ROYAL CANIN®

GENETIC HEALTH Analysis™

Results for:

HABIBI

4240339

30 MARCH 2017

INSIDE THIS REPORT

We have successfully processed the blood sample for Habibi 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

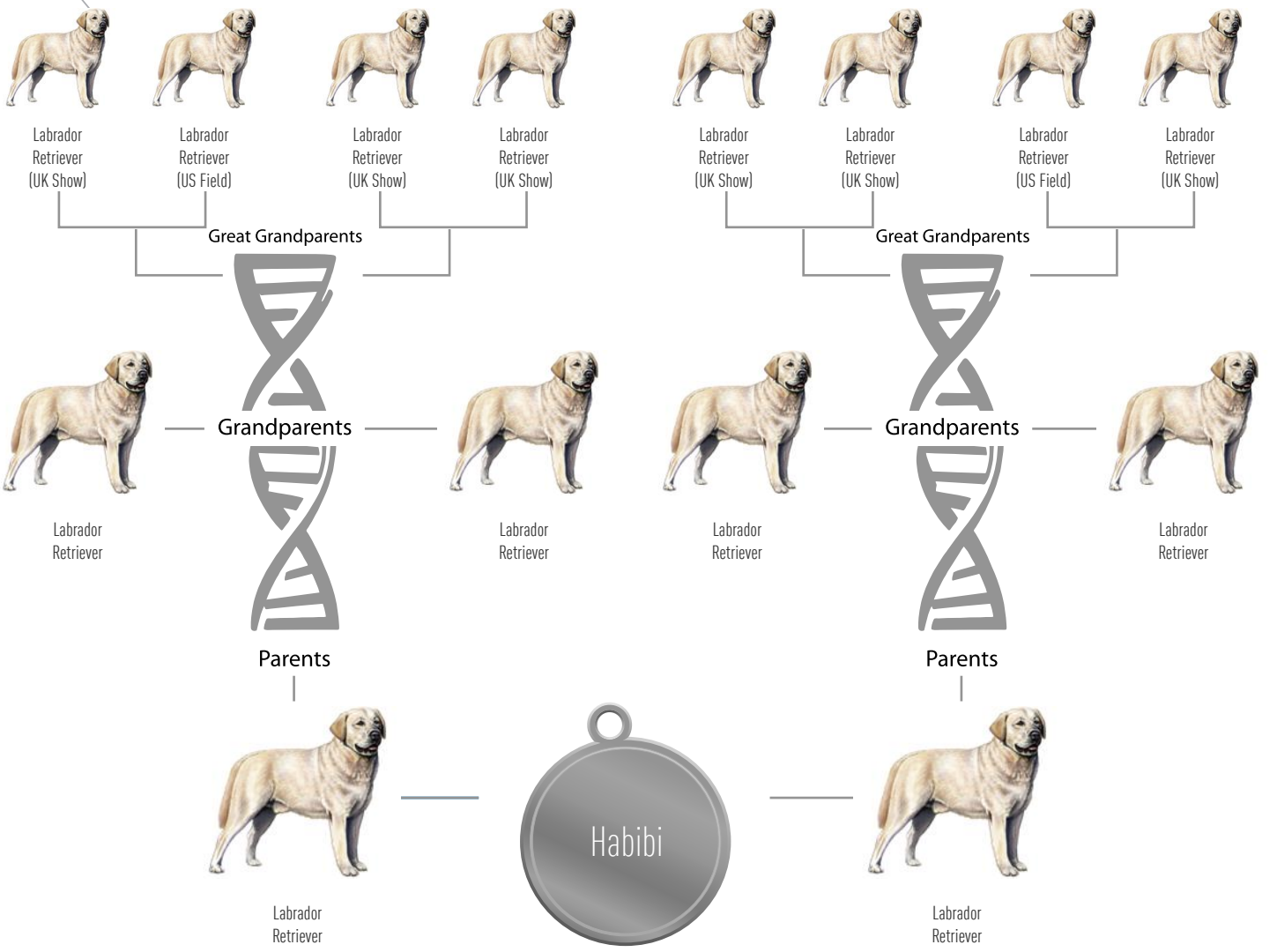
Nutritional Considerations

Genetic Ancestry Certification

GENEALOGY FINDINGS

What breeds make up Habibi?

The chart below summarizes the predicted last three generations of Habibi's ancestry based on the Wisdom Panel ancestry analyses performed on Habibi's DNA data. The data supports the observation that Habibi's genetic profile matches that of a purebred Labrador Retriever.



While the ROYAL CANIN® Genetic Health Analysis™ is not designed as a pure breed test our results indicate that the recent ancestry of Habibi only includes **Labrador Retriever**.

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.

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.

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.

BREED CHARACTERISTICS: HABIBI

Breed Detected:

Labrador Retriever

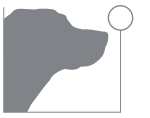
Height:
21 - 24 in

Weight (Show):
55 - 66 lb

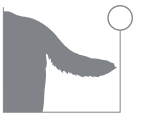
Weight (Pet):
49 - 77 lb

Ears:

Muzzle:



Tail:



The Labrador Retriever can trace its roots to the coast of Newfoundland, Canada. The breed dates back to at least the seventeenth century when they were known as the "Lesser Newfoundland." The breed is believed to have descended from the extinct "St. John's Water Dog" which was a cross between native water dogs and the Newfoundland. Labrador Retrievers were initially trained to retrieve fishing nets from the cold waters of the North Atlantic. Fisherman brought them to England in the nineteenth century where they were lauded for their swimming, retrieving and hunting skills. The Earl of Malmesbury is believed to have coined the name Labrador in order to differentiate them from their Newfoundland ancestors. During the 1800's, a heavy dog tax in Canada and quarantine laws in Britain drastically cut the number of Labradors in the U.K., but a good breeding program replenished the stock. Labrador Retrievers were recognized by the American Kennel Club in 1917.

The Labrador Retriever comes in solid black, chocolate, and yellow. The yellow varies from a pale cream to a rich red fox color. Some Labradors also have white chest blazes. The Dudley variant is where the nose is pink, though this is quite rare. Non-AKC registries sometimes recognize a Silver Variant though this may be classed as chocolate by the AKC.

Do you recognize any of these Labrador Retriever traits in Habibi?

- ○ Usually happy-go-lucky, calm, or easygoing dogs, though some may be energetic.
- ○ Usually friendly and are generally good family dogs.
- ○ Labrador Retrievers enjoy dog sports such as agility, hunting, tracking, rally and competitive obedience; retrieving and swimming.
- ○ Quite food motivated, which may make it easier to teach the Labrador Retriever to drop retrieved items not intended for play.

MDR1 TEST RESULTS

MDR1 Genetic Screening Results

CONDITION	GENE	MODE OF INHERITANCE	TEST RESULTS
Multi-Drug 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 Multi-Drug 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 multi-drug 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, Habibi 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

WASHINGTON STATE UNIVERSITY

GENETIC MARKERS

Habibi'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 your 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:
49 - 76 lbs

Size Category:
Large

Age until Adulthood:
< 15 months

Age until Seniority:
< 5 years

Habibi's Nutritional Needs

As an Adult: Digestive health is typically an important factor in overall health maintenance for adults in the large size category. A balanced diet with highly digestible proteins and a blend of prebiotic fibers can help maintain good stool quality.

Large dogs exert a great deal of stress on their joints. A diet with glucosamine, chondroitin and rich in omega-3 fatty acids (preferably from fish)can improve his/her joint health.

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 **Labrador Retriever** in its breed history. If your dog has traits that are similar to this breed, 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 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.

ROYAL CANIN

GENETIC HEALTH Analysis™

WE HEREBY CERTIFY THAT

HABIBI

IS GENETICALLY COMPOSED OF THE FOLLOWING CANINE BREEDS:

Labrador Retriever

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 DR. Cynthia Cole, R D Director DVM, PhD, DACVCP

ON THIS 30TH DAY OF MARCH IN THE YEAR 2017