



January 5, 2021

Dear Southern,

Following is Black Justice's ROYAL CANIN® Genetic Health Analysis™ report for your review.

Our analysis of the DNA extracted from the provided sample indicates that it was analyzed previously by another test powered by Wisdom Panel®. We wanted to alert you to this and inform you that the results of the second analysis may, in some circumstances, differ from the first analysis carried out on Black Justice's DNA. The reasons why this can occur are outlined below.

First, we periodically make upgrades to our breed database to incorporate new breeds and expand coverage of our existing breed signatures. We also update the computer program that analyses your dog's DNA and predicts the best model of your dog's breed ancestry. Additionally, in an effort towards continuous improvement, in late 2015, most products powered by Wisdom Panel® have undergone a significant upgrade to a new technology platform that analyzes substantially more data. Given the extensive improvements, results may come back noticeably different.

Another potential reason for observing minor differences is driven by the possibility of a small variation in the laboratory analysis. When a sample is repeatedly tested with our marker panel, run-by-run fluctuations in the number of successfully returned markers can occur. While this is not usually sufficient to alter the range of breeds detected in the analysis, occasionally differences, particularly in the breeds detected at our lowest confidence category, may be seen.

Should you have any questions or concerns about your Genetic Health Analysis™ result, please contact us at **1-800-592-6687** or **info.usa@royalcanin.com**, where we will be able to answer any further questions.

Best wishes,

The ROYAL CANIN® Genetic Health Analysis™ Team



Results for:

BLACK JUSTICE



5 JANUARY 2021

INSIDE THIS REPORT



We have successfully processed the blood sample for Black Justice 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

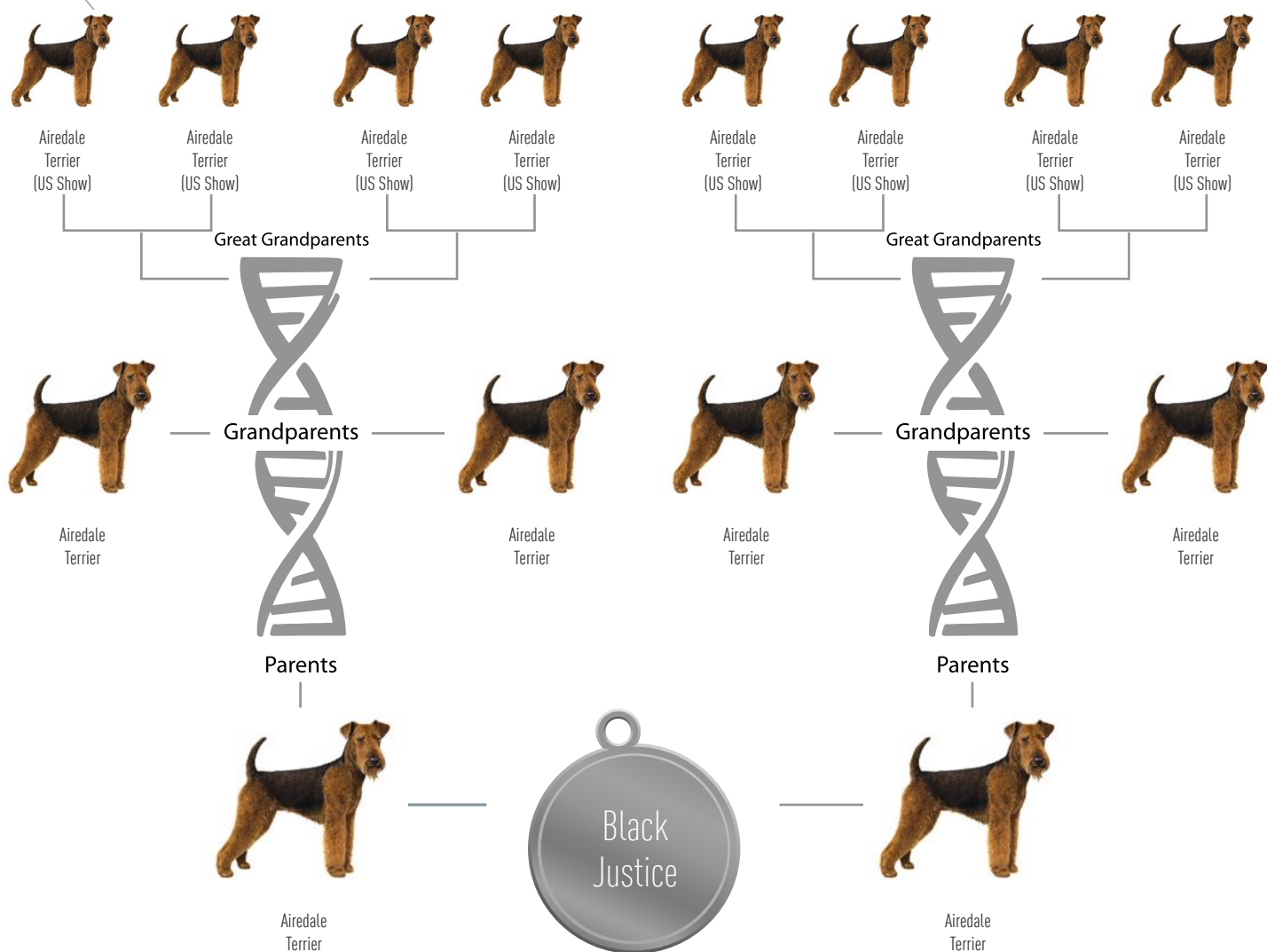
Nutritional Considerations

Genetic Ancestry Certification

GENEALOGY FINDINGS

What breeds make up Black Justice?

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



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

BLACK JUSTICE

ROYAL CANIN
GENETIC HEALTH
Analysis

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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.



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.

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: BLACK JUSTICE

Breed Detected:

Airedale Terrier



Height:

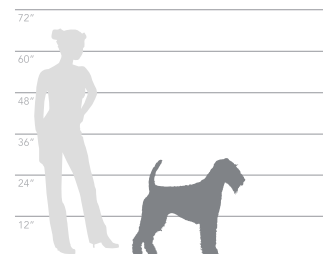
22 - 24 in

Weight (Show):

40 - 65 lb

Weight (Pet):

36 - 67 lb



Ears:



Muzzle:



Tail:



Airedale Terriers originated from eighteenth century Yorkshire, England in the regions of Airedale and Wharfedale. They are believed to be the descendants of the Old English Black-and-Tan Terrier, the Broken-Coated Working Terrier and the Rough-Coated Black-and-Tan Terrier. The breed was originally developed to guard against vermin, such as mice and rats. In 1853, Otterhounds were crossed with the Airedale Terriers, giving the breed an increased ability to swim, a better sense of smell and a larger size, making them suitable for the hunting of larger game. Airedale Terriers haven't always been known by their current name. In the early years of the breed's development they were referred to as Working Terriers and Waterside Terriers. The Airedale Terrier is known for its excellent gundog and retrieving skills and has been used in police and military work. The breed was officially recognized by the English Kennel Club in 1886 and by the American Kennel Club in 1888.

The DNA detected from this breed is most similar to DNA sampled from American Kennel Club registered dogs.

The Airedale Terrier comes in black and tan or grizzle and tan (a scattering of black hairs over the tan). The coat is dense and wiry. A small white chest blaze is also possible in this breed.

Do you recognize any of these Airedale Terrier traits in Black Justice?

☐ Energetic, intelligent, independent, and clownish. Can be stubborn or protective.

☐ Close supervision needed around children because their exuberance may lead to accidental injury; also may not get along well with other dogs.

☐ Enjoy sports such as retrieving, flyball, Frisbee, hunt and field trials, herding, sledding, carting, agility, tracking, and rally and competitive obedience.

☐ Reward-based training may be useful in reducing stubborn tendencies such as chasing wildlife, refusing to disengage from an activity, or digging.

BLACK JUSTICE

ROYAL CANIN
GENETIC HEALTH
Analysis

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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 Wisdom Health for use in the ROYAL CANIN® Genetic Health Analysis™ tests.

Additional Testing

In addition to the MDR1 genetic mutation screen, Black Justice 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



BLACK JUSTICE



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GENETIC MARKERS

Black Justice'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:
38 - 65 lbs

Size Category:
Medium

**Age until
Adulthood:**
< 12 months

**Age until
Seniority:**
< 7 years

Black Justice's Nutritional Needs

As an Adult: Many medium-sized dogs have sporting breeds in their ancestry that were bred to be active. The number of calories within their daily diet should be adapted to their exercise level in order to maintain a healthy weight.

Your medium dog may put a lot of stress on his joints while at play. A diet with glucosamine, chondroitin and rich in omega-3 fatty acids can improve his 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 **Airedale Terrier** 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 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.

WE HEREBY CERTIFY THAT

BLACK JUSTICE

IS GENETICALLY COMPOSED OF THE FOLLOWING CANINE BREEDS:



Airedale Terrier

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
Wisdom Health

ON THIS 5TH DAY OF JANUARY IN THE YEAR 2021