Congratulations!

Buddy is a Golden Retriever, Labrador Retriever Cross

In the following pages, you will learn about:

- **KEY BREEDS DETECTED**
- **KEY BREED HISTORY, APPEARANCE, AND BEHAVIOR**
- **HOW KEY PHYSICAL TRAITS ARE INHERITED**
- **OTHER POSSIBLE MIXED BREED SIGNATURES**
- **PREDICTED WEIGHT**
- **HOW TO UPLOAD A PHOTO AND SHARE YOUR STORY**
- **ADDITIONAL INFORMATION**
April 19, 2013

Dear Pete,

As part of the Wisdom Panel® Insights™ analysis, we have considered if Buddy appears to match the profile of a first generation (F1) cross using a variety of analyses, and Buddy’s results are indeed consistent with a first-generation F1 cross between a Golden Retriever and Labrador Retriever.

This is due to the following observed results:

• In a Principle Component Analysis (PCA), Buddy’s DNA sample appears within the expected F1 cluster between Golden Retriever and Labrador Retriever.

• In a PCA, Buddy’s DNA sample appears within the expected F1 cluster between Golden Retriever and Labrador Retriever when compared to an outgroup.

• Both Golden Retriever and Labrador Retriever were detected in a Wisdom Panel ancestry analysis that statistically indicated a likely first-generation F1 cross between the two breeds.

• Using a population genetic analysis program (Structure) to analyse the sample in relation to Golden Retriever and Labrador Retriever, the sample appeared to be an even mix of the two breeds.

• The observed homozygosity of Buddy’s DNA data is within the expected range for a first-generation F1 cross between Golden Retriever and Labrador Retriever.

A more detailed explanation of the specific tests performed on Buddy’s DNA data are explained in the Further Analysis section at the end of the report.

If you have any questions about the information enclosed, please contact our customer care team at customercare@marsveterinary.com.

Regards,

DR. NEALE FRETWELL
Research & Development Director
YOU HAVE A GOLDEN RETRIEVER, LABRADOR RETRIEVER CROSS

The Wisdom Panel® Insights™ computer algorithm performed over seven 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 3 ancestral generations that best fit the DNA marker pattern observed in Buddy. The ancestry chart depicting the best statistical result of this analysis is shown in the picture below.

Learn more about the Breeds detected in Buddy on the following pages...
Golden Retrievers are very popular dogs that can trace their lineage back to nineteenth century Scotland. They were bred as hunting dogs, used to locate and retrieve game from land and water. Initial efforts to breed the Golden Retriever were conducted by Sir Dudley Majoribanks, Lord of Tweedmouth, who spent twenty years secretly developing the breed. He began with a yellow dog from Brighton and an English retriever with a liver-colored curly coat called a Tweedwater Spaniel, now extinct. He later introduced Labrador Retrievers, Newfoundlands, Red Setters and Bloodhounds into the mix. The breed was accepted by the Kennel Club of England in 1903 as the “Golden Flat Coat” and they were first shown in an English dog show in 1908. Golden Retrievers were introduced to the United States in the late 1890’s and the name Golden Retriever was given to them in 1920. The American Kennel Club recognized the breed in 1925.

Golden Retrievers, like their name suggests are generally a rich golden color, which ranges from a light gold to a darker reddish gold. The coat and tail is feathered with paler creams though the dog is never white. The coat is dense enough to be textured though is neither short nor especially long.

DO YOU RECOGNIZE ANY OF THESE GOLDEN RETRIEVER TRAITS IN BUDDY?

- Happy-go-lucky, calm, or easy-going dogs, although some can be energetic or nervous.
- Enjoys sports such as hunting, tracking, agility and retrieving items such as floating toys that use the breed’s swimming ability.
- Usually friendly and are generally good family dogs.
- Quite food motivated, which may make it easier to teach the Golden Retriever to drop retrieved items not intended for play.
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 BUDDY?**

- 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.
THE INFLUENCE OF BREEDS ON APPEARANCE

This report reveals the breeds detected in your dog’s DNA. It also includes checklists of physical traits associated with these breeds. Breeds can combine their influences in countless, fascinating ways. It’s a unique combination that makes your dog one-of-a-kind.

Your dog may behave like - or strongly resemble - just one of the breeds in its makeup, but - much more commonly - your dog’s looks and personality will blend aspects of these breeds. Consider the example below...

In this example, you can see how many of Tula’s physical traits are due to a blending of breed influences.

YELLOW COAT
COLOR
requires two copies of a gene variant and is available from the Labrador Retriever, Poodle, and Golden Retriever.

BLACK NOSE
eyerims, lips, and pads on her feet are all due to one copy of the black gene variant that is available from all three ancestral breeds.

SOFT CURL
is coming from one copy of the curly gene variant from the Poodle and one copy of the straight variant from the Golden Retriever parent.

FURNISHINGS
- the “beard” and “eyebrows” - is due to one copy of the furnishing gene variant from the Poodle.

SHORT HAIR
is due to one copy of one gene variant from the Labrador Retriever that is dominant to the long coat of the Golden Retriever and Poodle.

Wisdom Panel® Insights™ found these breeds in our example dog Tula:

- Golden Retriever
- Labrador Retriever
- Standard Poodle

For additional information, watch an illustrative video at http://youtu.be/UAcPOch4-C8 - it provides educational content around canine DNA, the basic blueprint for life, and a closer look at inherited genes.
Comparison against a predicted F1 cross between Golden Retriever and Labrador Retriever, and your dog Buddy

PCA Analysis of Buddy’s DNA sample and samples of Golden Retriever and Labrador Retriever from the Wisdom Panel database:

Principle Component Analysis (PCA) allows us to see how similar samples are. Closely related samples, like dogs from the same breed, will be expected to be closer together than samples from other breeds. This tends to create a cluster of points for each breed or sub-population within a breed. If a sample is a direct cross between two breeds, it generally lies in-between the two parental breed clusters, and we have created an “Expected F1 Cluster” to illustrate where we would expect these first-generation F1 crosses to be situated. The PCA below shows Buddy’s DNA data as well as Golden Retriever and Labrador Retriever samples from the Wisdom Panel database. Buddy’s DNA sample falls within the Expected F1 Cluster, in-between the Golden Retriever and Labrador Retriever clusters. This is where we would expect to find a first generation (F1) cross.

PCA Analysis of Golden Retriever and Labrador Retriever as well as an All Breeds Outgroup:

The PCA below shows Buddy’s DNA data as well as samples for Golden Retriever and Labrador Retriever, as well as an outgroup that contains a single representative sample from all the other breeds in the Wisdom Panel database (All Breeds Outgroup). We have also shown an “Expected F1 Cluster” to illustrate where a first-generation F1 cross would be situated. Buddy’s DNA sample lies within the Expected F1 Cluster, between the Golden Retriever and Labrador Retriever clusters, where we would expect a first-generation F1 cross to be.
Structure analysis:
We ran a population analysis software package [Structure: Pritchard Stephens and Donnelly (2000)] on Buddy’s DNA data against Golden Retriever and Labrador Retriever. The results of this analysis show what proportion of Buddy's DNA data clusters with each breed and examining different possible ancestral patterns from the simple first-generation (F1) cross to the more complex ancestries like a second-generation (F2) cross or a backcross. Buddy’s DNA data is most consistent with a first-generation F1 cross of Golden Retriever and Labrador Retriever ancestry.

Homozygosity Profile:
Homozygosity is a measure of how many of Buddy's genetic markers are identical because both the sire and dam passed down the same marker variant. Purebred dogs tend to have a higher homozygosity than most mixed breed dogs, and first generation F1 crosses generally have a low homozygosity. A higher than expected homozygosity score might indicate a more complex, backcrossed or even purebred ancestry. The observed homozygosity of Buddy’s DNA data falls within the range that we would expect for a first generation F1 cross between Golden Retriever and Labrador Retriever.

Further Information
You may wish to research more information regarding the breeds found in Buddy. The following links provide useful information into breed characteristics, training and health.

- The American Kennel Club (AKC) provides information on AKC registered and Foundation Stock Service breeds at www.akc.org.
- The United Kennel Club (UKC) has a range of information on UKC registered breeds at www.ukcdogs.com.
- The Kennel Club is the major British registry and their website contains information about the breeds they register at www.thekennelclub.org.uk.
- The free encyclopedia Wikipedia contains a range of information on most breeds, including breed histories, at www.wikipedia.org.
- The Dog Breed Info Center has information on most breeds at www.dogbreedinfo.com.
- The Australian Pedigree website has a very detailed breed library which includes temperament and what breeds are like to live with at www.pedigree.com.au.
- The Wisdom Panel website contains additional information about the breeds, as well as our Photo Gallery at www.wisdompanel.com.
PREDICTED ADULT WEIGHT PROFILE:

Based upon the breeds detected in Buddy’s ancestry and the genetic markers analyzed by Wisdom Panel® Insights™, as well as the information provided that Buddy is Male, we have calculated the likely weight that Buddy should reach when an adult. The Wisdom Panel Insights target weight profile is presented as a range based on the unique mix and proportion of breeds detected.

- If Intact, the adult weight is predicted to be between 52 - 78 lbs.
- If Neutered, the adult weight is predicted to be between 57 - 86 lbs.

Many factors can influence an adult dog’s weight, including sex and neuter status. Both of these factors have been used to calculate the predicted weight profile. Another major influence on canine weight is body condition score, which is a factor of your dog’s lifetime nutrition and exercise regimen. If your dog’s body condition is different from the ideal body condition score, we anticipate that your dog might be under (if underweight) or over (if overweight) the weight predicted by Wisdom Panel Insights.

To learn more about assessing body condition score, please use the Royal Canin™ Body Condition Score Chart: http://www.royalcanin.co.uk/products/products/dog-s-body-condition2

More information on this can be found at: http://www.wisdompanelpro.com/sizeprediction/

CUSTOMIZE YOUR DOG’S CERTIFICATE:

You can now include a photo of your dog on your certificate.

- Simply go to: http://www.wisdompanel.com/test_status_checker/ or go to www.wisdompanel.com and click on the TEST STATUS CHECKER box at the top
- Enter your last name and test sample ID #
- Click on the UPLOAD PHOTO button
- Follow the pop-up instructions to upload your dog’s photo

BECAUSE YOU LOVE YOUR DOG - SHARE THEIR STORY!

Join our online community of dog owners and share your dog’s Wisdom Panel Insights story with the world. At WisdomPanel.com you can:

- Register your dog and upload photos into our Wisdom Panel photo gallery at: http://www.wisdompanel.com/photo_gallery/
- Get help to show off your dog’s breed profile on your blog, Facebook and Twitter

Use these details to create your dog’s profile at wisdompanel.com:

**Owner:** Pete Smith  
**Report Code:** 3000114721

You can also post your story on our Facebook page, Doggie DNA, and don’t forget to follow us on Twitter!
Thank you for using Wisdom Panel® Insights™ to uncover the story of your dog’s ancestry!

Congratulations on taking the steps to learn about Buddy’s ancestry and to understand what breeds are in your mixed breed dog using Wisdom Panel Insights! Knowing your dog’s breeds is more than a novelty - it is a medical necessity. Each breed in your pooch’s genetic paw print has unique health concerns you should know about so that you can provide a lifetime of excellent care.

We recommend discussing your dog’s ancestry report with your veterinarian, as he or she can help you use your Wisdom Panel Insights report to help better care for Buddy. The next time you visit your veterinarian, consider asking these questions in addition to any you come up with on your own:

- Are there any specific issues that may be relevant to my dog’s well-being?
- Are there any special techniques that may help in training a dog with this particular mix?
- Are there any particular dietary considerations to bear in mind for a dog like mine?

HOW WISDOM PANEL INSIGHTS WORKS

The process started when you sent a sample to our laboratory, where the DNA was extracted from the cells and examined for the 321 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-bred 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 from over 200 breeds and varieties 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.

MORE BREED INFORMATION

Visit www.Genesis4Pets.com to find out more about your dog’s health-care needs: you’ll feel better knowing that you’re doing everything you can to keep your pal happy and healthy. In addition to loads of free, easy-to-understand information based on the latest medical research, you will receive a 50% discount on all downloadable health-care booklets that explain the common health concerns for individual breeds. Simply enter promotional code WISDOM when you check out to receive your discount (expires 30 days after you receive your Wisdom Panel report).

Accessing your test status checker online also lets you view Mixed-Breed Genesis health reports provided by VetThink™ which are designed to assist you to take the best possible care of your dog throughout its life.
Each dog is unique and their physical and behavioral traits will be the result of multiple factors, including genetics, training, handling, and environment. Using a proprietary analysis and database, Wisdom Panel® 2.0 product can provide insight into the breed ancestry of your dog. The Wisdom Panel 2.0 product is designed and intended to be used solely to either identify the genetic breed makeup and predict the adult size of such a mixed-breed dog or to confirm the genetic profile observed in a tested dog matches a particular breed profile. No other purpose is intended, authorized, or permitted.

Upon receipt of your sample, Mars Veterinary will analyze your dog’s DNA to determine the breed(s) present in your dog’s recent ancestry. In the case of a likely purebred dog, this will involve a comparison of genetic profile in your dog to a proposed breed. In the case of a proposed crossbred dog (i.e. a dog with ancestry from two different purebred parents), this will involve determining the heritage of your dog’s sire and dam. In all cases this is done with a reasonable degree of certainty.

Mars Veterinary’s testing procedures are designed to provide reliable and accurate results. Mars Veterinary is not responsible for any errors in obtaining the swab sample or for any injuries or loss that may occur as a result.

In the unlikely event that it is not possible to determine breed history or that an error in the analysis occurs, liability by Mars Veterinary or related companies and individuals is expressly disclaimed. Damages, if any, are limited to the payment actually received by Mars Veterinary for the specified analysis at issue.

Wisdom Panel 2.0 is based upon the Mars Veterinary database of validated breeds. If your dog contains other breeds, it may result in the identification of breeds, or a combination of breeds in the database, related to the breeds in your pet’s history.

Many cities and communities 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. Wisdom Panel 2.0 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. Neither Mars Veterinary nor any related company is responsible for compliance or notification regarding these matters.
STATEMENT OF AUTHENTICATION

Owner's name: Pete Smith

Dog's name: Buddy

Date: April 19, 2013

This certifies the authenticity of Buddy’s canine genetic background as determined following careful analysis of more than 300 genetic markers using Wisdom Panel® Insights™. The purebred dog breeds signature matches included in this analysis are those that were detected in the last three generations of Buddy’s ancestry using the proprietary breed detection algorithm at Mars Veterinary.

Buddy is a Golden Retriever, Labrador Retriever Cross

Research & Development Director
DR. NEALE FRETWELL

This certifies the authenticity of Buddy’s canine genetic background.

Date: April 19, 2013
Dog’s name: Buddy
Owner's name: Pete Smith

MARS
Wisdom Panel
Insights
Breed Ancestry Certificate