GENETIC COMPREHENSIVE REPORT

OWNER'S DETAILS

Dirk Tijssen
Portion 74, Sterkfontein
Mogale City
1739 South Africa

COLLECTION DETAILS

Case Number	:	19172614
Date of Test	:	1st Feb 2019
Collected By	:	
Approved Collection	:	**NO**

ANIMAL'S DETAILS

Registered Name	:	Houndbrook Mr Neo Anderson
Pet Name	:	Ranger
Registration Number	:	5100106850
Breed	:	Beagle
Microchip Number	:	900164001702612
Sex	:	Intact Male
Date of Birth	:	2nd Jun 2018
Colour	:	Tri-Colour

Sample with Lab ID Number 19172614 was received at Orivet Genetics, DNA was extracted and analysed with the following result reported:

DNA PROFILE

P1_2 A G P3_2 A A P3_3 G G P11_3 C C P12_1 G G P24_2 A G P12_3 G G P30_3 A A P13_1 A A
P24_3 A A P31_1 A A P28_3 A A P31_3 G G P25_1 A A P32_2 C C P13_2 T T P13_3 A C P25_2 A G
P25_3 C C P32_3 A G P33_1 A A P14_1 T T P10_1 G G P26_1 A G P33_3 G G P26_2 A C P14_2 G G
P26_3 G G P14_3 A A P15_1 A A P34_1 C C P34_2 A G P34_3 A C P10_3 C C P15_2 G G P15_3 C C
P16_3 G G P35_1 G G P35_2 G G P36_1 A C P17_1 G G P36_2 C C P37_2 G G P17_2 A A P29_1 C G
P37_3 G G P38_1 C C P38_2 A G P27_1 C G P17_3 A A P27_2 C C P4_3 A G P18_2 C C P18_3 C C
P5_1 G G P11_1 G G P19_1 T T P19_2 G G P5_2 G G P19_3 G G P2_1 G G P2_3 A C P27_3 A T
P20_1 A A P20_3 A A P5_3 G G P11_2 C C P6_2 G G P6_3 C C P21_1 A G P21_3 A A P22_2 A A
P28_1 G G P7_1 C C P7_2 A G P28_2 C G P7_3 A A P29_2 G G P8_1 A A P22_3 C G P8_2 A A
P8_3 A A P23_1 C C P9_3 A T P23_2 C C P23_3 A G P24_1 A A P3_1 G G

RESULTS REVIEWED & CONFIRMED BY:

Dr. Noam Pik BVSc, BMVS, MBA, MACVS

George Sofronidis BSc(Hons)

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Authentication Code

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GENETIC ANALYSIS

Sample with Lab ID Number 19172614 was received at Orivet Genetics, DNA was extracted and analysed with the following result reported:

Test Reported:	Factor VII Deficiency
Result:	**CARRIER [ONE COPY OF THE VARIANT DETECTED][1]**
Gene :	**Coagulation factor VII (F7) Chromosome 22**
Variant Detected :	**Base Substitution c.407G>A p.Gly136Glu**

[1] We have scanned your animal's DNA and one copy of the normal gene and copy of the positive (mutant) gene has been detected. The genotype of the animal tested is CARRIER this result may also be referred to as HETEROZYGOUS or A/N or "+/-". Being an autosomal recessive disease the animal will not exhibit disease symptoms or develop the disease. Consideration needs to be taken if breeding this animal as it may produce affected offspring if mated to another carrier. It is recommended to have any breeding partner tested before breeding.

Sample with Lab ID Number 19172614 was received at Orivet Genetics, DNA was extracted and analysed with the following result reported:

Test Reported:	Degenerative Myelopathy
Result:	**NEGATIVE / CLEAR [NO VARIANT DETECTED][1]**
Gene :	**Superoxide dismutase 1 (SOD1) on chromosome 31**
Variant Detected :	**Base Substitution c.118G>A p.Glu40Lys**

[1] We have scanned the DNA and the genotype of this animal is NORMAL - no presence of the disease associated variant (mutation) has been detected. This result may also be referred to as NORMAL, "-/-" or "wild type (WT)" or "homozygous negative". The animal is clear of the disease and will not pass on the disease-causing variant. Can be mated with an untested animal and WILL NOT produce any positive/affected offspring.

Sample with Lab ID Number 19172614 was received at Orivet Genetics, DNA was extracted and analysed with the following result reported:

Test Reported:	Catalase Deficiency (Beagle Type)
Result:	**NEGATIVE / CLEAR [NO VARIANT DETECTED][1]**
Gene :	**CAT on Chromosome 18**
Variant Detected :	**Base Substitution G>A**

[1] We have scanned the DNA and the genotype of this animal is NORMAL - no presence of the disease associated variant (mutation) has been detected. This result may also be referred to as NORMAL, "-/-" or "wild type (WT)" or "homozygous negative". The animal is clear of the disease and will not pass on the disease-causing variant. Can be mated with an untested animal and WILL NOT produce any positive/affected offspring.

Sample with Lab ID Number 19172614 was received at Orivet Genetics, DNA was extracted and analysed with the following result reported:

Test Reported:	Congenital Stationary Night Blindness
Result:	**NEGATIVE / CLEAR [NO VARIANT DETECTED][1]**
Gene :	**RPE65 on Chromosome 6**
Variant Detected :	**Deletion of AAGA**

[1] We have scanned the DNA and the genotype of this animal is NORMAL - no presence of the disease associated variant (mutation) has been detected. This result may also be referred to as NORMAL, "-/-" or "wild type (WT)" or "homozygous negative". The animal is clear of the disease and will not pass on the disease-causing variant. Can be mated with an untested animal and WILL NOT produce any positive/affected offspring.

SAMPLE COLLECTION DETAILS

Case Number: 19172614

Approved Collection Method: NO

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Sample with Lab ID Number 19172614 was received at Orivet Genetics, DNA was extracted and analysed with the following result reported:

Test Reported:	Musladin-Lueke Syndrome (Beagle Type)
Result:	**NEGATIVE / CLEAR [NO VARIANT DETECTED][1]**
Gene :	**ADAMTS like 2 (ADAMTSL2) on Chromosome 9**
Variant Detected :	**Base Substitution c.660C>T p.Arg221Cys**

[1] We have scanned the DNA and the genotype of this animal is NORMAL - no presence of the disease associated variant (mutation) has been detected. This result may also be referred to as NORMAL, "-/-" or "wild type (WT)" or "homozygous negative". The animal is clear of the disease and will not pass on the disease-causing variant. Can be mated with an untested animal and WILL NOT produce any positive/affected offspring.

Sample with Lab ID Number 19172614 was received at Orivet Genetics, DNA was extracted and analysed with the following result reported:

Test Reported:	Neonatal Cerebellar Cortical Degeneration (Beagle Type)
Result:	**NEGATIVE / CLEAR [NO VARIANT DETECTED][1]**
Gene :	**SPTBN2**
Variant Detected :	**Deletion**

[1] We have scanned the DNA and the genotype of this animal is NORMAL - no presence of the disease associated variant (mutation) has been detected. This result may also be referred to as NORMAL, "-/-" or "wild type (WT)" or "homozygous negative". The animal is clear of the disease and will not pass on the disease-causing variant. Can be mated with an untested animal and WILL NOT produce any positive/affected offspring.

Sample with Lab ID Number 19172614 was received at Orivet Genetics, DNA was extracted and analysed with the following result reported:

Test Reported:	Primary Open Angle Glaucoma (Beagle Type)
Result:	**NEGATIVE / CLEAR [NO VARIANT DETECTED][1]**
Gene :	**ADAM metallopeptidase with thrombospondin type 1 motif 10 (ADAMTS10) on Chromosome 20**
Variant Detected :	**Base Substitution c.1981G>A p.Gly661Arg**

[1] We have scanned the DNA and the genotype of this animal is NORMAL - no presence of the disease associated variant (mutation) has been detected. This result may also be referred to as NORMAL, "-/-" or "wild type (WT)" or "homozygous negative". The animal is clear of the disease and will not pass on the disease-causing variant. Can be mated with an untested animal and WILL NOT produce any positive/affected offspring.

Sample with Lab ID Number 19172614 was received at Orivet Genetics, DNA was extracted and analysed with the following result reported:

Test Reported:	Cobalamin Malabsorption (Beagle Type)
Result:	**NEGATIVE / CLEAR [NO VARIANT DETECTED][1]**
Gene :	**Cubilin (CUBN) on chromosome 2**
Variant Detected :	**Nucleotide Deletion c.786delC p.Asp262Glufs*47**

[1] We have scanned the DNA and the genotype of this animal is NORMAL - no presence of the disease associated variant (mutation) has been detected. This result may also be referred to as NORMAL, "-/-" or "wild type (WT)" or "homozygous negative". The animal is clear of the disease and will not pass on the disease-causing variant. Can be mated with an untested animal and WILL NOT produce any positive/affected offspring.

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Sample with Lab ID Number 19172614 was received at Orivet Genetics, DNA was extracted and analysed with the following result reported:

Test Reported:	Pyruvate Kinase Deficiency (Beagle Type)
Result:	**NEGATIVE / CLEAR [NO VARIANT DETECTED][1]**
Gene :	**Pyruvate kinase L/R (PKLR) Chromosome 7**
Variant Detected :	**Base Substitution c.994G>A p.Gly332Ser**

[1] We have scanned the DNA and the genotype of this animal is NORMAL - no presence of the disease associated variant (mutation) has been detected. This result may also be referred to as NORMAL, "-/-" or "wild type (WT)" or "homozygous negative". The animal is clear of the disease and will not pass on the disease-causing variant. Can be mated with an untested animal and WILL NOT produce any positive/affected offspring.

Sample with Lab ID Number 19172614 was received at Orivet Genetics, DNA was extracted and analysed with the following result reported:

Test Reported:	E Locus - (Cream/Red/Yellow)
Result:	**EE - DOMINANT BLACK DOES NOT CARRY YELLOW/RED/WHITE[1]**
Gene :	**MC1R**
Variant Detected :	**Em (point mutation) > E (wild type) > e (point mutation)**

[1] 2 copies of black E or "extension". All areas of the coat colour eumalanin will not produce any "e" offspring. The Extension loci is responsible for the majority of non-agouti patterns.

Sample with Lab ID Number 19172614 was received at Orivet Genetics, DNA was extracted and analysed with the following result reported:

Test Reported:	A Locus (Fawn/Sable;Tri/Tan Points)
Result:	**a^t/a^t - TAN POINTS - TAN POINTS or TRICOLOUR MAY BE BRINDLED [SEE K LOCUS] [1]**
Gene :	**ASIP**
Variant Detected :	**Base Substitution 246 G>T(A82S); G>A (R83H): C>T (p.R96C)**

[1] Homozygous for black and tan/tricolour (no hidden colours) allele. Tri factored/white factored in dogs that have white points. No Bi Factoring (Black White & Tan). Animals are primarily black and have areas of pheomelanin (tan) which tends to be seen on the leg and stomach areas, the side of he head and spots above the eyes. Please note the colour and distribution of pheomelanin "tan" will be dependent on the breed and other colour genes. Please note that any genes on the "A" series will only be expressed if the K locus is kk, kkbr or kbrkbr.

Sample with Lab ID Number 19172614 was received at Orivet Genetics, DNA was extracted and analysed with the following result reported:

Test Reported:	K Locus (Dominant Black)
Result:	**kk - RECESSIVE NON- BLACK [COLOUR PATTERN DETERMINED BY A LOCUS][1]**
Gene :	**CBD103**
Variant Detected :	**Deletion of GGG**

[1] Dog does not have the dominant black mutation. Dog's coat colour will be determined by the agouti gene – may be brindled or not brindled. Any phaeomelanin (red/tan) will be brindled. Can be sable/fawn, tricolour, tan points, black or brown. Will (may) have black pigment and black markings.

SAMPLE COLLECTION DETAILS

Case Number: 19172614

Approved Collection Method: NO

Date of Test: 1st Feb 2019

Collected By:

Authentication Code

Scan To Verify

Sample with Lab ID Number 19172614 was received at Orivet Genetics, DNA was extracted and analysed with the following result reported:

Test Reported:	Black Hair Follicular Dysplasia
Result:	**CARRIER - CARRYING ONE COPY OF THE PHENOTYPE[1]**
Gene :	**RAB27**
Variant Detected :	**Base Substitution G>A**

1

Sample with Lab ID Number 19172614 was received at Orivet Genetics, DNA was extracted and analysed with the following result reported:

Test Reported:	Coat Colour Dilution Alopecia
Result:	**NEGATIVE - NOT SHOWING THE PHENOTYPE[1]**
Gene :	**MLPH on Chromosome 25**
Variant Detected :	**Base Substitution G>A**

1

Sample with Lab ID Number 19172614 was received at Orivet Genetics, DNA was extracted and analysed with the following result reported:

Test Reported:	D (Dilute) Locus
Result:	**DD - NO COPY OF MLPH-D ALLELE (DILUTE) - PIGMENT IS NORMAL[1]**
Gene :	**MLPH**
Variant Detected :	**Base Substitution**

[1] Full colour, no dilute gene present. The D allele modifies the Melanophillin (MLPH) gene. This animal cannot produce "dilute" offspring.

Sample with Lab ID Number 19172614 was received at Orivet Genetics, DNA was extracted and analysed with the following result reported:

Test Reported:	Cone-Rod Dystrophy I - PRA (cord I)
Result:	**CARRIER [ONE COPY OF THE VARIANT DETECTED][1]**
Gene :	**RPGR interacting protein 1 (RPGRIP1) on chromosome 15**
Variant Detected :	**Nucleotide Insertion c.338-339InsA(29)GGAAGCAACAGGATG p.Thr59STOP (frameshift and premature stop codon)**

[1] We have scanned your animal's DNA and one copy of the normal gene and copy of the positive (mutant) gene has been detected. The genotype of the animal tested is CARRIER this result may also be referred to as HETEROZYGOUS or A/N or "+/-". Being an autosomal recessive disease the animal will not exhibit disease symptoms or develop the disease. Consideration needs to be taken if breeding this animal as it may produce affected offspring if mated to another carrier. It is recommended to have any breeding partner tested before breeding.

SAMPLE COLLECTION DETAILS

Case Number: 19172614

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Sample with Lab ID Number 19172614 was received at Orivet Genetics, DNA was extracted and analysed with the following result reported:

Test Reported:	Exercise Induced Collapse (Retriever Type)
Result:	**NEGATIVE / CLEAR [NO VARIANT DETECTED][1]**
Gene :	**DNM1**
Variant Detected :	**Base Substitution c.767 G>T**

[1] We have scanned the DNA and the genotype of this animal is NORMAL - no presence of the disease associated variant (mutation) has been detected. This result may also be referred to as NORMAL, "-/-" or "wild type (WT)" or "homozygous negative". The animal is clear of the disease and will not pass on the disease-causing variant. Can be mated with an untested animal and WILL NOT produce any positive/affected offspring.

Sample with Lab ID Number 19172614 was received at Orivet Genetics, DNA was extracted and analysed with the following result reported:

Test Reported:	Brown (GLNT331STOP) Stop Codon
Result:	**BB^s - DOES NOT CARRY BROWN or CHOCOLATE (STOP CODON) [1]**
Gene :	**TYRP1**
Variant Detected :	**Point Mutation**

[1] Does not carry brown – cannot have brown offspring.

Sample with Lab ID Number 19172614 was received at Orivet Genetics, DNA was extracted and analysed with the following result reported:

Test Reported:	Brown (345DELPRO) Deletion
Result:	**BB^d - DOES NOT CARRY BROWN or CHOCOLATE (DELETION) [1]**
Gene :	**TYRP1**
Variant Detected :	**Base Substitution (Point Mutation)**

[1] Does not carry brown – cannot have brown offspring.

Sample with Lab ID Number 19172614 was received at Orivet Genetics, DNA was extracted and analysed with the following result reported:

Test Reported:	Brown (SER41CYS) Insertion Codon
Result:	**BB^c - DOES NOT CARRY BROWN or CHOCOLATE (INSERTION) [1]**
Gene :	**TYRP1**
Variant Detected :	**Base Substitution (Point Mutation)**

[1] Does not carry brown – cannot have brown offspring.

SAMPLE COLLECTION DETAILS

Case Number: 19172614

Approved Collection Method: NO

Date of Test: 1st Feb 2019

Collected By:

Authentication Code

Scan To Verify

EXPLANATION of RESULT TERMINOLOGY

The terms below are provided to help clarify certain results phrases on your genetic report. The phrases below are those as reported by Orivet and may vary from one laboratory to the other.

NEGATIVE / CLEAR [NO VARIANT DETECTED]
No presence of the variant (mutation) has been detected. The animal is clear of the disease and will not pass on any disease-causing mutation.

CARRIER [ONE COPY OF THE VARIANT DETECTED]
This is also referred to as HETEROZYGOUS. One copy of the normal gene and copy of the affected (mutant) gene has been detected. The animal will not exhibit disease symptoms or develop the disease. Consideration needs to be taken if breeding this animal - if breeding with another carrier or affected or unknown then it may produce an affected offspring.

POSITIVE / AT RISK [TWO COPIES OF THE VARIANT DETECTED]
Two copies of the disease gene variant (mutation) have been detected also referred to as HOMOZYGOUS for the variant. The animal may show symptoms (affected) associated with the disease. Appropriate treatment should be pursued by consulting a Veterinarian.

POSITIVE HETEROZYGOUS [ONE COPY OF THE DOMINANT VARIANT DETECTED]
Also referred to as POSITIVE ONE COPY or POSITIVE HETEROZYGOUS. This result is associated with a disease that has a dominant mode of inheritance. One copy of the normal gene (wild type) and affected (mutant) gene is present. Appropriate treatment should be pursued by consulting a Veterinarian. This result can still be used to produce a clear offspring.

POSITIVE HOMOZYGOUS [TWO COPIES OF THE DOMINANT VARIANT DETECTED]
Also referred to as POSITIVE HOMOZYGOUS. Two copies of the disease gene variant (mutant) have been detected and the animal may show symptoms associated with the disease. Please Note: This disease has dominant mode of inheritance so if mated to a clear animal ALL offspring with be AFFECTED – HETEROZYGOUS ONE COPY.

NORMAL BY PARENTAGE HISTORY
The sample submitted has had its parentage verified by DNA. By interrogating the DNA profiles of the Dam, Sire and Offspring this information together with the history submitted for the parents excludes this animal from having this disease. The controls run confirm that the dog is NORMAL for the disease requested.

NORMAL BY PEDIGREE
The sample submitted has had its parentage verified by Pedigree. The pedigree has been provided and details (genetic testing reports) of the parents have been included. Parentage could not be determined via DNA profile as no sample was submitted.

NO RESULTS AVAILABLE
Insufficient information has been provided to provide a result for this test. Sire and Dam information and/or sample may be required. This result is mostly associated with tests that have a patent/license and therefore certain restrictions apply. Please contact the laboratory to discuss.

INDETERMINABLE
The sample submitted has failed to give a conclusive result. This result is mainly due to the sample failing to “cluster” or result in the current grouping. A recollection is required at no charge.

DNA PROFILE
Also known as a DNA fingerprint. This is unique for the animal. No animal shares the same DNA profile. An individual’s DNA profile is inherited from both parents and can be used for verifying parentage (pedigrees). This profile contains no disease or trait information and is simply a unique DNA signature for that animal.

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PARENTAGE VERIFICATION
QUALIFIES/CONFIRMED or DOES NOT QUALIFY/EXCLUDED
Parentage is determined by examining the markers on the DNA profile. A result is generated and stated for all DNA parentage requests. Parentage confirmation reports can only be generated if a DNA profile has been carried out for Dam, Offspring and possible Sire/s.

PENDING
Results for this test are still being processed. Some tests are run independently and are reported at a later date. When completed, the result will be emailed.
APPROVED COLLECTION METHOD (NO)
The sample submitted for testing HAS NOT met the requirements recommended by member bodies for the DNA collection process.

TRAIT (PHENOTYPE)
A feature that an animal is born with (a genetically determined characteristic). Traits are a visual phenotype that range from colour to hair length, and also includes certain features such as tail length. If an individual is AFFECTED for a trait then it will show that characteristic eg. AFFECTED for the B (Brown) Locus or bb will be brown/chocolate.

POSITIVE – SHOWING THE PHENOTYPE
The animal is showing the trait or phenotype tested.

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CLARIFICATION OF GENETIC TESTING

The goal of genetic testing is to provide breeders with relevant information to improve breeding practices in the interest of animal health. However, genetic inheritance is not a simple process, and may be complicated by several factors. Below is some information to help clarify these factors.

1) Some diseases may demonstrate signs of what Geneticists call “genetic heterogeneity”. This is a term to describe an apparently single condition that may be caused by more than one mutation and/or gene.
2) It is possible that there exists more than one disease that presents in a similar fashion and segregates in a single breed. These conditions - although phenotypically similar - may be caused by separate mutations and/or genes.
3) It is possible that the disease affecting your breed may be what Geneticists call an “oligogenic disease”. This is a term to describe the existence of additional genes that may modify the action of a dominant gene associated with a disease. These modifier genes may for example give rise to a variable age of onset for a particular condition, or affect the penetrance of a particular mutation such that some animals may never develop the condition.
The range of hereditary diseases continues to increase and we see some that are relatively benign and others that can cause severe and/or fatal disease. Diagnosis of any disease should be based on pedigree history, clinical signs, history (incidence) of the disease and the specific genetic test for the disease.
Penetrance of a disease will always vary not only from breed to breed but within a breed, and will vary with different diseases. Factors that influence penetrance are genetics, nutrition and environment. Although genetic testing should be a priority for breeders, we strongly recommend that temperament and phenotype also be considered when breeding.

Orivet Genetic Pet Care aims to frequently update breeders with the latest research from the scientific literature. If breeders have any questions regarding a particular condition, please contact us on **(03) 9534 1544** or **admin@orivet.com** and we will be happy to work with you to answer any relevant questions.

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