Paw Print Genetics
A division of Genetic Veterinary Sciences, Inc.

Canine Genetic Health Certificate™

Call Name:	Chase	**Laboratory #:**	481057
Registered Name:	MarLoWin's Chasing A Legend	**Registration #:**	DN77395402
Breed:	Miniature American Shepherd	**Microchip #:**	900235000113529
Sex:	Male	**Certificate Date:**	Feb. 25, 2025
DOB:	Nov. 2023		

This canine's DNA showed the following genotype(s):

Disease	Gene	Genotype	Interpretation
Chondrodystrophy with Intervertebral Disc Disease Risk Factor (CDDY with IVDD)	*CFA12 FGF4*	WT/WT	Normal (Clear) - No CDDY or Increased IVDD Risk
Coagulation Factor VII Deficiency	*F7*	WT/WT	Normal (Clear)
Collie Eye Anomaly	*NHEJ1*	WT/WT	Normal (Clear)
Cone Degeneration	*CNGB3*	WT/WT	Normal (Clear)
Craniomandibular Osteopathy	*SLC37A2*	WT/WT	Normal (Clear)
Degenerative Myelopathy (Common Variant)	*SOD1*	WT/WT	Normal (Clear)
Exercise-Induced Collapse	*DNM1*	WT/WT	Normal (Clear)
Hereditary Ataxia (Australian Shepherd Type)	*PNPLA8*	WT/WT	Normal (Clear)
Hereditary Cataracts (Australian Shepherd Type)	*HSF4*	WT/WT	Normal (Clear)
Hyperuricosuria	*SLC2A9*	WT/WT	Normal (Clear)
Intestinal Cobalamin Malabsorption (Australian Shepherd Type)	*AMN*	WT/WT	Normal (Clear)
Intestinal Cobalamin Malabsorption (Border Collie Type)	*CUBN*	WT/WT	Normal (Clear)

WT, wild type (normal); M, mutant; Y, Y chromosome (male)

Paw Print Genetics® performed the testing on the dog listed on this certificate. See the Laboratory Report for interpretation and recommendations based on these findings. The genes/diseases reported here were selected by the client. Normal results do not exclude inherited mutations not tested in these or other genes that may cause medical problems or may be passed on to offspring. The results included in this report relate only to the items tested using the sample provided. These tests were developed and their performance determined by Paw Print Genetics. This laboratory has established and verified the test(s)' accuracy and precision with >99.9% sensitivity and specificity. The presence of mosaicism may not be detected by this test. Non-paternity may lead to unexpected results. This is not a breed identification test. Because all tests performed are DNA-based, rare genomic variations may interfere with the performance of some tests producing false results. If you think these results are in error, please contact the laboratory immediately for further evaluation. In the event of a valid dispute of results claim, Paw Print Genetics will do its best to resolve such a claim to the customer's satisfaction. If no resolution is possible after investigation by Paw Print Genetics with the cooperation of the customer, the extent of the customer's sole remedy is a refund of the fee paid. In no event shall Paw Print Genetics be liable for indirect, consequential or incidental damages of any kind. Any claim must be asserted within 60 days of the report of the test results. Genetic counseling is available at Paw Print Genetics.

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Sex:	Male	**Certificate Date:**	Feb. 25, 2025
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This canine's DNA showed the following genotype(s):

Disease	Gene	Genotype	Interpretation
Junctional Epidermolysis Bullosa (Australian Shepherd Type)	*LAMB3*	WT/WT	Normal (Clear)
Multidrug Resistance 1	*ABCB1*	WT/WT	Normal (Clear)
Multifocal Retinopathy 1	*BEST1*	WT/WT	Normal (Clear)
Neuronal Ceroid Lipofuscinosis 6	*CLN6*	WT/WT	Normal (Clear)
Neuronal Ceroid Lipofuscinosis 8 (Australian Shepherd Type)	*CLN8*	WT/WT	Normal (Clear)
Progressive Retinal Atrophy, Progressive Rod-Cone Degeneration	*PRCD*	WT/WT	Normal (Clear)
Von Willebrand Disease I	*VWF*	WT/WT	Normal (Clear)

WT, wild type (normal); M, mutant; Y, Y chromosome (male)

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Coat Color and Trait Certificate

Call Name:	Chase	**Laboratory #:**	481057
Registered Name:	MarLoWin's Chasing A Legend	**Registration #:**	DN77395402
Breed:	Miniature American Shepherd	**Microchip #:**	900235000113529
Sex:	Male	**Certificate Date:**	Feb. 25, 2025
DOB:	Nov. 2023		

This canine's DNA showed the following genotype(s):

Coat Color/Trait Test	Gene	Genotype	Interpretation
Chondrodysplasia (CDPA)	*CFA18 FGF4*	cd/cd	No Leg Shortening Associated with CDPA
M Locus (Merle)	*PMEL*	m/m	Non merle

Interpretation:

Two genetic mutations are associated with shortened legs in dogs. Both mutations consist of copied sections (duplication) of the canine *FGF4* gene (called an *FGF4*-retrogene) that have been inserted into two aberrant locations in the genome; one in chromosome 12 (*CFA12 FGF4*; associated with CDDY and IVDD risk) and one in chromosome 18 (*CFA18 FGF4*; associated with chondrodysplasia [CDPA], but not associated with IVDD). Appropriate breeding decisions regarding dogs which have inherited the *CFA12 FGF4* mutation (WT/M or M/M) need to address both the potential loss of genetic diversity in a population which would occur if dogs with this mutation were prohibited from breeding as well as the loss of the short-legged appearance that is a defining physical characteristic for some breeds. In breeds which inherit both mutations, breeders may use genetic testing results to selectively breed for the CDPA (*CFA18 FGF4*) mutation while breeding away from the CDDY and IVDD risk (*CFA12 FGF4*) mutation to reduce IVDD risk and retain the short-legged appearance. However, the frequency of each mutation varies between breeds and, in some cases, may not be conducive to such a breeding strategy. For example, breeds with extreme limb shortening (e.g. Basset hound, Dachshund, Corgi) typically develop their appearance due to inheritance of both the *CFA12 FGF4* and *CFA18 FGF4* mutations. In addition, depending on the breed, offspring born without either the *CFA12 FGF4* or *CFA18 FGF4* mutations may display longer limbs than cohorts and, therefore, not meet specific breed standards.

This dog carries two copies of the **cd** allele which does not result in leg shortening. However, the actual leg length of the dog is a result of a combination of factors including the mutation associated with CDDY and IVDD risk (*CFA12 FGF4*) as well as variants in other genes. This dog will pass one copy of **cd** to 100% of its offspring.

This dog carries two copies of **m**, the non-merle, wild-type allele of the *PMEL* gene, and, therefore, does not have a merle coat color/pattern. This dog will pass on one copy of the **m** allele to 100% of its offspring.

Paw Print Genetics® has genetic counseling available to you at no additional charge to answer any questions about these test results, their implications and potential outcomes in breeding this dog.

Animal Disease Diagnostic Laboratory

Purdue University, 406 S. University Street, West Lafayette, IN 47907-2065
Phone: (765)494-7440 Fax (765)494-9181 Email: addl@purdue.edu
Web: http://www.addl.purdue.edu

ATTENTION: The ADDL's hours of operation, sample receiving, and testing schedule will be impacted by the holiday season. For more details about holiday hours and shipping recommendations, please visit our website at www.addl.purdue.edu

ADDL Case #: A24-10604 **Other ID:** **Date Received:** 12/20/2023

Submitter	Premises	Owner
PURDUE CANINE GENETICS LAB 625 HARRISON STREET WEST LAFAYETTE, IN 47907	DOG INFO PUPPY- NOT REGISTERED 10/29/2023 AKC	MarLoWin Aussies TINA WINSTON PO BOX 187 PHILPOT, KY 42366

Vet Phone:
Vet Fax:
Premise ID: DOG INFO
Tests Requested in: Mol Diag

Species: Canine
Breed: Miniature American Shepherd

Sex: Male
Age: 1.5 Months

Test	Ordered	Status	Completed
Neuroaxonal Dystrophy	12/20/2023	Complete	12/22/2023
Non-HSF4 Hereditary Cataracts	12/20/2023	Complete	12/22/2023

Owner Report

12/22/2023 10:21:36 AM

Molecular Diagnostics by Dr. Rebecca Wilkes, Section Head

The following tests were performed using **PCR**.

Animal ID	Specimen	Organism	Result
ROLANDE	Cheek Swab	Neuroaxonal Dystrophy	Clear (N/N)
		Non-HSF4 Hereditary Cataracts	Clear (N/N)