TEDDY

DNA Test Report | Test Date: December 28th, 2019 | embk.me/teddy556

BREED MIX

Poodle (Small) : 55.5%
Golden Retriever : 44.5%

GENETIC STATS

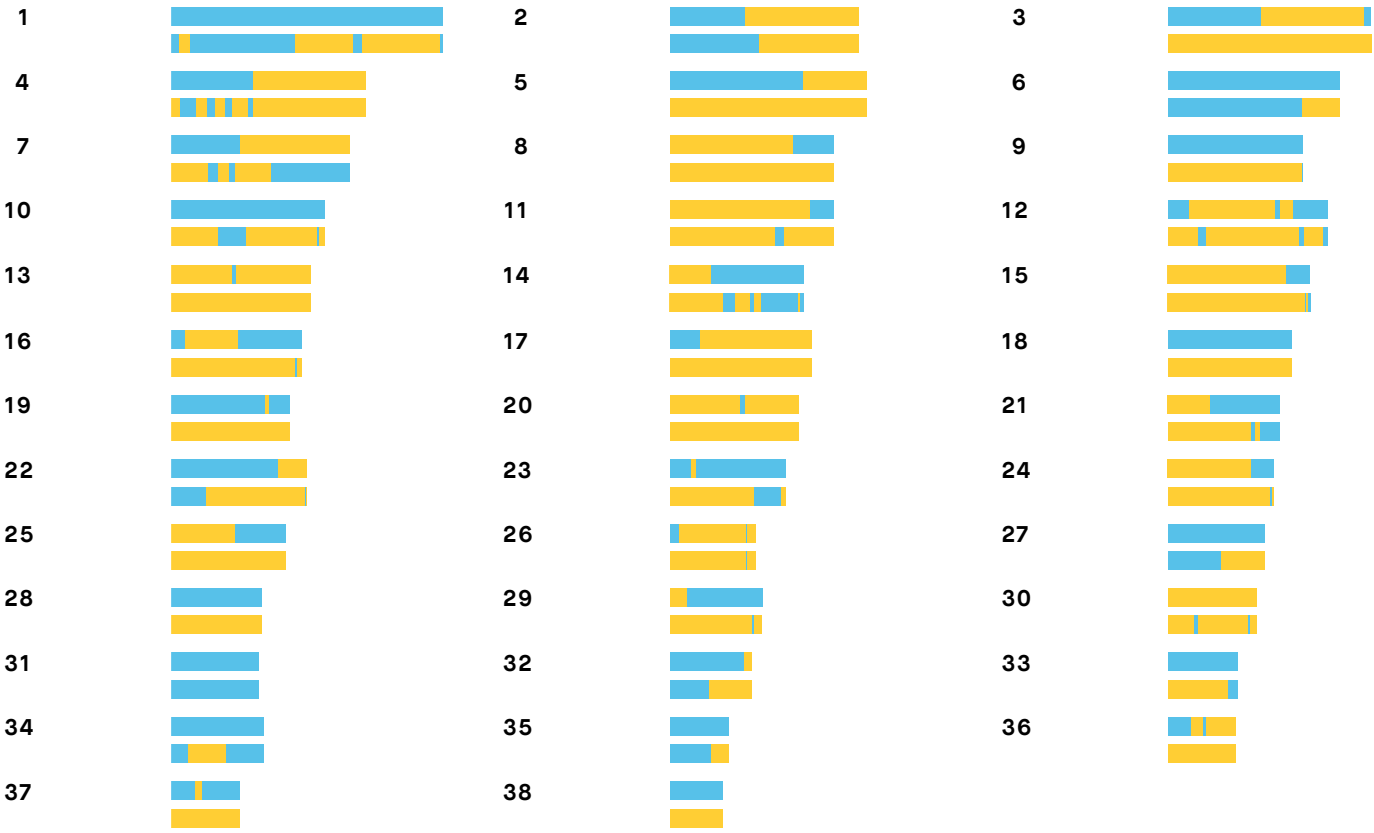
Predicted adult weight: **25 lbs**
Genetic age: n/a (Date of birth unknown)

TEST DETAILS

Kit number: EM-9675476
Swab number: 31001811414065

BREED MIX BY CHROMOSOME

Our advanced test identifies from where Teddy inherited every part of the chromosome pairs in his genome.



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FAMILY TREE

Our algorithms predict this is the most likely family tree to explain Teddy's breed mix, but this family tree may not be the only possible one.

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POODLE (SMALL)

Miniature and toy poodles are varieties of the poodle breed which originated in Germany in the 15th century. Unlike the larger standard poodle (>15 inches tall), these small poodles were not developed for hunting---except for truffles!---and were generally used as lap dogs and companions. Small poodles are frequently used to create designer dogs like Schnoodles and Maltipoos with low-shedding, hypoallergenic coats. All poodles are highly intelligent and energetic, and need daily exercise and stimulation. They are overall healthy dogs, although heritable eye disease, epilepsy and allergies are relatively common, and toy poodles also have a heightened risk of accidents/trauma due to their small size.

Alternative Names
Toy Poodle, Miniature Poodle

Fun Fact
Although Toy Poodles are the most popular dog breed in Japan, Poodles as a group are the eight most popular breed in the US, with miniature poodles being the most common variety.

RELATED BREEDS

Poodle (Standard)
Sibling breed

Maltese
Cousin breed

Havanese
Cousin breed

Bichon Frise
Cousin breed

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GOLDEN RETRIEVER

The Golden Retriever was developed in the early 19th century as an ideal hunting companion, able to retrieve birds on both land and water in the marshy Scottish countryside. Their friendliness and intelligence makes the both a popular family pet and an excellent working dog, well suited for being a service dog, therapy dog or for search and rescue. The third most popular breed in the US, the American and Canadian Goldens are generally lankier and darker than their British counterparts. Their wavy, feathered topcoat is water resistant, their undercoat helps them with thermoregulation and both coats have a tendency for heavy seasonal shedding. Goldens need lots of exercise (especially when younger), and their love of play and water means their owners usually get a lot of exercise too! In 2013, the 100th anniversary of Britain's Golden Retriever Club, Goldens from around the world came made the pilgrimage to the breed's birthplace in Scotland, where 222 of them posed in a single record-breaking photo. At the same time, the Golden Retriever Lifetime Study was getting started in the United States, recruiting 3,000 Golden Retrievers for a lifetime study aimed at understanding how genetics, lifestyle and environment influences healthy aging and cancer risk in Goldens.

Fun Fact
A Golden Retriever is also pictured in the Guinness Book of World's Records for "Most tennis balls held in mouth" (with 15).

RELATED BREEDS

Flat-Coated Retriever
Sibling breed

Labrador Retriever
Sibling breed

Chesapeake Bay Retriever
Cousin breed

Newfoundland
Cousin breed

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MATERNAL LINE

Through Teddy's mitochondrial DNA we can trace his mother's ancestry back to where dogs and people first became friends. This map helps you visualize the routes that his ancestors took to your home. Their story is described below the map.

HAPLOGROUP: A1a

A1a is the most common maternal lineage among Western dogs. This lineage traveled from the site of dog domestication in Central Asia to Europe along with an early dog expansion perhaps 10,000 years ago. It hung around in European village dogs for many millennia. Then, about 300 years ago, some of the prized females in the line were chosen as the founding dogs for several dog breeds. That set in motion a huge expansion of this lineage. It's now the maternal lineage of the overwhelming majority of Mastiffs, Labrador Retrievers and Gordon Setters. About half of Boxers and less than half of Shar-Pei dogs descend from the A1a line. It is also common across the world among village dogs, a legacy of European colonialism.

HAPLOTYPE: A399

Part of the A1a haplogroup, this haplotype occurs most frequently in Golden Retrievers.

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PATERNAL LINE

Through Teddy's Y chromosome we can trace his father's ancestry back to where dogs and people first became friends. This map helps you visualize the routes that his ancestors took to your home. Their story is described below the map.

HAPLOGROUP: A1a

Some of the wolves that became the original dogs in Central Asia around 15,000 years ago came from this long and distinguished line of male dogs. After domestication, they followed their humans from Asia to Europe and then didn't stop there. They took root in Europe, eventually becoming the dogs that founded the Vizsla breed 1,000 years ago. The Vizsla is a Central European hunting dog, and all male Vizslas descend from this line. During the Age of Exploration, like their owners, these pooches went by the philosophy, "Have sail, will travel!" From the windy plains of Patagonia to the snug and homey towns of the American Midwest, the beaches of a Pacific paradise, and the broad expanse of the Australian outback, these dogs followed their masters to the outposts of empires. Whether through good fortune or superior genetics, dogs from the A1a lineage traveled the globe and took root across the world. Now you find village dogs from this line frolicking on Polynesian beaches, hanging out in villages across the Americas, and scavenging throughout Old World settlements.

HAPLOTYPE: H1a.59

Part of the A1a haplogroup, this haplotype occurs most frequently in European village dogs.

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TRAITS: COAT COLOR

TRAIT	RESULT
E Locus (MC1R) The E Locus determines if and where a dog can produce dark (black or brown) hair. Dogs with two copies of the recessive **e** allele do not produce dark hairs at all, and will be "red" over their entire body. The shade of red, which can range from a deep copper to yellow/gold to cream, is dependent on other genetic factors including the Intensity loci. In addition to determining if a dog can develop dark hairs at all, the E Locus can give a dog a black "mask" or "widow's peak," unless the dog has overriding coat color genetic factors. Dogs with one or two copies of the **Em** allele usually have a melanistic mask (dark facial hair as commonly seen in the German Shepherd and Pug). Dogs with no copies of **Em** but one or two copies of the **Eg** allele usually have a melanistic "widow's peak" (dark forehead hair as commonly seen in the Afghan Hound and Borzoi, where it is called either "grizzle" or "domino").	**No dark hairs anywhere (ee)**
K Locus (CBD103) The K Locus **K^B** allele "overrides" the A Locus, meaning that it prevents the A Locus genotype from affecting coat color. For this reason, the **K^B** allele is referred to as the "dominant black" allele. As a result, dogs with at least one **K^B** allele will usually have solid black or brown coats (or red/cream coats if they are **ee** at the E Locus) regardless of their genotype at the A Locus, although several other genes could impact the dog's coat and cause other patterns, such as white spotting. Dogs with the **k^yk^y** genotype will show a coat color pattern based on the genotype they have at the A Locus. Dogs who test as **K^Bk^y** may be brindle rather than black or brown.	**Not expressed (K^Bk^y)**

TEDDY

TRAITS: COAT COLOR (CONTINUED)

TRAIT	RESULT
Intensity Loci LINKAGE Areas of a dog's coat where dark (black or brown) pigment is not expressed either contain red/yellow pigment, or no pigment at all. Five locations across five chromosomes explain approximately 70% of red pigmentation "intensity" variation across all dogs. Dogs with a result of **Intense Red Pigmentation** will likely have deep red hair like an Irish Setter or "apricot" hair like some Poodles, dogs with a result of **Intermediate Red Pigmentation** will likely have tan or yellow hair like a Soft-Coated Wheaten Terrier, and dogs with **Dilute Red Pigmentation** will likely have cream or white hair like a Samoyed. Because the mutations we test may not directly cause differences in red pigmentation intensity, we consider this to be a linkage test.	**Any pigmented hair likely yellow or tan (Intermediate Red Pigmentation)**
A Locus (ASIP) The A Locus controls switching between black and red pigment in hair cells, but it will only be expressed in dogs that are not **ee** at the E Locus and are **$k^y k^y$** at the K Locus. Sable (also called "Fawn") dogs have a mostly or entirely red coat with some interspersed black hairs. Agouti (also called "Wolf Sable") dogs have red hairs with black tips, mostly on their head and back. Black and tan dogs are mostly black or brown with lighter patches on their cheeks, eyebrows, chest, and legs. Recessive black dogs have solid-colored black or brown coats.	**Not expressed ($a^y a^t$)**
D Locus (MLPH) The D locus result that we report is determined by two different genetic variants that can work together to cause diluted pigmentation. These are the common **d** allele, also known as **"d1"**, and a less common allele known as **"d2"**. Dogs with two **d** alleles, regardless of which variant, will have all black pigment lightened ("diluted") to gray, or brown pigment lightened to lighter brown in their hair, skin, and sometimes eyes. There are many breed-specific names for these dilute colors, such as "blue", "charcoal", "fawn", "silver", and "Isabella". Note that in certain breeds, dilute dogs have a higher incidence of Color Dilution Alopecia. Dogs with one **d** allele will not be dilute, but can pass the **d** allele on to their puppies. To view your dog's **d1** and **d2** test results, click the "SEE DETAILS" link in the upper right hand corner of the "Base Coat Color" section of the Traits page, and then click the "VIEW SUBLOCUS RESULTS" link at the bottom of the page.	**Not expressed (Dd)**

TEDDY

TRAITS: COAT COLOR (CONTINUED)

TRAIT	RESULT
B Locus (TYRP1) Dogs with two copies of the **b** allele produce brown pigment instead of black in both their hair and skin. Dogs with one copy of the **b** allele will produce black pigment, but can pass the **b** allele on to their puppies. E Locus **ee** dogs that carry two **b** alleles will have red or cream coats, but have brown noses, eye rims, and footpads (sometimes referred to as "Dudley Nose" in Labrador Retrievers). "Liver" or "chocolate" is the preferred color term for brown in most breeds; in the Doberman Pinscher it is referred to as "red".	**Likely black colored nose/feet (BB)**
Saddle Tan (RALY) The "Saddle Tan" pattern causes the black hairs to recede into a "saddle" shape on the back, leaving a tan face, legs, and belly, as a dog ages. The Saddle Tan pattern is characteristic of breeds like the Corgi, Beagle, and German Shepherd. Dogs that have the **II** genotype at this locus are more likely to be mostly black with tan points on the eyebrows, muzzle, and legs as commonly seen in the Doberman Pinscher and the Rottweiler. This gene modifies the A Locus $\mathbf{a^t}$ allele, so dogs that do not express $\mathbf{a^t}$ are not influenced by this gene.	**Not expressed (NI)**
S Locus (MITF) The S Locus determines white spotting and pigment distribution. MITF controls where pigment is produced, and an insertion in the MITF gene causes a loss of pigment in the coat and skin, resulting in white hair and/or pink skin. Dogs with two copies of this variant will likely have breed-dependent white patterning, with a nearly white, parti, or piebald coat. Dogs with one copy of this variant will have more limited white spotting and may be considered flash, parti or piebald. This MITF variant does not explain all white spotting patterns in dogs and other variants are currently being researched. Some dogs may have small amounts of white on the paws, chest, face, or tail regardless of their S Locus genotype.	**Likely to have little to no white in coat (SS)**

TRAITS: COAT COLOR (CONTINUED)

TRAIT	RESULT
M Locus (PMEL) Merle coat patterning is common to several dog breeds including the Australian Shepherd, Catahoula Leopard Dog, and Shetland Sheepdog, among many others. Merle arises from an unstable SINE insertion (which we term the "M*" allele) that disrupts activity of the pigmentary gene PMEL, leading to mottled or patchy coat color. Dogs with an **M*m** result are likely to be phenotypically merle or could be "phantom" merle, that is, they have a merle allele that does not affect coat color. Dogs with an **M*M*** result are likely to be phenotypically merle or double merle. Dogs with an **mm** result have no merle alleles and are unlikely to have a merle coat pattern. Note that Embark does not currently distinguish between the recently described cryptic, atypical, atypical+, classic, and harlequin merle alleles. Our merle test only detects the presence, but not the length of the SINE insertion. We do not recommend making breeding decisions on this result alone. Please pursue further testing for allelic distinction prior to breeding decisions.	**No merle alleles (mm)**
H Locus (Harlequin) This pattern is recognized in Great Danes and causes dogs to have a white coat with patches of darker pigment. A dog with an **Hh** result will be harlequin if they are also **M*m** or **M*M*** at the M Locus and are not **ee** at the E locus. Dogs with a result of **hh** will not be harlequin. This trait is thought to be homozygous lethal; a living dog with an **HH** genotype has never been found.	**No harlequin alleles (hh)**

TEDDY

TRAITS: OTHER COAT TRAITS

TRAIT	RESULT
Furnishings (RSPO2) LINKAGE Dogs with one or two copies of the **F** allele have "furnishings": the mustache, beard, and eyebrows characteristic of breeds like the Schnauzer, Scottish Terrier, and Wire Haired Dachshund. A dog with two **I** alleles will not have furnishings, which is sometimes called an "improper coat" in breeds where furnishings are part of the breed standard. The mutation is a genetic insertion which we measure indirectly using a linkage test highly correlated with the insertion.	**Likely furnished (mustache, beard, and/or eyebrows) (FF)**
Coat Length (FGF5) The FGF5 gene is known to affect hair length in many different species, including cats, dogs, mice, and humans. In dogs, the **T** allele confers a long, silky haircoat as observed in the Yorkshire Terrier and the Long Haired Whippet. The ancestral **G** allele causes a shorter coat as seen in the Boxer or the American Staffordshire Terrier. In certain breeds (such as Corgi), the long haircoat is described as "fluff."	**Likely long coat (TT)**
Shedding (MC5R) Dogs with at least one copy of the ancestral **C** allele, like many Labradors and German Shepherd Dogs, are heavy or seasonal shedders, while those with two copies of the **T** allele, including many Boxers, Shih Tzus and Chihuahuas, tend to be lighter shedders. Dogs with furnished/wire-haired coats caused by RSPO2 (the furnishings gene) tend to be low shedders regardless of their genotype at this gene.	**Likely light shedding (TT)**
Coat Texture (KRT71) Dogs with a long coat and at least one copy of the **T** allele have a wavy or curly coat characteristic of Poodles and Bichon Frises. Dogs with two copies of the ancestral **C** allele are likely to have a straight coat, but there are other factors that can cause a curly coat, for example if they at least one **F** allele for the Furnishings (RSPO2) gene then they are likely to have a curly coat. Dogs with short coats may carry one or two copies of the **T** allele but still have straight coats.	**Likely wavy coat (CC)**

TEDDY

TRAITS: OTHER COAT TRAITS (CONTINUED)

TRAIT	RESULT
Hairlessness (FOXI3) LINKAGE A duplication in the FOXI3 gene causes hairlessness over most of the body as well as changes in tooth shape and number. This mutation occurs in Peruvian Inca Orchid, Xoloitzcuintli (Mexican Hairless), and Chinese Crested (other hairless breeds have different mutations). Dogs with the **NDup** genotype are likely to be hairless while dogs with the **NN** genotype are likely to have a normal coat. The **DupDup** genotype has never been observed, suggesting that dogs with that genotype cannot survive to birth. Please note that this is a linkage test, so it may not be as predictive as direct tests of the mutation in some lines.	**Very unlikely to be hairless (NN)**
Hairlessness (SGK3) Hairlessness in the American Hairless Terrier arises from a mutation in the SGK3 gene. Dogs with the **ND** genotype are likely to be hairless while dogs with the **NN** genotype are likely to have a normal coat.	**Very unlikely to be hairless (NN)**
Oculocutaneous Albinism Type 2 (SLC45A2) LINKAGE Dogs with two copies **DD** of this deletion in the SLC45A2 gene have oculocutaneous albinism type 2 (OCA2), also known as Doberman Z Factor Albinism, a recessive condition characterized by severely reduced or absent pigment in the eyes, skin, and hair. Affected dogs sometimes suffer from vision problems due to lack of eye pigment (which helps direct and absorb ambient light) and are prone to sunburn. Dogs with a single copy of the deletion **ND** will not be affected but can pass the mutation on to their offspring. This particular mutation can be traced back to a single white Doberman Pinscher born in 1976, and it has only been observed in dogs descended from this individual. Please note that this is a linkage test, so it may not be as predictive as direct tests of the mutation in some lines.	**Likely not albino (NN)**

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TRAITS: OTHER BODY FEATURES

TRAIT	RESULT
Muzzle Length (BMP3) Dogs in medium-length muzzle (mesocephalic) breeds like Staffordshire Terriers and Labradors, and long muzzle (dolichocephalic) breeds like Whippet and Collie have one, or more commonly two, copies of the ancestral **C** allele. Dogs in many short-length muzzle (brachycephalic) breeds such as the English Bulldog, Pug, and Pekingese have two copies of the derived **A** allele. At least five different genes affect muzzle length in dogs, with BMP3 being the only one with a known causal mutation. For example, the skull shape of some breeds, including the dolichocephalic Scottish Terrier or the brachycephalic Japanese Chin, appear to be caused by other genes. Thus, dogs may have short or long muzzles due to other genetic factors that are not yet known to science.	**Likely medium or long muzzle (CC)**
Tail Length (T) Whereas most dogs have two **C** alleles and a long tail, dogs with one **G** allele are likely to have a bobtail, which is an unusually short or absent tail. This mutation causes natural bobtail in many breeds including the Pembroke Welsh Corgi, the Australian Shepherd, and the Brittany Spaniel. Dogs with **GG** genotypes have not been observed, suggesting that dogs with the **GG** genotype do not survive to birth. Please note that this mutation does not explain every natural bobtail! While certain lineages of Boston Terrier, English Bulldog, Rottweiler, Miniature Schnauzer, Cavalier King Charles Spaniel, and Parson Russell Terrier, and Dobermans are born with a natural bobtail, these breeds do not have this mutation. This suggests that other unknown genetic mutations can also lead to a natural bobtail.	**Likely normal-length tail (CC)**
Hind Dewclaws (LMBR1) Common in certain breeds such as the Saint Bernard, hind dewclaws are extra, nonfunctional digits located midway between a dog's paw and hock. Dogs with at least one copy of the **T** allele have about a 50% chance of having hind dewclaws. Note that other (currently unknown to science) mutations can also cause hind dewclaws, so some **TT** or **TC** dogs will have hind dewclaws.	**Unlikely to have hind dew claws (CC)**

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TRAITS: OTHER BODY FEATURES (CONTINUED)

TRAIT	RESULT
Blue Eye Color (ALX4) LINKAGE Embark researchers discovered this large duplication associated with blue eyes in Arctic breeds like Siberian Husky as well as tri-colored (non-merle) Australian Shepherds. Dogs with at least one copy of the duplication (**Dup**) are more likely to have at least one blue eye. Some dogs with the duplication may have only one blue eye (complete heterochromia) or may not have blue eyes at all; nevertheless, they can still pass the duplication and the trait to their offspring. **NN** dogs do not carry this duplication, but may have blue eyes due to other factors, such as merle. Please note that this is a linkage test, so it may not be as predictive as direct tests of the mutation in some lines.	**Less likely to have blue eyes (NN)**
Back Muscling & Bulk, Large Breed (ACSL4) The **T** allele is associated with heavy muscling along the back and trunk in characteristically "bulky" large-breed dogs including the Saint Bernard, Bernese Mountain Dog, Greater Swiss Mountain Dog, and Rottweiler. The "bulky" **T** allele is absent from leaner shaped large breed dogs like the Great Dane, Irish Wolfhound, and Scottish Deerhound, which are fixed for the ancestral **C** allele. Note that this mutation does not seem to affect muscling in small or even mid-sized dog breeds with notable back muscling, including the American Staffordshire Terrier, Boston Terrier, and the English Bulldog.	**Likely normal muscling (CC)**

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TRAITS: BODY SIZE

TRAIT	RESULT
Body Size (IGF1) The **I** allele is associated with smaller body size.	**Smaller (II)**
Body Size (IGFR1) The **A** allele is associated with smaller body size.	**Intermediate (GA)**
Body Size (STC2) The **A** allele is associated with smaller body size.	**Intermediate (TA)**
Body Size (GHR - E191K) The **A** allele is associated with smaller body size.	**Smaller (AA)**
Body Size (GHR - P177L) The **T** allele is associated with smaller body size.	**Larger (CC)**

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TRAITS: PERFORMANCE

TRAIT	RESULT
Altitude Adaptation (EPAS1) This mutation causes dogs to be especially tolerant of low oxygen environments (hypoxia), such as those found at high elevations. Dogs with at least one **A** allele are less susceptible to "altitude sickness." This mutation was originally identified in breeds from high altitude areas such as the Tibetan Mastiff.	**Normal altitude tolerance (GG)**
Appetite (POMC) LINKAGE This mutation in the POMC gene is found primarily in Labrador and Flat Coated Retrievers. Compared to dogs with no copies of the mutation (**NN**), dogs with one (**ND**) or two (**DD**) copies of the mutation are more likely to have high food motivation, which can cause them to eat excessively, have higher body fat percentage, and be more prone to obesity. Read more about the genetics of POMC, and learn how you can contribute to research, in our blog post (https://embarkvet.com/resources/blog/pomc-dogs/). We measure this result using a linkage test.	**Normal food motivation (NN)**

TEDDY

CLINICAL TOOLS

These clinical genetic tools can inform clinical decisions and diagnoses. These tools do not predict increased risk for disease.

Alanine Aminotransferase Activity (GPT)

Teddy's baseline ALT level is Normal

What is Alanine Aminotransferase Activity?
Alanine aminotransferase (ALT) is a clinical tool that can be used by veterinarians to better monitor liver health. This result is not associated with liver disease. ALT is one of several values veterinarians measure on routine blood work to evaluate the liver. It is a naturally occurring enzyme located in liver cells that helps break down protein. When the liver is damaged or inflamed, ALT is released into the bloodstream.

How vets diagnose this condition
Genetic testing is the only way to provide your veterinarian with this clinical tool.

How this condition is treated
Veterinarians may recommend blood work to establish a baseline ALT value for healthy dogs with one or two copies of this variant.

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HEALTH REPORT

How to interpret Teddy's genetic health results:
If Teddy inherited any of the variants that we tested, they will be listed at the top of the Health Report section, along with a description of how to interpret this result. We also include all of the variants that we tested Teddy for that we did not detect the risk variant for.

A genetic test is not a diagnosis
This genetic test does not diagnose a disease. Please talk to your vet about your dog's genetic results, or if you think that your pet may have a health condition or disease.

Teddy is at increased risk for one genetic health condition.

Chondrodystrophy and Intervertebral Disc Disease, CDDY/IVDD, Type I IVDD	▲
Breed-Relevant Genetic Conditions	**13 variants not detected** ✓
Additional Genetic Conditions	**177 variants not detected** ✓

TEDDY

HEALTH REPORT

Chondrodystrophy and Intervertebral Disc Disease, CDDY/IVDD, Type I IVDD (FGF4 retrogene - CFA12)

Teddy inherited one copy of the variant we tested
Teddy is at increased risk for Type I IVDD

How to interpret this result
Teddy has one copy of an FGF4 retrogene on chromosome 12. In some breeds such as Beagles, Cocker Spaniels, and Dachshunds (among others) this variant is found in nearly all dogs. While those breeds are known to have an elevated risk of IVDD, many dogs in those breeds never develop IVDD. For mixed breed dogs and purebreds of other breeds where this variant is not as common, risk for Type I IVDD is greater for individuals with this variant than for similar dogs.

What is Chondrodystrophy and Intervertebral Disc Disease, CDDY/IVDD, Type I IVDD?
Type I Intervertebral Disc Disease (IVDD) is a back/spine issue that refers to a health condition affecting the discs that act as cushions between vertebrae. With Type I IVDD, affected dogs can have a disc event where it ruptures or herniates towards the spinal cord. This pressure on the spinal cord causes neurologic signs which can range from a wobbly gait to impairment of movement. Chondrodystrophy (CDDY) refers to the relative proportion between a dog's legs and body, wherein the legs are shorter and the body longer. There are multiple different variants that can cause a markedly chondrodystrophic appearance as observed in Dachshunds and Corgis. However, this particular variant is the only one known to also increase the risk for IVDD.

When signs & symptoms develop in affected dogs
Signs of CDDY are recognized in puppies as it affects body shape. IVDD is usually first recognized in adult dogs, with breed specific differences in age of onset.

Signs & symptoms
Research indicates that dogs with one or two copies of this variant have a similar risk of developing IVDD. However, there are some breeds (e.g. Beagles and Cocker Spaniels, among others) where this variant has been passed down to nearly all dogs of the breed and most do not show overt clinical signs of the disorder. This suggests that there are other genetic and environmental factors (such as weight, mobility, and family history) that contribute to an individual dog's risk of developing clinical IVDD. Signs of IVDD include neck or back pain, a change in your dog's walking pattern (including dragging of the hind limbs), and paralysis. These signs can be mild to severe, and if your dog starts exhibiting these signs, you should schedule an appointment with your veterinarian for a diagnosis.

How vets diagnose this condition
For CDDY, dogs with one copy of this variant may have mild proportional differences in their leg length. Dogs with two copies of this variant will often have visually longer bodies and shorter legs. For IVDD, a neurological exam will be performed on any dog showing suspicious signs. Based on the result of this exam, radiographs to detect the presence of calcified discs or advanced imaging (MRI/CT) to detect a disc rupture may be recommended.

How this condition is treated
IVDD is treated differently based on the severity of the disease. Mild cases often respond to medical management which includes cage rest and pain management, while severe cases are often treated with surgical intervention. Both conservative and surgical treatment should be followed up with rehabilitation and physical therapy.

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BREED-RELEVANT CONDITIONS TESTED

Teddy did not have the variants that we tested for, that are relevant to his breeds:

- Von Willebrand Disease Type I (VWF)
- Progressive Retinal Atrophy, prcd (PRCD Exon 1)
- Golden Retriever Progressive Retinal Atrophy 1, GR-PRA1 (SLC4A3)
- Golden Retriever Progressive Retinal Atrophy 2, GR-PRA2 (TTC8)
- Neuronal Ceroid Lipofuscinosis (CLN5 Golden Retriever Variant)
- GM2 Gangliosidosis (HEXB, Poodle Variant)
- Degenerative Myelopathy, DM (SOD1A)
- Neonatal Encephalopathy with Seizures, NEWS (ATF2)
- Muscular Dystrophy (DMD Golden Retriever Variant)
- Dystrophic Epidermolysis Bullosa (COL7A1)
- Ichthyosis (PNPLA1)
- Osteogenesis Imperfecta, Brittle Bone Disease (COL1A1)
- Osteochondrodysplasia, Skeletal Dwarfism (SLC13A1)

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ADDITIONAL CONDITIONS TESTED

Teddy did not have the variants that we tested for, in the following conditions that the potential effect on dogs with Teddy's breeds may not yet be known.

- MDR1 Drug Sensitivity (MDR1)
- P2Y12 Receptor Platelet Disorder (P2Y12)
- Factor IX Deficiency, Hemophilia B (F9 Exon 7, Terrier Variant)
- Factor IX Deficiency, Hemophilia B (F9 Exon 7, Rhodesian Ridgeback Variant)
- Factor VII Deficiency (F7 Exon 5)
- Factor VIII Deficiency, Hemophilia A (F8 Exon 10, Boxer Variant)
- Factor VIII Deficiency, Hemophilia A (F8 Exon 11, Shepherd Variant 1)
- Factor VIII Deficiency, Hemophilia A (F8 Exon 1, Shepherd Variant 2)
- Thrombopathia (RASGRP1 Exon 5, Basset Hound Variant)
- Thrombopathia (RASGRP1 Exon 8)
- Thrombopathia (RASGRP1 Exon 5, American Eskimo Dog Variant)
- Von Willebrand Disease Type III, Type III vWD (VWF Exon 4)
- Von Willebrand Disease Type III, Type III vWD (VWF Exon 7)
- Von Willebrand Disease Type II, Type II vWD (VWF)
- Canine Leukocyte Adhesion Deficiency Type I, CLADI (ITGB2)
- Canine Leukocyte Adhesion Deficiency Type III, CLADIII (FERMT3)
- Congenital Macrothrombocytopenia (TUBB1 Exon 1, Cairn and Norfolk Terrier Variant)
- Canine Elliptocytosis (SPTB Exon 30)
- Glanzmann's Thrombasthenia Type I (ITGA2B Exon 12)
- May-Hegglin Anomaly (MYH9)
- Prekallikrein Deficiency (KLKB1 Exon 8)
- Pyruvate Kinase Deficiency (PKLR Exon 5)
- Pyruvate Kinase Deficiency (PKLR Exon 7 Labrador Variant)

TEDDY

ADDITIONAL CONDITIONS TESTED

- Pyruvate Kinase Deficiency (PKLR Exon 10)
- Trapped Neutrophil Syndrome (VPS13B)
- Ligneous Membranitis, LM (PLG)
- Platelet factor X receptor deficiency, Scott Syndrome (TMEM16F)
- Methemoglobinemia CYB5R3
- Congenital Hypothyroidism (TPO, Tenterfield Terrier Variant)
- Congenital Hypothyroidism (TPO, Rat, Toy, Hairless Terrier Variant)
- Complement 3 Deficiency, C3 Deficiency (C3)
- Severe Combined Immunodeficiency (PRKDC)
- Severe Combined Immunodeficiency (RAG1)
- X-linked Severe Combined Immunodeficiency (IL2RG Variant 1)
- X-linked Severe Combined Immunodeficiency (IL2RG Variant 2)
- Progressive Retinal Atrophy, rcd1 (PDE6B Exon 21 Irish Setter Variant)
- Progressive Retinal Atrophy, rcd3 (PDE6A)
- Progressive Retinal Atrophy, CNGA (CNGA1 Exon 9)
- Progressive Retinal Atrophy (CNGB1)
- Progressive Retinal Atrophy (SAG)
- Progressive Retinal Atrophy, crd1 (PDE6B)
- Progressive Retinal Atrophy - crd4/cord1 (RPGRIP1)
- X-Linked Progressive Retinal Atrophy 1, XL-PRA1 (RPGR)
- Progressive Retinal Atrophy, PRA3 (FAM161A)
- Collie Eye Anomaly, Choroidal Hypoplasia, CEA (NHEJ1)
- Day blindness, Cone Degeneration, Achromatopsia (CNGB3 Exon 6)
- Achromatopsia (CNGA3 Exon 7 German Shepherd Variant)
- Achromatopsia (CNGA3 Exon 7 Labrador Retriever Variant)

TEDDY

ADDITIONAL CONDITIONS TESTED

- Autosomal Dominant Progressive Retinal Atrophy (RHO)
- Canine Multifocal Retinopathy (BEST1 Exon 2)
- Canine Multifocal Retinopathy (BEST1 Exon 5)
- Canine Multifocal Retinopathy (BEST1 Exon 10 Deletion)
- Canine Multifocal Retinopathy (BEST1 Exon 10 SNP)
- Glaucoma (ADAMTS10 Exon 9)
- Glaucoma (ADAMTS10 Exon 17)
- Glaucoma (ADAMTS17 Exon 11)
- Glaucoma (ADAMTS17 Exon 2)
- Goniodysgenesis and Glaucoma (OLFM3)
- Hereditary Cataracts, Early-Onset Cataracts, Juvenile Cataracts (HSF4 Exon 9 Shepherd Variant)
- Primary Lens Luxation (ADAMTS17)
- Congenital Stationary Night Blindness (RPE65)
- Macular Corneal Dystrophy, MCD (CHST6)
- 2,8-Dihydroxyadenine Urolithiasis, 2,8-DHA Urolithiasis (APRT)
- Cystinuria Type I-A (SLC3A1)
- Cystinuria Type II-A (SLC3A1)
- Cystinuria Type II-B (SLC7A9)
- Hyperuricosuria and Hyperuricemia or Urolithiasis, HUU (SLC2A9)
- Polycystic Kidney Disease, PKD (PKD1)
- Primary Hyperoxaluria (AGXT)
- Protein Losing Nephropathy, PLN (NPHS1)
- X-Linked Hereditary Nephropathy, XLHN (COL4A5 Exon 35, Samoyed Variant 2)
- Autosomal Recessive Hereditary Nephropathy, Familial Nephropathy, ARHN (COL4A4 Exon 3)
- Primary Ciliary Dyskinesia, PCD (CCDC39 Exon 3)

TEDDY

ADDITIONAL CONDITIONS TESTED

- Congenital Keratoconjunctivitis Sicca and Ichthyosiform Dermatosis, Dry Eye Curly Coat Syndrome, CKCSID (FAM83H Exon 5)
- X-linked Ectodermal Dysplasia, Anhidrotic Ectodermal Dysplasia (EDA Intron 8)
- Renal Cystadenocarcinoma and Nodular Dermatofibrosis, RCND (FLCN Exon 7)
- Canine Fucosidosis (FUCA1)
- Glycogen Storage Disease Type II, Pompe's Disease, GSD II (GAA)
- Glycogen Storage Disease Type IA, Von Gierke Disease, GSD IA (G6PC)
- Glycogen Storage Disease Type IIIA, GSD IIIA (AGL)
- Mucopolysaccharidosis Type I, MPS I (IDUA)
- Mucopolysaccharidosis Type IIIA, Sanfilippo Syndrome Type A, MPS IIIA (SGSH Exon 6 Variant 1)
- Mucopolysaccharidosis Type IIIA, Sanfilippo Syndrome Type A, MPS IIIA (SGSH Exon 6 Variant 2)
- Mucopolysaccharidosis Type VII, Sly Syndrome, MPS VII (GUSB Exon 5)
- Mucopolysaccharidosis Type VII, Sly Syndrome, MPS VII (GUSB Exon 3)
- Glycogen storage disease Type VII, Phosphofructokinase Deficiency, PFK Deficiency (PFKM Whippet and English Springer Spaniel Variant)
- Glycogen storage disease Type VII, Phosphofructokinase Deficiency, PFK Deficiency (PFKM Wachtelhund Variant)
- Lagotto Storage Disease (ATG4D)
- Neuronal Ceroid Lipofuscinosis 1, NCL 1 (PPT1 Exon 8)
- Neuronal Ceroid Lipofuscinosis 2, NCL 2 (TPP1 Exon 4)
- Neuronal Ceroid Lipofuscinosis 1, Cerebellar Ataxia, NCL4A (ARSG Exon 2)
- Neuronal Ceroid Lipofuscinosis 1, NCL 5 (CLN5 Border Collie Variant)
- Neuronal Ceroid Lipofuscinosis 6, NCL 6 (CLN6 Exon 7)
- Neuronal Ceroid Lipofuscinosis 8, NCL 8 (CLN8 English Setter Variant)
- Neuronal Ceroid Lipofuscinosis (MFSD8)
- Neuronal Ceroid Lipofuscinosis (CLN8 Australian Shepherd Variant)
- Neuronal Ceroid Lipofuscinosis 10, NCL 10 (CTSD Exon 5)
- Adult-Onset Neuronal Ceroid Lipofuscinosis (ATP13A2, Tibetan Terrier Variant)

TEDDY

ADDITIONAL CONDITIONS TESTED

- Late-Onset Neuronal Ceroid Lipofuscinosis (ATP13A2, Australian Cattle Dog Variant)
- GM1 Gangliosidosis (GLB1 Exon 15 Shiba Inu Variant)
- GM1 Gangliosidosis (GLB1 Exon 15 Alaskan Husky Variant)
- GM1 Gangliosidosis (GLB1 Exon 2)
- GM2 Gangliosidosis (HEXA)
- Globoid Cell Leukodystrophy, Krabbe disease (GALC Exon 5)
- Autosomal Recessive Amelogenesis Imperfecta, Familial Enamel Hypoplasia (Italian Greyhound Variant)
- Autosomal Recessive Amelogenesis Imperfecta, Familial Enamel Hypoplasia (Parson Russell Terrier Variant)
- Persistent Mullerian Duct Syndrome, PMDS (AMHR2)
- Deafness and Vestibular Syndrome of Dobermans, DVDob, DINGS (MYO7A)
- Shar-Pei Autoinflammatory Disease, SPAID, Shar-Pei Fever (MTBP)
- Alaskan Husky Encephalopathy, Subacute Necrotizing Encephalomyelopathy (SLC19A3)
- Alexander Disease (GFAP)
- Cerebellar Abiotrophy, Neonatal Cerebellar Cortical Degeneration, NCCD (SPTBN2)
- Cerebellar Ataxia, Progressive Early-Onset Cerebellar Ataxia (SEL1L)
- Cerebellar Hypoplasia (VLDLR)
- Spinocerebellar Ataxia, Late-Onset Ataxia, LoSCA (CAPN1)
- Spinocerebellar Ataxia with Myokymia and/or Seizures (KCNJ10)
- Hereditary Ataxia (RAB24)
- Benign Familial Juvenile Epilepsy, Remitting Focal Epilepsy (LGI2)
- Fetal-Onset Neonatal Neuroaxonal Dystrophy (MFN2)
- Hypomyelination and Tremors (FNIP2)
- Shaking Puppy Syndrome, X-linked Generalized Tremor Syndrome (PLP)
- Neuroaxonal Dystrophy, NAD (Spanish Water Dog Variant)
- Neuroaxonal Dystrophy, NAD (Rottweiler Variant)

TEDDY

ADDITIONAL CONDITIONS TESTED

- L-2-Hydroxyglutaricaciduria, L2HGA (L2HGDH)
- Polyneuropathy, NDRG1 Greyhound Variant (NDRG1 Exon 15)
- Polyneuropathy, NDRG1 Malamute Variant (NDRG1 Exon 4)
- Narcolepsy (HCRTR2 Intron 6)
- Progressive Neuronal Abiotrophy, Canine Multiple System Degeneration, CMSD (SERAC1 Exon 15)
- Progressive Neuronal Abiotrophy, Canine Multiple System Degeneration, CMSD (SERAC1 Exon 4)
- Juvenile Laryngeal Paralysis and Polyneuropathy, Polyneuropathy with Ocular Abnormalities and Neuronal Vacuolation, POANV (RAB3GAP1, Rottweiler Variant)
- Hereditary Sensory Autonomic Neuropathy, Acral Mutilation Syndrome, AMS (GDNF-AS)
- Juvenile-Onset Polyneuropathy, Leonberger Polyneuropathy 1, LPN1 (LPN1, ARHGEF10)
- Juvenile Myoclonic Epilepsy (DIRAS1)
- Juvenile-Onset Polyneuropathy, Leonberger Polyneuropathy 2, LPN2 (GJA9)
- Spongy Degeneration with Cerebellar Ataxia 1, SDCA1, SeSAME/EAST Syndrome (KCNJ10)
- Spongy Degeneration with Cerebellar Ataxia 2, SDCA2 (ATP1B2)
- Dilated Cardiomyopathy, DCM1 (PDK4)
- Dilated Cardiomyopathy, DCM2 (TTN)
- Long QT Syndrome (KCNQ1)
- Muscular Dystrophy (DMD, Cavalier King Charles Spaniel Variant 1)
- Muscular Dystrophy (DMD Pembroke Welsh Corgi Variant)
- Limb Girdle Muscular Dystrophy (SGCD, Boston Terrier Variant)
- Centronuclear Myopathy (PTPLA)
- Exercise-Induced Collapse (DNM1)
- Inherited Myopathy of Great Danes (BIN1)
- Myostatin Deficiency, Bully Whippet Syndrome (MSTN)
- Myotonia Congenita (CLCN1 Exon 7)
- Myotonia Congenita (CLCN1 Exon 23)

TEDDY

ADDITIONAL CONDITIONS TESTED

- Myotubular Myopathy 1, X-linked Myotubular Myopathy, XL-MTM (MTM1, Labrador Variant)
- Hypocatalasia, Acatalasemia (CAT)
- Pyruvate Dehydrogenase Deficiency (PDP1)
- Malignant Hyperthermia (RYR1)
- Imerslund-Grasbeck Syndrome, Selective Cobalamin Malabsorption (CUBN Exon 53)
- Imerslund-Grasbeck Syndrome, Selective Cobalamin Malabsorption (CUBN Exon 8)
- Lundehund Syndrome (LEPREL1)
- Congenital Myasthenic Syndrome (CHAT)
- Congenital Myasthenic Syndrome (COLQ)
- Episodic Falling Syndrome (BCAN)
- Paroxysmal Dyskinesia, PxD (PGIN)
- Ectodermal Dysplasia, Skin Fragility Syndrome (PKP1)
- Ichthyosis, Epidermolytic Hyperkeratosis (KRT10)
- Ichthyosis (SLC27A4)
- Ichthyosis (NIPAL4)
- Hereditary Footpad Hyperkeratosis (FAM83G)
- Hereditary Nasal Parakeratosis (SUV39H2)
- Musladin-Lueke Syndrome (ADAMTSL2)
- Oculocutaneous Albinism, OCA2 (Pekingese Type)
- Bald Thigh Syndrome (IGFBP5)
- Cleft Lip and/or Cleft Palate (ADAMTS20)
- Hereditary Vitamin D-Resistant Rickets (VDR)
- Osteogenesis Imperfecta, Brittle Bone Disease (COL1A2)
- Osteogenesis Imperfecta, Brittle Bone Disease (SERPINH1)
- Skeletal Dysplasia 2, SD2 (COL11A2)

TEDDY

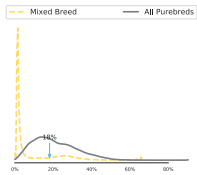
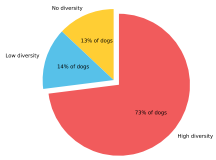
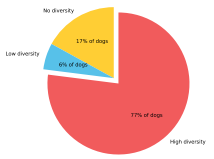
ADDITIONAL CONDITIONS TESTED

- **Craniomandibular Osteopathy, CMO (SLC37A2)**
- **Chondrodystrophy, Norwegian Elkhound and Karelian Bear Dog Variant (ITGA10)**

TEDDY

DNA Test Report | Test Date: December 28th, 2019 | embk.me/teddy556

INBREEDING AND DIVERSITY

CATEGORY	RESULT
Coefficient Of Inbreeding Our genetic COI measures the proportion of your dog's genome where the genes on the mother's side are identical by descent to those on the father's side.	**18%** 
MHC Class II - DLA DRB1 A Dog Leukocyte Antigen (DLA) gene, DRB1 encodes a major histocompatibility complex (MHC) protein involved in the immune response. Some studies have shown associations between certain DRB1 haplotypes and autoimmune diseases such as Addison's disease (hypoadrenocorticism) in certain dog breeds, but these findings have yet to be scientifically validated.	**High Diversity** How common is this amount of diversity in mixed breed dogs: 
MHC Class II - DLA DQA1 and DQB1 DQA1 and DQB1 are two tightly linked DLA genes that code for MHC proteins involved in the immune response. A number of studies have shown correlations of DQA-DQB1 haplotypes and certain autoimmune diseases; however, these have not yet been scientifically validated.	**High Diversity** How common is this amount of diversity in mixed breed dogs: 

AnimalGenetics INCORPORATED
1336 Timberlane Road
Tallahassee, FL 32312-1766

Generated On: **1/23/2020**

Canine Genetic Testing Report

Submitted By
Christopher Costas 8958 NW 171st Lane Hialeah, FL 33018 United States

Subject Dog 00176487

Date Received: 1/16/2020

Dog Name: **Teddy**
Breed: Goldendoodle
Phenotype:

Registration:
Microchip:
Sex: Male
Birth: 05/05/2017

Sire

Sire Name:
Breed:
Registration:
Phenotype:

Dam

Dam Name:
Breed:
Registration:
Phenotype:

Coat Color Testing

	A Locus-Ay		*Not Tested*
	A Locus-Aw		*Not Tested*
	A Locus-At		*Not Tested*
	A Locus-a		*Not Tested*
	B Locus		*Not Tested*
	D Locus		*Not Tested*
	E Locus- EM		*Not Tested*
	E Locus- e		*Not Tested*
	K Locus-KB		*Not Tested*
	Spotting		*Not Tested*
	Harlequin		*Not Tested*
	Merle		*Not Tested*

Coat Type Testing

	Hair Length		*Not Tested*
	Hair Curl		*Not Tested*
	Furnishings		*Not Tested*
	Bobtail		*Not Tested*
	Shedding		*Not Tested*

Genetic Disorders

X	CDDY	C/C	Dog is homozygous for the CDDY. Dog is at risk for IVDD
X	CDPA	N/N	Dog is negative for thef CDPA mutation.
	DM		*Not Tested*
	GR-PRA1		*Not Tested*
	GR-PRA2		*Not Tested*
	Ich		*Not Tested*
	MD		*Not Tested*
	NEwS		*Not Tested*
	prcd-PRA		*Not Tested*
	vWD1		*Not Tested*

Genetic Marker Results

Run Date: *Not Tested*

- / - AHT121	- / - AHT137	- / - AHTh171	- / - AHTh260	- / - AHTk211	- / - AHTk253	- / - C22-279
- / - CAN-AMEL	- / - FH2054	- / - FH2848	- / - INRA21	- / - INU005	- / - INU030	- / - INU055
- / - REN54P11	- / - REN162C04	- / - REN169D01	- / - REN169O18	- / - REN247M23		

Additional Comments

None