Poodle Colors and Patterns

A Locus – Agouti

Controls the distribution of eumelanin (black/brown pigment) and is epistatic to several other loci.

- **Ay (Fawn/Sable)** – *Dominant*
    - Produces fawn or sable coat with black-tipped hairs.
    - May appear solid in dogs with other dominant modifiers.
    - Overrides At and a.
- **Aw (Wolf Sable)** – *Intermediate dominance*
    - Not typically present in Miniature Poodles but could theoretically be expressed if introduced.
    - Banding of hairs with black and yellow tones.
- **At (Tan Points)** – *Recessive to Ay*
    - Black with tan points (cheeks, eyebrows, chest, legs, under tail).
    - Only visible if no dominant Ay is present and affected by K and E loci.
- **a (Recessive Black)** – *Recessive to all*
    - Results in a uniform black or brown coat if not overridden.
    - Only expressed when dog is homozygous (a/a) and ky/ky at K locus and not affected by dominant E locus.

Interaction Notes:

- Requires ky/ky to express pattern; otherwise masked by dominant K.
- Affects color pattern, not pigment type.

K Locus – Dominant Black

Overrides agouti patterns if dominant.

- **K^b (Dominant Black)** – *Completely dominant*
    - Masks A locus patterning completely.
    - Solid black or brown if paired with appropriate B and E alleles.
- **K^{br} (Brindle)** – *Intermediate, rare in Poodles*
    - May show brindle striping; expression dependent on A locus (At or Ay).
    - Technically a modifier, and some labs consider this part of other loci.
- **ky (Agouti Permissive)** – *Recessive*
    - Allows expression of A locus patterns.

Interaction Notes:

- If K^b is present, the A locus becomes irrelevant for coat patterning.
- Requires E locus to be E/E or E/e for eumelanin-based colors.

E Locus – Extension

Controls presence and placement of eumelanin. Interacts heavily with the K and A loci.

- **E (Normal Extension)** – *Dominant*
  - Allows eumelanin expression (black or brown pigment).
  - Works with K and A to determine coat pattern and pigment.
- **e (Recessive Red)** – *Recessive*
  - Homozygous (e/e) causes phaeomelanin-only coat (red, apricot, cream).
  - Masks all other loci for eumelanin (K and A effects are not visible).

Interaction Notes:

- e/e renders K and A loci visually silent.
- Can still carry black or brown pigment genes without expressing them.

B Locus – Brown (Liver)

Determines whether eumelanin is black or brown.

- **B (Black pigment)** – *Dominant*
  - Produces black eumelanin.
- **b (Brown pigment)** – *Recessive*
  - Homozygous (b/b) changes eumelanin to liver/chocolate.
  - Affects skin, nose, eye rims, and coat if eumelanin is expressed.

Interaction Notes:

- Only visible if E is present (not e/e).
- Works with D locus for intensity.

D Locus – Dilution

Dilutes black to blue and brown to café au lait.

- **D (Full pigment)** – *Dominant*
  - Allows full intensity of eumelanin.
- **d (Dilute)** – *Recessive*
  - Homozygous (d/d) dilutes eumelanin: black becomes blue; brown becomes café au lait.

Interaction Notes:

- Only affects eumelanin.
- Must have E and B (or b) to be visible.

S Locus – White Spotting

Determines the amount of white in the coat.

- **S (Solid)** – *Dominant*
  - No white spotting.
- **sp (Piebald)** – *Recessive*
  - Homozygous sp/sp leads to white spotting of varying degrees.

Interaction Notes:

- Modifies pigment layout, not type.
- Can be present on any pigment base.

M Locus – Merle

Affects pigment distribution in patches.

- **M (Merle)** – *Incomplete dominant*
  - M/m gives merle pattern (mottled eumelanin).
  - M/M is often severely health-affected.
  - Not typically present in Miniature Poodles but could theoretically be expressed if introduced.
  - See Myths and Truths About Merle page for more details.

Interaction Notes:

- Requires E (not e/e) to be visible.
- Interacts with D, B, and K loci for final appearance.

G Locus – Graying

Progressive graying of eumelanin over time.

- **G (Graying)** – *Dominant*
  - Causes black/brown to fade over time to silver or café shades.
- **g (Non-graying)** – *Recessive*
  - Coat stays the original color.

Interaction Notes:

- Works on eumelanin only.
- Does not affect phaeomelanin (reds stay red).

I Locus – Intensity

Modifies phaeomelanin pigment depth.

- **I (Intense Red)** – *Dominant*
  - Brighter reds and apricots.
- **i (Dilute Phaeomelanin)** – *Recessive*
  - Lighter shades like cream or almost white.

Interaction Notes:

- Only affects phaeomelanin.
- Modifies e/e expression or red-based Ay dogs.

◆ What Is a Locus?

- A locus (plural: loci) is like a specific address or location on a chromosome.
- Each locus holds genes that control a certain trait—like coat color, pattern, or texture.
- Think of a locus like a mailbox for a particular genetic instruction—say, the K locus handles whether a dog is solid black or patterned.

◆ What Is an Allele?

- An allele is a version of a gene found at a specific locus.
- Every dog has two alleles at each locus—one from their mom and one from their dad.
- The combination of those two alleles is what determines how that trait shows up.

  For example: At the B locus (which controls black or brown pigment), a dog might inherit a B from dad and a b from mom. Since B is dominant, the dog will appear black, even though it carries brown.

🧬 How Does Inheritance Work?

- Each parent passes down one allele per locus to their puppies.
- The combination the puppy gets from both parents creates their genotype (genetic makeup).
- What we see—their coat color, pattern, or nose color—is their phenotype, which depends on how the alleles interact.

Some alleles are:

- Dominant – Only one copy is needed to show the trait.
- Recessive – Two copies (one from each parent) are needed for the trait to appear.
- Incomplete or Co-dominant – A mix or blend of both alleles can be seen.

Example: A Simple Genetic Match

Let's say you're breeding two Miniature Poodles:

- Mom has genotype E/e at the E locus (black pigment allowed).
- Dad has genotype e/e (recessive red).

Each puppy has a 50% chance of getting E/e and a 50% chance of e/e:

- E/e puppies will show black, brown, or other eumelanin-based colors.
- e/e puppies will be red, apricot, or cream, regardless of other loci!

The Colorful Cascade

When you combine all the loci together—A, B, E, K, D, G, I, S, and more—it becomes a beautifully complex puzzle. Each locus builds on the next like layers in a painting, making every puppy a unique genetic masterpiece.