east of Siberia. They were initially domesticated by the Chukchi -an ancient population that thrived by herding reindeer and moving with each season to new grazing regions. They came to America in 1909 and found their place in the Alaskan wilderness. They love to be out in cold weather and are known to be the ideal sled dog. They have strong insulated paws that are perfect for traction in the snow. The Siberian Husky also has two layers in their coat that protects them from Arctic winters.

Alternative Names

Fun Fact

In 1925 a team of Siberian Huskies saved Nome, Alaska by carrying the serum to cure diphtheria a considerable distance by sled. The run was done in the middle of a blizzard and in conditions below -23 degrees Fahrenheit. The run is remembered by the annual Iditarod Trail Sled Race, and Balto, the famous sled dog who led his team through the final leg.

RELATED BREEDS



Alaskan Malamute
Sibling breed



Greenland Sledge Dog
Cousin breed



Samoyed
Cousin breed



ALASKAN MALAMUTE



The largest and oldest of the Arctic sled dogs, the Alaskan Malamute possesses great strength and endurance. He is not designed to race, but rather to carry large loads over long distances. Today, many Malamutes are family pets, but are highly athletic and still capable of enjoying sledding, weight-pulling, back-packing, jogging and swimming with their owners. The Malamute coat is thick and coarse, with a plumed tail carried over the back. The coat usually ranges in color from light gray to black or from sable to red. Face markings, including a cap on the head and a bar/mask on the face are often distinguishing features.

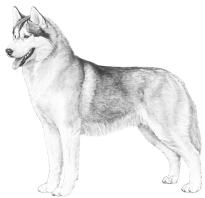
The Alaskan Malamute is believed to be a descendant of the domesticated wolf-dogs who accompanied the Paleolithic hunters who crossed the land bridges of the Bering Strait and migrated into the North American continent roughly 4,000 years ago.

Alternative Names

Fun Fact

The Alaskna Malamute is one of the oldest artic sled dogs.

RELATED BREEDS



Siberian Husky
Sibling breed



Greenland Sledge Dog
Cousin breed



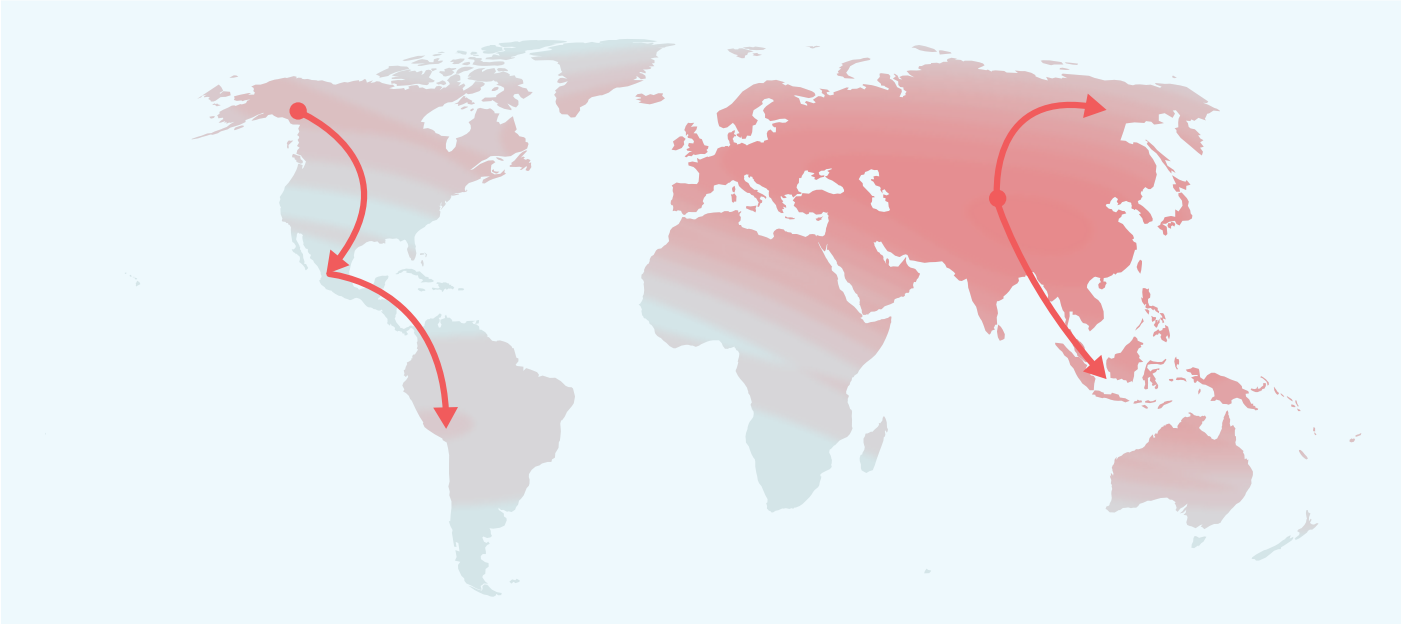
Chinook
Cousin breed



Carolina Dog
Cousin breed



MATERNAL LINE



Through Dakota's mitochondrial DNA we can trace his mother's ancestry back to where dogs and people first became friends. This map helps you visualize the routes that his ancestors took to your home. Their story is described below the map.

HAPLOGROUP: A2

A2 is a very ancient maternal line. Most likely it was one of the major female lines that contributed to the very first domesticated dogs in Central Asia about 15,000 years ago. Some of the line stayed in Central Asia to the present day, and frequently appear as Tibetan Mastiffs and Akitas. Those that escaped the mountains of Central Asia sought out other cold spots, and are now found among Alaskan Malamutes and Siberian Huskies. This lineage is also occasionally found in several common Western breeds, such as German Shepherds and Labrador Retrievers. Curiously, all New Guinea Singing Dogs descend from this line. These are an ancient and very interesting breed found in the mountains of Papua New Guinea. Unfortunately, they are now endangered. They are closely related to the Australian dingo, so you could say its cousins are dingos! This line is also common in village dogs in Southeast and East Asia. Unlike many other lineages, A2 did not spread across the whole world, probably because it did not have the opportunity to hitch its wagon to European colonialism - or because these dogs just prefer

HAPLOTYPE: A29a

Part of the A2 haplogroup, this haplotype occurs most commonly in Siberian Huskies, Alaskan Malamutes, Labrador Retrievers, and village dogs from Alaska.



PATERNAL LINE



Through Dakota's Y chromosome we can trace his father's ancestry back to where dogs and people first became friends. This map helps you visualize the routes that his ancestors took to your home. Their story is described below the map.

HAPLOGROUP: A

A is the distant relative of some of the most numerous paternal lineages in the world. Characterized by a single sub-lineage, this is a rare and interesting paternal line! The A line is found exclusively (so far) in Siberian Huskies and in Alaskan village dogs. It seems plausible that this paternal lineage diverged within the last 10,000 years from a group arriving with the first Arctic explorers. The recent ancestors of dogs with this lineage actually allowed humans to survive in some of the most forbidding conditions on the face of the earth!

HAPLOTYPE: Hc.1

The lone member of the A haplogroup, this haplotype occurs most commonly in Siberian Huskies and village dogs from Alaska.



TRAITS

Coat Color

E Locus (Mask/Grizzle/Red)	EE
K Locus (Dominant Black)	k^yk^y
A Locus (Agouti)	a^{wa}a^t
D Locus (Dilute)	DD
B Locus (Brown/Chocolate/Liver)	BB

Other Coat Traits

Furnishings / Improper Coat (RSPO2)	II
Long Haircoat (FGF5)	GT
Shedding (MC5R)	CC
Curly Coat (KRT71)	CC

Body Size

IGF1	NN
IGF1R	GG
STC2	TT
GHR (E195K)	GG
GHR (P177L)	CC

Genetic Diversity

Inbreeding Coefficient	8%
MHC Class II - DLA DRB1	No Diversity
MHC Class II - DLA DQA1 and DQB1	High Diversity

Other Body Features

Brachycephaly (BMP3)	CC
Natural Bobtail (T)	CC
Hind Dewclaws (LMBR1)	CC

Performance

Altitude Adaptation (EPAS1)	GG
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DAKOTA



DNA Test Report

Test Date: July 16th, 2017

embk.me/dakota23

CLINICAL TRAITS

These clinical genetic traits can inform clinical decisions and diagnoses. These traits do not predict a disease state or increased risk for disease. We currently assess one clinical trait: Alanine Aminotransferase Activity.

Alanine Aminotransferase Activity result: Normal

Dakota has two normal alleles at ALT.

More information on Alanine Aminotransferase Activity:

Known to be highly expressed in liver cells, activity levels of alanine aminotransferase, or ALT, is a common value on most blood chemistry panels and is known to be a sensitive measure of liver health. Dogs with two ancestral G alleles show "normal" activity. Dogs that have one or two copies of the derived A allele may have lower resting levels of ALT activity, known as "low normal". If your dog's result is "low normal" then when a blood chemistry panel is being interpreted the values that you and your veterinarian consider "normal" may need to be adjusted. Please note that neither a "normal" nor a "low normal" result for this predicts a disease state or increased risk for liver disease. Moreover, this mutation does not associate with increased levels of ALT: If your dog has high ALT levels, please consult your veterinarian.



DAKOTA



DNA Test Report

Test Date: July 16th, 2017

embk.me/dakota23

HEALTH

Good news! Dakota did not test positive for any of the genetic diseases that Embark screens for. Read on to learn more about the conditions we test for, but rest assured that Dakota does not have the mutations known to cause them.

It is still important to let your veterinarian know these results because they could help guide Dakota's diagnosis and treatment if he gets sick in the future. Many other diseases caused by environmental factors or undiscovered genetic variants can cause symptoms similar to diseases we test for. By ruling out these mutations, your veterinarian will be able to find the true cause more quickly. Your veterinarian will also know they can safely prescribe medications some dogs are sensitive to.

0
AT RISK

0
CARRIER

160
CLEAR



OTHER CONDITIONS

Good news! Dakota tested clear for 9 genetic conditions that are common in his breed mix.

- Multidrug Sensitivity (MDR1)
- Canine Leukocyte Adhesion Deficiency Type III (FERMT3)
- X-linked Ectodermal Dysplasia, Anhidrotic Ectodermal Dysplasia (EDA Intron 8)
- Mucopolysaccharidosis Type VII, Sly Syndrome (GUSB Exon 3)
- Polyneuropathy (NDRG1 Exon 4)
- Factor VIII Deficiency, Hemophilia A (F8 Exon 11, Shepherd Variant 1)
- Hyperuricosuria and Hyperuricemia or Urolithiasis (SLC2A9)
- Renal Cystadenocarcinoma and Nodular Dermatofibrosis (RCND) (FLCN Exon 7)
- Degenerative Myelopathy (SOD1A)

FULL TEST PANEL

To help ensure healthy breeds, every test includes analysis of our full panel of over 160 genetic diseases.

Dakota is also clear of 151 other genetic diseases that Embark tests for.