

Wisdom Panel™ Results

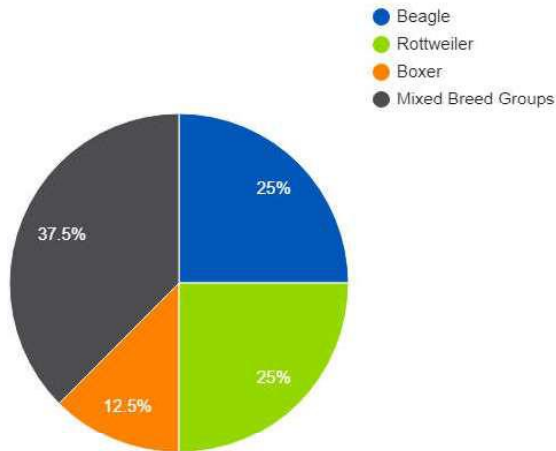
Lulu's Results Are In!



Lulu's Unique Genetic Signature

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AGTGGGTCTTTAGGAATTCGGTTGGGGCGTGAAACAGAGTTTGCCAGTTT  
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TCCCTGCCAGGCTCCCTGTTCTTAGAGTGAATCAGGGTCTCCAGCCAGTT  
TCGGTGAACCGGAGGCAAGGAAGGTTAAGGAGGGACAGAGAGAGCCAAA  
GCCAAAGCCAGACGGAAGTCTCAATGGGTCTCAGACTCGGCCAG
```

This is a portion of the code—or "fingerprint"—from your dog's DNA that we use as a unique identifier.



How did we get these percentages?

Once your sample is received at our lab it is scanned into our database and assigned to a batch for testing. It then undergoes processing to extract the DNA from your dog's cells, which is examined for the 1800 markers that are used in the tests. The results of these markers are sent to a computer that evaluates them using an algorithm designed to consider all of the pedigree trees that are possible in the last three generations for your dog. Our computer algorithm uses information from our extensive breed database of more than 12,000 samples to analyze these potential pedigrees and determine which one is the best fit.

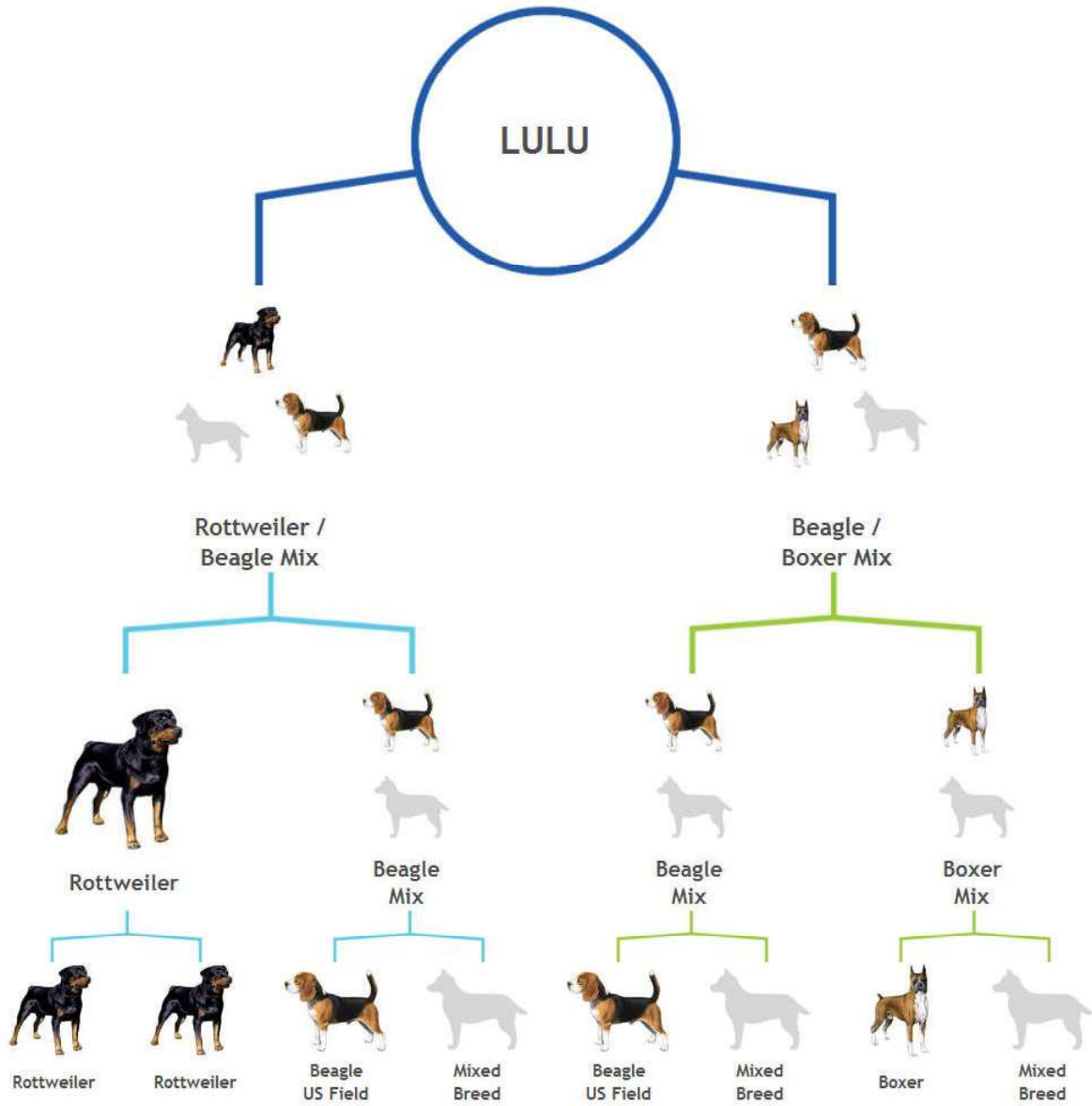
The computer algorithm gives each of the 18,000,000+ combinations of ancestry trees built and considered, a score representing how well that selected combination of breeds matches your dog's data. The pedigree with the overall best score is selected and provided to you in your dog's individualized report. It normally takes 2-3 weeks from the time a sample is received for the genetic testing and analysis to be completed.

In addition, the **Wisdom Panel** 2.5, 3.0 and 4.0 versions screen for the MDR1 genetic mutation that affects drug sensitivity. This mutation in the MDR1 or Multi-Drug Resistance 1 gene is found in many of the herding breeds. The MDR1 gene is responsible for production of a protein called P-glycoprotein. The P-glycoprotein molecule is a drug transport pump that plays an important role in limiting drug absorption and distribution (particularly to the brain) and enhancing the excretion of many drugs used in dogs. As a result, dogs with this mutation may have adverse reactions to some common drugs, so it is important to test your dog and share your results with your veterinarian so they can provide you with the best possible care.

Wisdom Panel 4.0 also screens for Exercise-induced Collapse (EIC) and specific phenotypic traits (visual characteristics of the dog). EIC is most commonly found in some retrieving breeds or mixed-breed dogs with retrieving ancestry and is an inherited disorder of nerve and muscle that was first identified in Labrador Retrievers. It is caused by a mutation in the DNM1 gene, and is characterized by exercise intolerance in otherwise normal dogs. You will want to make sure to share these results with your veterinarian so they can update your dog's records. They may be critical to the care and everyday health of your dog.

Breed Percentages

The **Wisdom Panel** computer algorithm performed over 18 million calculations using 11 different models (from a single breed to complex combinations of breeds) to predict the most likely combination of pure and mixed-breed dogs in the last three ancestral generations that best fit the DNA marker pattern observed in Lulu. Here you will find the results of these calculations. To view more about the breed(s) found in your dog, click on the individual breed name(s) next to the pie chart. You can also continue onto the next page to see this same information in ancestry tree format.



Beagle



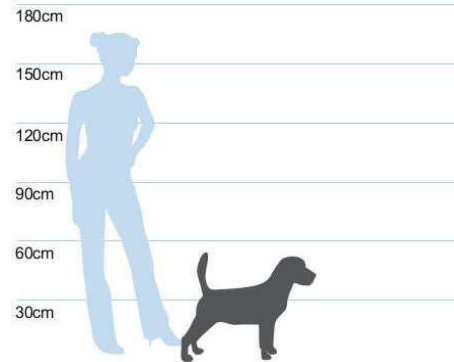
Description

The Beagle is a long-established breed, descending from the Foxhound, the Harrier and the Kerry Beagle. They were most commonly used for hunting hare, quail and pheasant, although nowadays they also make excellent family dogs and have even been used in police work. The origin of the Beagle's name is debated. Some people believe the name derives from the Celtic word "beag," which means "small" or from the French word "begle," which means "useless" or "of little value." The Beagle was introduced to the United States in the 1860's and the breed was officially recognized by the American Kenne Club in 1885.

- Happy or gentle nature, and usually friendly dogs; although some have high energy levels.
- Beagles seem to enjoy dog sports such as tracking, hunting, agility, rally and competitive obedience.
- Respond well to reward-based training involving treats or favorite toys.
- Chasing wildlife or barking may impair bonding.

All dogs should be considered individual animals. Because each is a product of their unique environment and handling, they may exhibit different traits and behaviors than those listed here.

Appearance



Height: 33 - 41 cm

Weight (Show): 9 - 14 kg

Weight (Pet): 7 - 17 kg

Ear



Muzzle



Tail





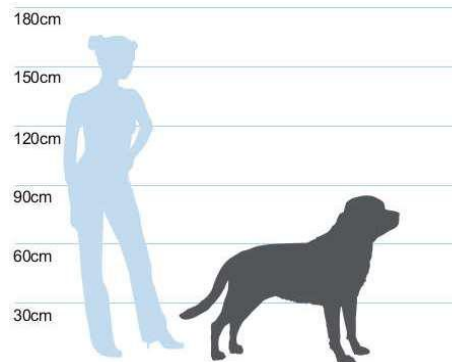
Description

Rottweilers are an ancient breed, dating all the way back to the early Roman Empire. Roman troops were accompanied on their travels by the Roman cattle dogs, which helped herd the cattle that would later serve as food for the soldiers. The travels of the Roman armies took them through Europe and Germany, and specifically the town of Rottweil. This eventually became a cattle area and the descendants of the Roman cattle dogs were used to protect the herds. Rottweilers made excellent working dogs and were used to pull carts as well as herd and protect. They were also known for their ability to hunt boar. By the end of the nineteenth century, the breed was virtually extinct to the point of there being only one female left in the entire town of Rottweil. Before World War I police dogs were needed, and the Rottweiler was chosen for the task due to their strength, intelligence and ability to follow directions. The first Rottweiler club was founded in Germany in 1907 and Rottweilers were saved from extinction.

- Calm, intelligent, and hard working dogs.
- Rottweilers enjoy dog sports such as agility, tracking, herding, and obedience.
- Because they are sensitive, they respond best to reward-based training using treats or favorite toys.
- The Rottweiler 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.

All dogs should be considered individual animals. Because each is a product of their unique environment and handling, they may exhibit different traits and behaviors than those listed here.

Appearance



Height: 58 - 69 cm

Weight (Show): 38 - 54 kg

Weight (Pet): 33 - 60 kg

Ear

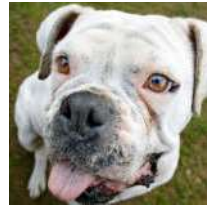


Muzzle



Tail





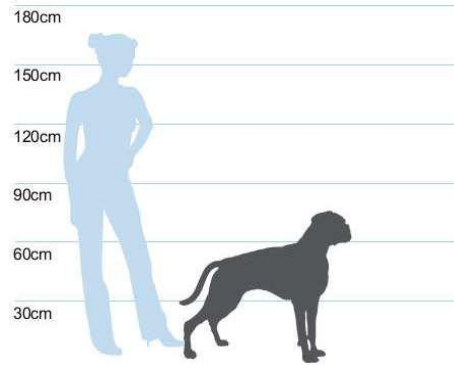
Description

The history of the Boxer dates back to nineteenth century Germany, where they were used for hunting deer and boar. The ancestors of the Boxer include the Bullenbeiszer and the Barenbeiszer, which are now both extinct. The crossing of those breeds with the English Bulldogs of the 1830's resulted in the Boxer as we know it today. Boxers were bred to be hunting dogs and they earned their name from the "boxing" pose they are known to take when standing on their hind legs. Later in the breed's development, it was made apparent that they were also well-suited for herding and the Boxer was used in more than a few circus acts due to its ability to learn tricks quickly and perform them on command. The popularity of Boxers started to increase rapidly in the 1860's when the German Boxer Klub was founded. It is a very popular breed in many countries of the world today.

- Intelligent, hard working, and playful dogs, with a high amount of energy.
- Boxers seem to enjoy dog sports such as agility, flyball, rally and competitive obedience.
- Eager to learn and respond well to reward-based training using treats and favorite toys.
- Tendency to jump up on people, sometimes boxing with their front feet when doing so.

All dogs should be considered individual animals. Because each is a product of their unique environment and handling, they may exhibit different traits and behaviors than those listed here.

Appearance



Height: 53 - 64 cm

Weight (Show): 25 - 30 kg

Weight (Pet): 22 - 35 kg

Ear



Muzzle



Tail



What does Mixed-breed or “Groups” mean for Lulu?

A portion of Lulu’s ancestry was predicted to be mixed beyond the three generations we test for. We were unable to identify strong individual breed signals in this mixed portion, so we have listed the genetic breed groups with the strongest statistical likelihood below. The breed groups themselves are listed in order of strength in the results with the most likely at the top of the list. The breeds listed within are examples of breeds in each of these groups.

Guard Group



Dogs of the Guard Group were bred to guard people and property. They are often quick to learn and these intelligent, capable animals make solid companions.

Example of Guard Group breeds:

- Boston Terrier
 - Boxer
 - Great Dane
 - American Staffordshire Terrier
-

Herding Group



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

Example of Herding Group breeds:

- Australian Cattle Dog
 - Border Collie
 - German Shepherd Dog
 - Great Pyrenees
-

Terrier Group



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 of Terrier Group breeds:

- Chihuahua
 - Soft-coated Wheaten Terrier
 - Standard Schnauzer
 - Russell Terrier
 - Miniature Pinscher
-

Mountain dogs Group



This genetic group was bred for hard work in mountainous regions. Characterized by their thick coats and sturdy, larger builds they quickly became the invaluable working companions of people in endurance activities such as drafting and hauling.

Example of Mountain dogs Group breeds:

- Bernese Mountain Dog
 - Saint Bernard
 - Leonberger
 - Newfoundland
-

Sporting Group



The sporting group breeds are incredibly diverse in personality and appearance, but can be characterized as very sturdy. They were developed to work closely with people and in general have a very responsive nature and high intelligence.

Example of Sporting Group breeds:

- Cocker Spaniel
 - Golden Retriever
 - Poodle
 - Weimaraner
-



STATEMENT OF AUTHENTICATION

Owner's name: **Peter Smith**

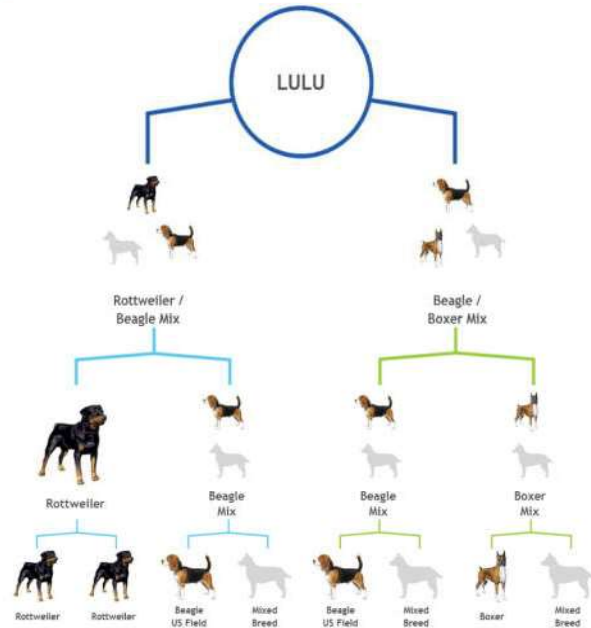
Dog's name: **Lulu**

Date: **May 17, 2017**

This certifies the authenticity of Lulu's canine genetic background as determined following careful analysis of more than 1800 genetic markers using **Wisdom Panel**. The purebred dog breed signature matches included in this analysis are those that were detected in the last three generations of Lulu's ancestry using the proprietary breed detection algorithm at Mars Veterinary.

Cynthia Cole

Dr. Cynthia Cole DVM, PhD, DACVCP
Research & Development Director



Multidrug Sensitivity

Lulu's MDR1 test results are **normal/normal** meaning there is no sign of the MDR1 genetic mutation.

You will want to make sure to share these results with your veterinarian so they can update Lulu's records. They may be critical to the care of your dog.

MDR1 Screening Results

- *Condition:* Multi-Drug Sensitivity
- *Mode of Inheritance:* Dominant
- *Test Results:* **Normal/Normal**

Test Results Analysis

MDR1 Normal/Normal - these dogs have 2 copies of the normal MDR1 gene and do not have the MDR1 mutation. They will not pass on the mutation to their offspring. These dogs are not at increased risk for experiencing side effects from drugs that are pumped by P-glycoprotein.

Technology Licensed By



What is MDR1?

MDR-1, or Multi-Drug Resistance-1 is a genetic mutation found in many of the herding breeds, some sighthound breeds and many mixed breed dogs. The MDR-1 gene is responsible for production of P-glycoprotein, which is a transport pump that plays an important role in limiting drug absorption and distribution (particularly to the brain), and in enhancing the excretion of many drugs used in dogs.

Some dogs, particularly herding breeds or mixed-breed dogs with herding breed ancestry have a mutation in the MDR-1 gene that makes them defective in their ability to limit drug absorption and distribution. These dogs are also slower to eliminate drugs from the body that are that are normally transported by P-glycoprotein. All dogs have two copies of this gene, and dogs with mutations in both copies will be much more sensitive to many commonly used drugs. Even dogs with only one copy of the mutation, however, are more sensitive to drugs than dogs with two normal MDR1 genes. Therefore, it is important to test your dog and share your results with your veterinarian so they can provide your dog with the best possible care.

Commonly Affected Breeds

- Australian Shepherd 50%
- Australian Shepherd, Mini 50%
- Border Collie < 5%
- Collie 70%
- English Shepherd 15%
- German Shepherd 10%
- Herding Breed Cross 10%
- Long-haired Whippet 65%
- McNab 30%
- Mixed Breed 5%
- Old English Sheepdog 5%
- Shetland Sheepdog 15%
- Silken Windhound 30%

Adult Weight

One of the main questions people ask when adopting a mixed-breed puppy is "What size will my puppy grow up to be?" To help answer this question we've developed a proprietary algorithm that uses the breeds identified on each chromosome in a mixed-breed dog to predict the likely size range a puppy will develop into when fully mature. For adult dogs this weight prediction along with recommendations from your veterinarian can be used to maintain a healthy weight for your dog.

Lulu's predicted adult weight is:

- **Between 28 - 42 kg**

How is Weight Calculated?

Our weight-predictive algorithm has been developed and calibrated using a combination of important elements:

- The published weight ranges of more than 200 purebred dog breeds.
- The observed weights of more than 100,000 client-owned purebred dogs, each with an ideal Body Condition Score.
- Dog breeds identified by Wisdom Panel that reflects a dog's true heritage and genetic complexity.
- A genetic algorithm developed and optimized using observed mixed-breed dog data that serves to weight the real contribution of each set of chromosomal genetic markers to the final predicted weight of an adult dog.
- The observed weights of over 800 mixed-breed dogs of varied backgrounds.

Environmental Effects on Weight

A dog's early life is extremely important in determining its overall growth potential and final adult weight. Some key factors that can decrease a dog's weight from the expected include:

- Nutrition of dam (mom) during pregnancy and nursing
- Nutrition of puppy in critical first year during period of rapid growth and development
- Illness/disease
- Heavy parasite load either internal (eg. roundworms) OR external (eg. fleas, ticks)

Differences in Body Weight

We've factored everything we know about Lulu in predicting a healthy adult weight. However there are several other factors that can play an important role. Through the use of your report information and by working with your veterinarian you can help your dog reach and/or maintain a healthy adult body weight.



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