

INTEGRITY TESTED BREEDERS REGISTRY

ITBR

GENETIC COMPATIBILITY GUIDELINES

Understanding Genetic Testing, Carrier Status, and Inbreeding

Applies to all ITBR members | Dogs, Cats, and All Registered Species

Version 1.0 — 2026

Applies to all ITBR members across all Australian states and territories.

Integrity Tested Breeders Registry (ITBR)

www.integritytestedbreeders.com.au | info@integritytestedbreeders.com.au

PREAMBLE

This document is written for breeders with little or no prior knowledge of genetics. Every concept is explained in plain English with real-world examples. Technical terms are defined when first used and in the glossary at the end.

These guidelines are binding on all ITBR members. Producing a litter from a prohibited combination is a breach of the ITBR Code of Conduct regardless of intent. If you are uncertain about anything in this document, contact ITBR before mating.

The most important thing to understand before reading further

An animal can look perfectly healthy, win shows, and produce beautiful offspring - and still carry a mutation that causes serious suffering in some of its puppies or kittens.

DNA testing before mating is the only way to know. This is why ITBR requires it.

SECTION I - UNDERSTANDING DNA TEST RESULTS

Every animal inherits two copies of each gene, one from its mother and one from its father. A mutation is a change in a gene that can cause disease. DNA tests check whether your animal carries known mutations. For each condition tested, your result will be one of three things:

CLEAR (also written as **N/N**)

Two normal copies. The animal does not carry this mutation, is not affected, and cannot pass it to offspring.

Clear animals are the ideal breeding animal for this condition.

CARRIER (also written as **N/Mut** or **N/n**)

One normal copy and one mutated copy. The animal is clinically healthy, the normal copy compensates.

A Carrier **CAN** be used for breeding, but only with a Clear partner. This document explains exactly what is and is not permitted.

Roughly half of a Carrier's offspring will inherit the mutation.

AFFECTED (also written as **Mut/Mut** or **n/n**)

Two mutated copies. The animal will develop (or has developed) the condition.

Every offspring from an Affected animal inherits one copy of the mutation.

Breeding from an Affected animal requires specific consideration explained below. In most cases it is prohibited.

Important: some conditions appear at birth; others develop slowly over years. An Affected animal can look completely healthy at two years old and develop symptoms at five or seven. DNA testing tells you what is in the genes today -- before offspring are produced.

SECTION 2 - AUTOSOMAL RECESSIVE CONDITIONS

Autosomal: the gene sits on a non-sex chromosome. Males and females are affected equally.

Recessive: an animal needs TWO copies of the mutation, one from each parent, to actually develop the condition. One copy alone is not enough. This is why Carriers appear healthy.

The majority of hereditary DNA conditions in dogs and cats are autosomal recessive, including Progressive Retinal Atrophy (PRA) in many dog breeds, Exercise Induced Collapse (EIC) in Labradors, and Polycystic Kidney Disease (PKD) in some cat breeds.

The inheritance pattern for every disease can be found on the genetic test at time of purchase.

2.1 Permitted and Prohibited Combinations

Pairing	Offspring outcome	Risk of Affected	ITBR status
Clear x Clear	100% Clear offspring	None - 0%	Yes - ideal
Clear x Carrier	50% Clear, 50% Carrier	None - 0%	Yes - acceptable
Carrier x Carrier	25% Clear, 50% Carrier, 25% Affected	High - 25%	PROHIBITED
Carrier x Affected	50% Carrier, 50% Affected	Very high - 50%	PROHIBITED
Affected x Affected	100% Affected	Certain - 100%	PROHIBITED
Affected x Clear	100% Carrier	None - 0%	Yes – acceptable if the reproductive process doesn't cause the animal additional distress

Note on probabilities: these are the odds for each individual puppy or kitten, not guarantees across the litter. A litter of four from a Carrier x Carrier pairing might produce zero Affected -- or three. The risk is real every pregnancy, which is why the combination is prohibited even though some offspring would be healthy.

2.2 Breeding from a Carrier

A Carrier bred to a Clear partner produces no Affected offspring; this is the critical rule. ITBR permits Carrier x Clear breedings because carriers are often high-quality animals whose removal would reduce genetic diversity, and because the mutation causes them no harm.

When breeding from a Carrier you must:

- **Test the partner as Clear** for the same condition before mating, not probably clear, not untested. Confirmed Clear.
- **Test all offspring** intended for further breeding before they are used. A Carrier bred to another Carrier produces Affected offspring.

SECTION 3 -- AUTOSOMAL DOMINANT CONDITIONS

Dominant: one copy of the mutation is enough to cause the condition. Unlike recessive conditions, there is no "one copy is safe" being heterozygous (one copy) typically means the animal is already affected, or at significant risk of becoming so.

3.1 How Dominant Inheritance Works

Each time an Affected animal (carrying one mutated copy) is bred, each offspring has a 50% chance of inheriting the mutation. An animal with two copies is usually more severely affected -- in some cases, two copies is lethal.

Pairing	Offspring outcome	Risk of Affected	ITBR status
Unaffected x Unaffected	100% Unaffected	None - 0%	Yes - ideal
Unaffected x Affected (1 copy)	50% Unaffected, 50% Affected (1 copy)	Moderate - 50%	PROHIBITED
Affected (1 copy) x Affected	25% Unaffected, 50% Affected (1), 25% Affected (2)	High - 75%	PROHIBITED
Affected (2 copies) x Unaffected	100% Affected (1 copy)	Certain - 100%	PROHIBITED

3.2 ITBR Rules for Dominant Conditions

Breeding from a dominant-Affected animal are not permitted for Autosomal Dominant conditions.

Key examples of autosomal dominant conditions

PKDI (Polycystic Kidney Disease) in Persian-related cats - one copy causes progressive kidney failure. All Persian, Exotic Shorthair, British Shorthair, Ragdoll, Birman, and Himalayan cats used for breeding must be tested before registration.

Scottish Fold osteochondrodysplasia (Fd gene) - every Fold cat carries the Fd mutation. Two copies (FdFd, produced by Fold x Fold) causes severe and painful progressive joint disease in all four limbs. A Scottish Fold must never be bred to another Fold. Fold x Straight only.

Hereditary cataracts in some dog breeds - one copy causes or predisposes to cataract development.

SECTION 4 -- X-LINKED CONDITIONS

Females (XX) have two X chromosomes. Males (XY) have one X and one Y. Because males only have one X chromosome, the rules for Carrier and Affected work differently - and the results are often more severe in males.

For females (XX) - X-linked recessive

One normal X + one mutated X = Carrier. She is clinically healthy but can pass the mutation to offspring.

Two mutated copies = Affected (requires inheriting the mutation from both parents - uncommon).

For males (XY) - X-linked recessive

One mutated X = Affected - full stop. There is no second X to compensate.

There is no Carrier status for males with X-linked conditions. A male either has the mutation and is Affected, or he does not.

Examples include Haemophilia B in dogs (clotting disorder; affected males bleed severely from minor wounds while carrier females are healthy) and Muscular Dystrophy (GRMD) in Golden Retrievers.

A real-world scenario

A Carrier female is bred to a Clear male. Both look perfectly healthy.

Female offspring: 50% Clear, 50% Carrier (healthy but will pass it on)

Male offspring: 50% Clear, 50% AFFECTED (will develop the condition)

Half the male puppies from two healthy-looking parents will be Affected. Testing the female BEFORE mating is the only way to prevent this.

4.1 ITBR Rules for X-Linked Conditions

- Carrier females must not be bred without consulting ITBR regarding offspring management
- All male offspring from a Carrier female must be tested before use as breeding animals or sale as such
- All female offspring from a Carrier female have a 50% chance of being Carriers and must be tested before breeding
- An Affected male must not be used for breeding -- all his daughters will be Carriers

SECTION 5 - FELINE BLOOD TYPE INCOMPATIBILITY (CATS ONLY)

This section covers a condition that is completely preventable with a simple test but causes the death of newborn kittens if ignored.

5.1 Feline Blood Types

Cats have three blood types: A, B, and AB. Type B is controlled by a recessive gene - a cat needs two copies of the b allele to be Type B. Type B occurs at high rates in certain breeds, including British

Shorthair, Devon Rex, Cornish Rex, Scottish Fold, Ragdoll, Birman, Abyssinian, Somali, and Persian-related breeds.

5.2 Neonatal Isoerythrolysis (NI) - What It Is and Why It Kills Kittens

Type B cats naturally produce antibodies against Type A blood. This happens in all Type B cats, with no exposure needed. These anti-A antibodies are present in a Type B queen's colostrum; the first milk produced in the first 24-48 hours after birth.

When a Type A kitten nurses from its Type B mother, it absorbs those anti-A antibodies through its gut wall. Those antibodies then attack and destroy the kitten's own red blood cells, causing haemolytic anaemia. Affected kittens:

- Nurse normally at first, then decline rapidly within 24-72 hours
- Develop jaundice (yellow gums and skin) and pass dark brown or red urine
- Stop nursing, become weak, and die, sometimes within hours

There is no effective treatment. Removing kittens from the mother in the first 24 hours and hand-feeding may save some, but the window is extremely narrow.

ITBR position: absolute prohibition

A Type B queen may only be bred to a Type B tom.

Breeding a Type B queen to a Type A or Type AB tom risks producing Type A kittens who will die from NI after nursing. There is no acceptable risk threshold for this outcome.

5.3 Blood Type Combinations

Combination	Possible kitten types	NI risk	ITBR status
Type B queen x Type B tom	All Type B	None	Yes - permitted
Type B queen x Type A tom	Type A or B	FATAL - all Type A kittens at risk	PROHIBITED
Type B queen x Type AB tom	Type A, B, or AB	FATAL - Type A/AB kittens at risk	PROHIBITED
Type A queen x Type A tom	Type A (or Ab carrier)	None	Yes - permitted
Type A queen x Type B tom	Type A or B	Minimal - see note below	Yes - see note
Type A queen x Type AB tom	Type A or AB	None	Yes - permitted

Note – Type A queen x Type B tom: some Type A cats produce low-level anti-B antibodies that may mildly affect any Type B kittens in the litter. Discuss with your veterinarian and blood type the offspring.

5.4 How to Blood Type Your Cat

Blood typing can be done by veterinary blood test or by DNA test through Orivet and other approved providers (cheek swab). Both methods are accepted by ITBR.

Blood typing before mating is required for all cats regardless of breed

If your breed is not on this list but you are unsure, contact ITBR before mating.

SECTION 6 - COAT COLOUR GENETICS AND WELFARE

Several coat colour genes have direct welfare consequences when wrong combinations occur. This section covers the ones most relevant to ITBR-registered breeds.

6.1 The Merle Gene in Dogs

A single copy of Merle (Mm) produces the characteristic mottled blue/grey/brown coat pattern in Australian Shepherds, Border Collies, Collies, Shelties, Great Danes, Dachshunds, and others. A single-copy Merle dog is generally healthy.

Double Merle (MM) produced when two Merle-carrying dogs are bred together, causes the excess pigment dilution to affect the eyes and inner ear during development. Double Merle dogs commonly develop partial or complete blindness, partial or complete deafness, or both. These are severe, lifelong, irreversible conditions.

Merle x Merle is PROHIBITED without exception

Breeding a Merle dog to any other Merle-carrying dog, including cryptic Merle (see below) is prohibited under ITBR rules.

Visual assessment alone is not sufficient. DNA testing is required.

6.2 Why Red Dogs Can Be "Hidden" Merle And Why This Matters

The Merle gene only affects eumelanin (the black/brown pigment). It has no visible effect on pheomelanin (the red/yellow pigment).

A dog that is ee at the E locus (recessive red / clear sable) produces only pheomelanin in its coat no black pigment at all. With nothing for Merle to dilute, the dog's coat appears completely normal: a solid red, gold, apricot, or cream. But the dog still carries the Merle gene and can pass it to offspring. This is called a **Cryptic Merle** or **Phantom Merle**.

Why this should alarm every red-breed breeder

You breed red Australian Shepherds, red Border Collies, or red Dachshunds. Your dogs look normal, no patches, no blue eyes, no merle pattern.

Unknown to you, one carries the Merle gene hidden because the dog is ee. You breed this dog to a visually merle dog.

Each offspring now has a 50% chance of inheriting Merle from both parents. Those double-Merle offspring may be born blind, deaf, or both.

Visual assessment is useless here. DNA testing is the only way to know.

DNA testing for Merle before breeding is required for any dog used for breeding in a Merle-carrying breed, regardless of coat colour or appearance. Breeds where this applies include:

- Australian Shepherd
- Border Collie
- Dachshund
- Rough and Smooth Collie
- Shetland Sheepdog
- Any other breed listed in ITBR Minimum Health Testing - Dogs as requiring Merle testing

6.3 Dominant White and Deafness in Cats

The Dominant White gene (W) in cats produces a white coat masking all underlying colour. It is associated with high rates of congenital deafness, particularly in cats with blue eyes. The deafness is permanent and results from disrupted melanocyte migration to the inner ear during development.

- White cats with two blue eyes: up to 65-85% deaf in one or both ears in some populations
- White cats with one blue eye: commonly deaf on the side of the blue eye
- White cats with non-blue eyes: still at elevated risk compared to non-white cats

All cats carrying the Dominant White gene who are used for breeding must be BAER tested (Brainstem Auditory Evoked Response - a non-DNA hearing test) before registration. Breeding two Dominant White cats together requires ITBR notification before mating.

Colour Dilution Alopecia (CDA) - brief note for dog breeders

The dilute gene (dd) produces blue, fawn, lilac, and Isabella coats. In some breeds, dilute dogs are predisposed to Colour Dilution Alopecia progressive hair follicle degradation causing hair loss and chronic skin infections. Breeds with known CDA risk include Dobermann, Italian Greyhound, Great Dane, and Dachshund. Breeders of dilute dogs should be aware of this association.

SECTION 7 -- ITBR COMPATIBILITY RULES: COMPLETE SUMMARY

Strictly prohibited -- no exceptions

1. Carrier x Carrier (autosomal recessive)
2. Carrier x Affected (autosomal recessive)
3. Affected x Affected (any condition)
4. Unaffected x Affected (autosomal dominant) - produces 50% affected offspring
5. Carrier female (X-linked) x any male - requires individual assessment and offspring testing plan
6. Merle x Merle (including cryptic Merle - DNA testing required, not visual assessment)
7. Type B queen x any tom other than a Type B tom
8. Scottish Fold x Scottish Fold
9. Breeding from an X-linked Affected male

Permitted without restriction (key examples)

Clear x Clear (any condition)

Clear x Carrier (any autosomal recessive)

Unaffected x Unaffected (any dominant condition)

Affected x Clear (autosomal recessive) - produces all Carrier offspring; as long as it doesn't cause additional harm to the affected individual

Type B queen x Type B tom

Type A queen x any blood type tom (NI risk comes from the queen, not the tom)

Non-Merle x Non-Merle (confirmed by DNA test)

Merle x Non-Merle (confirmed by DNA test, not visual assessment)

Scottish Fold x Scottish Straight (Fold to non-Fold only)

Dominant White (W) cat x Dominant White cat - requires BAER testing of parents and careful breeding consideration

SECTION 8 -- ITBR CHECKS AND DISCLOSURE OBLIGATIONS

ITBR checks genetic test results for both parents when a litter registration is submitted. If a prohibited or flagged combination is found, ITBR will contact you before processing.

Request a pre-check before mating - not after. Email info@integritytestedbreeders.com.au with the ITBR animal numbers and test results for both proposed parents. We will respond within 10 business days. A flag before mating can prevent a problem. A flag at litter registration cannot undo one.

8.1 Disclosure Obligations

- All DNA test results must be accurately provided to ITBR at each litter registration
- Blood type results must be provided for all cats
- Merle status confirmed by DNA test (not visual assessment) must be provided for dogs in the breeds listed in Section 6.2

SECTION 9 - CONSEQUENCES OF NON-COMPLIANCE

Prohibited combinations, non-disclosure of test results, or false test results submitted to ITBR are all breaches of the ITBR Code of Conduct. Consequences include:

- **Financial penalty:** occurs for repeated (2 or more) matings of prohibited combinations, first incidence will not incur a fee but further information as to why the mating is prohibited and methods to eliminate the issue from occurring again. Repeated matings will result in fine and re-education
- **Suspension** of litter registration privileges pending formal review (for repeated prohibited matings)
- **Cancellation** of ITBR membership for repeat or serious breaches
- **Publication** of the cancellation on the ITBR website where relevant to public safety or breed health

A note on good faith

If you are unsure about a result, a combination, or anything in this document, contact ITBR before mating. Members who seek advice and act on it in good faith are treated very differently from members who ignore the rules or conceal information.

Email us: info@integritytestedbreeders.com.au

We would rather answer a question now than issue a breach notice later. We are here to help you with your breeding journey.

SECTION 10 - QUICK REFERENCE GLOSSARY

Affected: An animal with two mutated copies of a recessive gene, or one or more copies of a dominant gene, that will develop the associated condition.

Autosomal: Relating to a gene on a non-sex chromosome. Males and females are equally affected.

BAER test: Brainstem Auditory Evoked Response. A hearing test for dogs and cats, not a DNA test. Measures the brain's electrical response to sound.

Carrier: An animal with one normal and one mutated copy of a recessive gene. Clinically healthy but can pass the mutation to offspring.

Clear: Two normal copies of a gene. Does not have the mutation and cannot pass it to offspring.

Colostrum: First milk produced after birth. Rich in antibodies. Kittens and puppies absorb these through the gut wall in the first 24-48 hours of life.

Dominant: A gene variant that causes a condition or elevated risk even when only one copy is present.

Eumelanin: Black or brown pigment in animal coats. The Merle gene affects eumelanin but not phaeomelanin (red/yellow pigment).

Mutation: A change in the DNA sequence of a gene. Can be harmless or can cause disease.

Neonatal Isoerythrolysis (NI): Fatal destruction of newborn kittens' red blood cells by antibodies in the Type B queen's colostrum when the kitten has Type A blood.

Phaeomelanin: Red or yellow pigment in animal coats. NOT affected by the Merle gene, which is why red dogs can carry Merle invisibly.

Recessive: A gene variant that only causes disease when two copies are present. One copy = Carrier (usually healthy). Two copies = Affected.

X-linked: A condition controlled by a gene on the X chromosome. Males (XY) have only one X, so they are Affected by X-linked mutations without needing two copies.

INTEGRITY TESTED BREEDERS REGISTRY

Breeding with Integrity. Testing with Purpose.

www.integritytestedbreeders.com.au | Version 1.0 | 2026