



Results for:

SUMMIT

4 2 5 2 7 1 9

23 FEBRUARY 2018

INSIDE THIS REPORT

We have successfully processed the blood sample for Summit and summarized our findings in this report. Inside, you will find information about your dog's specific genetic markers as well as insights into what kind of breeds make up your dog's ancestry.

Your veterinarian will be able to give you more insight into how these findings impact your dog's health and wellness. Use this report to work closely with your veterinarian to develop an individual health plan.

THIS REPORT INCLUDES:

Genealogy Findings

Breed Characteristics

Genetic Markers / MDR1

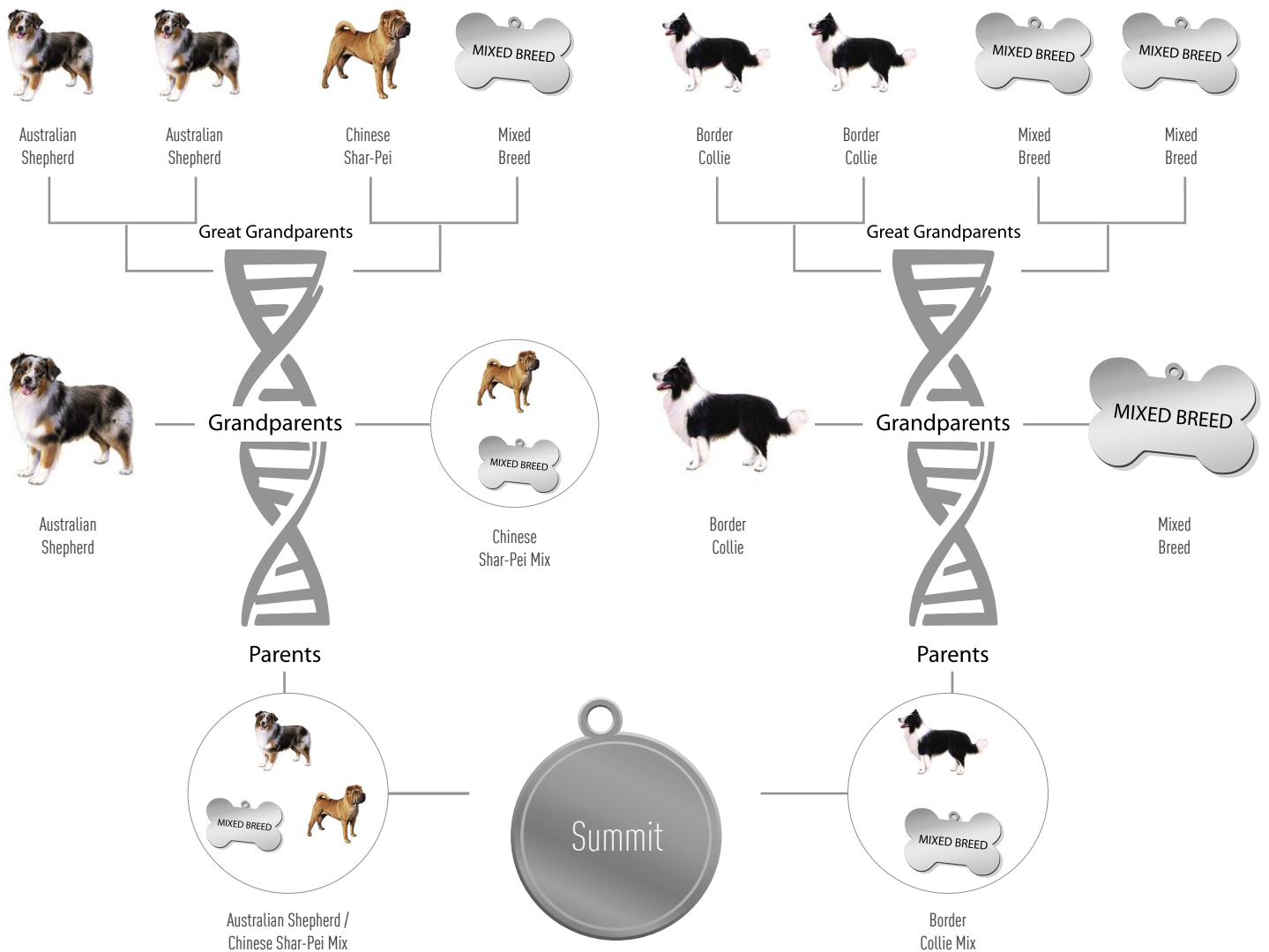
Nutritional Considerations

Genetic Ancestry Certification

GENEALOGY FINDINGS

What breeds make up Summit?

The ROYAL CANIN® Genetic Health Analysis™ completed over 17,000,000 iterations and has typed over 12,000 dogs to determine the most likely combination of breeds that best fit the DNA marker pattern observed in your dog, going back three generations.



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GENEALOGY FINDINGS



What does the Mixed-Breed Ancestry mean for Summit?

A portion of Summit's ancestry was predicted to be mixed beyond three generations. It is difficult to identify strong breed signals in this mixed portion, so we have listed the genetic breed groups with the strongest statistical likelihood below. The genetic breed groups are listed by the relative strength with the most likely at the top of the list.



Description: The herding group is a diverse category. These highly intelligent breeds were developed to guard and control the movement of livestock.

Example Breeds: Australian Cattle Dog, Border Collie, German Shepherd Dog, Great Pyrenees



Description: The Terrier Group ancestors were bred to hunt and kill vermin. They are often characterized as feisty and energetic dogs whose sizes range from fairly small to much larger.

Example Breeds: Russell Terrier, Soft-coated Wheaten Terrier, Standard Schnauzer, Chihuahua, Miniature Pinscher



Description: This group consists of dogs typically bred for the specific purpose of human companionship, and many are popular pets because of their gentle nature. They became more common as the concept and luxury of dogs as pets prevailed.

Example Breeds: Bichon Frise, Pug, Shih Tzu, Keeshond, Pomeranian



Detection Threshold

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BREED CHARACTERISTICS: EXAMPLE

How genetics influence breed appearance and behavior.

This report includes common behavioral and physical traits associated with each of the breeds we've detected in your dog's DNA. But remember, the link between genes and their expression in specific dogs is complex. It's likely that your dog exhibits characteristics of each breed in different ways – some more subtle than others.

An example of breed expression in an individual dog.

We found three primary breeds in our example dog, Frankie. While overall, Frankie is one-of-a-kind, certain aspects of Frankie's behavior and appearance indicate the influence of each of these breeds.



Shetland Sheepdog



Italian Greyhound



Parson Russell Terrier



Feathering

The longer hair on the legs, tail and around the ears, is due to dominant modifier genes available from the Shetland Sheepdog.

White Spotting

This is due to a lack of pigment and is often found in the extremities (feet, chest, face, etc.), but can also extend over more of the body. It can be due to many genes including those found in the three ancestral breeds here.

Brindle Coat Color

The black and tan striping in Frankie's coat is a dominant trait coming from one copy of the brindle gene variant. This is available from the Italian Greyhound, Parson Russell Terrier and Shetland Sheepdog.

Black Pigment

This coloring in the nose, eye rims, lips and pads on the feet is due to one copy of the black gene variant, available from all three ancestral breeds.

Short Hair

This is due to one copy of the gene variant from the Italian Greyhound or the Parson Russell Terrier that is dominant over the long coat gene from the Shetland Sheepdog.

BREED CHARACTERISTICS: SUMMIT

Breed Detected:

Australian Shepherd



Height:

18 - 23 in

Weight (Show):

40 - 60 lb

Weight (Pet):

38 - 66 lb

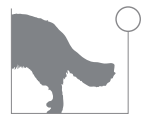
Ears:



Muzzle:



Tail:



The Australian Shepherd was developed to be a working dog, specifically to assist with the herding of animals. The breed was introduced to the United States in the 1800's, accompanying the Basque Shepherds that emigrated from Australia. The origin of the Basques began in the Spanish Styrene's and the breed's ancestry may be traced back to the Spanish Shepherd dogs that lived during the early days of the United State's colonization. The population of the Australian Shepherds rose significantly following World War II and the breed gained popularity due to their role in rodeos, horse shows and growing media attention. The American Kennel Club recognized the Australian Shepherd for registration in the Studbook in 1991.

The Australian Shepherd is more frequently seen with merle markings, though black or red colors are also possible, merle or solid, with or without white markings. Tan points are also seen in some dogs. Shorter coats are seen in working lines.

Do you recognize any of these Australian Shepherd traits in Summit?

- Very intelligent, obedient, active, energetic, and watchful dogs.
- Eager to learn and respond well to reward-based training.
- Australian Shepherds seem to enjoy dog sports such as herding, agility, tracking, flyball, Frisbee, rally and competitive obedience.
- Herding tendencies may lead to chasing cars, herding children, or barking.

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BREED CHARACTERISTICS: SUMMIT

Breed Detected:
Border Collie



Height:

18 - 21 in

Weight (Show):

33 - 44 lb

Weight (Pet):

31 - 53 lb



Ears:



Muzzle:



Tail:



The Border Collie can be traced back to the 1700's where they were traditionally used by shepherds in Scotland and England. They were developed for their herding skills and quickly acquired an excellent reputation. The Border Collie has keen herding instincts and their power over sheep has proven to be an asset to shepherds. In 1894, an effort was made by a farmer named Adam Telfer to tone down the breed's mannerisms. Telfer succeeded and today's Border Collies are descendants of Telfer's dogs. The Border Collie was introduced into the United States in the 1880's, where it played a key role in sheep ranching in the western states. The Border Collie was officially recognized by the American Kennel Club in 1995.

The Border Collie comes in a range of colors which includes solid, bicolor, tricolor, merle (mottled) and sable. The solid colors include black, blue (a shade of gray), gold, brindle (black and brown stripes) and red. The white markings are generally but not always symmetrical.

Do you recognize any of these Border Collie traits in Summit?

- Very intelligent, obedient, active, energetic and watchful dogs.
- Eager to learn and respond well to reward-based training.
- Enjoy activities including agility, flyball, herding, retrieving, Frisbee, rally, and competitive obedience.
- May attempt to herd children and chase moving vehicles; the Border Collie stare may be perceived by other dogs as threatening.

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BREED CHARACTERISTICS: SUMMIT

Breed Detected:

Chinese Shar-Pei



Height:

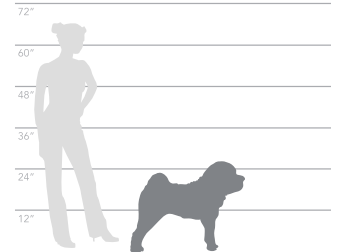
18 - 20 in

Weight (Show):

40 - 60 lb

Weight (Pet):

40 - 68 lb



Ears:



Muzzle:



Tail:



The Shar-Pei is an early breed whose origins date back to the Han Dynasty in Southern China. The first recorded history of the Shar-Pei is in artwork dating back to 200 BC. They were believed to have descended from the Nordic and Mastiff breeds of ages past. Some even believe that the Chow Chow may share some heritage with the Chinese Shar-Pei, due to the breeds' characteristic black tongues. The Shar-Pei was originally bred to be a farming dog, but they were also used to hunt and were sometimes used for dog fighting. The breed faced the threat of extinction when the communist regime in China outlawed them during the revolution. In 1978 it was recognized in the Guinness Book of Records as the rarest dog breed in existence. They were first introduced to the United States in 1966. When an article was published in 1973 asking the United States to assist with the survival of the breed, American breeders responded and the numbers began to rise. Today the Shar Pei, while not exactly common, is no longer in danger of extinction. The American Kennel Club recognized the breed in October of 1991.

The Chinese Shar-Pei can be a range of solid colors including black, white, cream, apricot, brown, red, chocolate, brindle (black and brown striped), and blue (a gray color) with darker shading around the back and muzzle. The muzzle may have a black mask, but the breed always has a blue-black tongue.

Do you recognize any of these Chinese Shar-Pei traits in Summit?

- Intelligent, independent, and alert dogs with a reputation of being loyal to the family.
- Independent spirit but responds well to a reward-based approach to training involving treats or favorite toys.
- Chinese Shar-Pei are moderately active dogs.
- The Chinese Shar-Pei was originally bred for various purposes including the guarding of people and/or property. Individual members of this breed will benefit from firm and dedicated training to temper this guarding tendency, and thus help to maintain safety as a household companion.

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ROYAL CANIN
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MDR1 TEST RESULTS

MDR1 Genetic Screening Results

CONDITION	GENE	MODE OF INHERITANCE	TEST RESULTS
Multidrug Sensitivity	MDR1	Dominant	Normal/Normal

Please be sure to schedule an appointment with your veterinarian to discuss these results; they can help answer any questions you may have regarding the health of your pet.

Test Results Analysis

MDR1 Normal/Normal - Your dog has two copies of the normal MDR1 gene and does not have the MDR1 mutation. If you breed your dog then they cannot pass the MDR1 mutation on to their offspring.

About MDR1

MDR1, or Multidrug Resistance-1 is a genetic mutation found in herding breeds, sighthound breeds and some mixed-breed dogs. All dogs have two copies of this gene, and dogs with mutations in both copies may have side effects or adverse reactions to certain drugs. Even dogs with only one copy of the mutation are more likely to experience side effects or adverse reactions than dogs with two normal MDR1 genes. Therefore, it is critically important to talk about these results with your veterinarian.

Origins of the Test

The discovery of the mutation of the multidrug resistant gene (MDR1) and its effects on multidrug sensitivity in dogs, was made by Washington State University. It is a patent-protected diagnostic test offered by Washington State University that has been licensed to Mars Veterinary for use in the ROYAL CANIN® Genetic Health Analysis™ tests.

Additional Testing

In addition to the MDR1 genetic mutation screen, Summit was also tested for more than 140 other genetic health indicators. We have reported all the genetic marker findings including these MDR1 results to your veterinarian. If you have not already consulted with him or her, please be sure to schedule an appointment to find out more information regarding any potential health conditions and any additional health screenings that may be recommended.

Please keep in mind that this test is not designed to diagnose any medical conditions beyond what is noted here and in your veterinarian's report, but to alert you and your veterinarian of a predisposition your dog may have to certain health issues. The main goal of the Genetic Health Analysis™ is to help you and your veterinarian create a customized health and wellness plan for your dog based on the genetic markers of your dog.

Technology Licensed By



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GENETIC MARKERS

Summit's Health Blueprint

Beyond understanding how your dog's ancestors influence appearance and behavior, the ROYAL CANIN® Genetic Health Analysis™ also identifies genetic markers specific to your dog that can predict the possibility of certain health conditions based on:

- Breed History
- Individual Genetic Makeup

If any of these markers were found, we would have alerted your veterinarian. If you have not already consulted with your veterinarian, be sure to schedule an appointment to find out more information regarding any potential health conditions and any health screenings that may be recommended.

Please keep in mind that this test is not designed to detect diseases, but to alert you and your veterinarian of a predisposition your dog may have to certain diseases and health issues. The main goal of the Genetic Health Analysis™ is to help you and your veterinarian create a custom health and wellness plan for your dog.

NUTRITIONAL CONSIDERATIONS

ROYAL CANIN® has spent over 40 years researching the science of pet nutrition. And now, with the wealth of information from the Genetic Health Analysis™, we're able to use our expertise to provide you with precise nutritional recommendations based on your dog's genetics.

Adult weight:
39 - 62 lbs

Size Category:
Medium

**Age until
Adulthood:**

< 12 months

**Age until
Seniority:**

< 7 years

Summit's Nutritional Needs

As a Puppy: A puppy's natural defenses are not yet fully developed. A diet with antioxidants such as Vitamin E, Vitamin C, Taurine and Lutein can help support a puppy's natural defenses.

Puppies in the medium size category may have ancestors bred for hunting and other high energy activities. It is important to feed your puppy a diet with the appropriate amount of calories for his/her lifestyle in order to maintain a healthy weight.

In addition to size and life stage, Genetic Health Analysis™ also identifies breeds within your dog's family tree. Understanding nutritional needs within the breed makeup could help you and your veterinarian gain insight into selecting the optimal diet for your pet's overall wellness.

Your dog has **Australian Shepherd and Border Collie** in its breed history. If your dog has traits that are similar to any of these breeds, here are some nutritional factors to consider:

- Support healthy digestion with a diet that contains highly digestible proteins, a blend of prebiotic fibers and high quality carbohydrates
- Support a healthy skin and coat with a diet that includes EPA, DHA, and omega-6 fatty acids
- Help maintain a healthy weight through a balanced diet that contains the optimal amount of calories to fit the dog's lifestyle and activity needs
- Help support healthy joints by selecting a diet with omega-3 fatty acids, glucosamine and chondroitin

Please remember that the nutritional considerations in this report are only a guide. Every dog is unique and has nutritional needs based on multiple factors including medical history, environment, lifestyle, and life stage. It is very important that you consult your veterinarian for a precise diet recommendation.

ANALYSIS SUMMARY

How Genetic Health Analysis works

The process started when you sent a sample to our laboratory, where the DNA was extracted from the cells and examined for over 3000 markers that are used in the test. The results for these markers were sent to a computer that evaluated them using a program designed to consider all of the pedigree trees that are possible in the last three generations. The trees considered include a simple pedigree with a single breed (a likely pure breed dog), two different breeds at the parental level (a first-generation cross), all the way up to a complex tree with eight different great-grandparent breeds allowed.

Our computer used information for over 250 breeds, varieties, and types from our breed database to fill these potential pedigrees. For each of the millions of combinations of ancestry trees built and considered, the computer gave each a score representing how well that selected combination of breeds matched to your dog's data. The pedigree with the overall best score is the one which is shown on the ancestry chart. Only breeds that reached our set confidence threshold for reporting are reported in the ancestry chart.

Each dog is unique and their physical and behavioral traits will be the result of multiple factors, including genetics, training, handling, and environment. ROYAL CANIN®'s proprietary Genetic Health Analysis™ provides insight into the behavioral traits in breeds that have been identified in your dog, the predicted genetic adult weight range and breed-related risks of developing certain genetic diseases. A dog's weight range can vary significantly depending on age, diet and exercise. Genetic Health Analysis™ is not intended to diagnose diseases or predict behavior in any particular dog.

In the unlikely event that it is not possible to determine breed history, predicted adult weight range or breed-related health risks, or if an error in the analysis occurs, liability by ROYAL CANIN® or related companies and individuals is disclaimed and damages in any event are limited to the payment actually received by ROYAL CANIN® for the individual specified analysis at issue.

Genetic Health Analysis™ is designed and intended to be used solely to identify the genetic history of your dog's recent ancestry and no other purpose is intended, authorized or permitted.

All dogs should be considered individual animals. Because each dog is a product of its unique environment and handling, it may exhibit different traits and behaviors than those listed on the breed detail pages provided in the final results. The descriptions of the individual breeds provided by ROYAL CANIN® Genetic Health Analysis™ on these pages are intended to be general in nature. They are not intended to be all-inclusive or definitive and may or may not reflect the natural temperament of your dog.

Many countries and provinces have breed-specific ordinances and laws that may require special handling or prohibit the ownership of some dogs with a particular breed in their genetic background. Genetic Health Analysis™ is not intended to be used by regulatory or animal control officials to determine whether a particular breed is legislated or banned in a particular community. Nor is Genetic Health Analysis™ intended to be used in any judicial proceedings. Rather, it is intended to be used as a tool or resource in determining a dog's genetic history. Neither ROYAL CANIN® nor any related company is responsible for compliance or notification regarding these matters.

ROYAL CANIN® continues to study the complexities of the canine genome, with the goal of continuing to add breeds and the ability to detect additional breed-related disease conditions to Genetic Health Analysis™ in the future.

If you have any questions about the results, please contact Technical Services at 1.800.592.6687.

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WE HEREBY CERTIFY THAT

SUMMIT

IS GENETICALLY COMPOSED OF THE FOLLOWING CANINE BREEDS:



Australian Shepherd



Border Collie



Chinese Shar-Pei



Mixed Breed

AS DETERMINED BY A ROYAL CANIN® GENETIC ANALYSIS OF OVER 3000 UNIQUE DNA MARKERS AND A PROPRIETARY BREED DETECTION ALGORITHM EXAMINING THE LAST THREE GENERATIONS OF ANCESTRY.

SIGNED: *Cynthia Cole*
Cynthia Cole, DVM, PhD, DACVP
Mars Veterinary

ON THIS 23RD DAY OF FEBRUARY IN THE YEAR 2018