Breeding Smarter: Combining Traditional Pedigree Knowledge with Modern DNA Tools in the Shiloh Shepherd

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For generations, experienced breeders have relied on their knowledge of the dogs behind the pedigrees when making breeding decisions. A pedigree is much more than a list of names. Each dog represents a history of health, temperament, structure, strengths, weaknesses, and traits passed down through generations.

By knowing these dogs and studying how different bloodlines have produced offspring over time, breeders can recognize patterns, identify hereditary problems, understand which lines complement one another, and determine which combinations may introduce unacceptable risks.

Pedigree analysis and test-breeding reports help breeders trace repeated ancestors, identify concentrations of particular bloodlines, and estimate the degree of relatedness between prospective parents.

This accumulated knowledge allows breeders to make informed decisions based not only on the two dogs being bred, but on generations of dogs behind them. It is also why accurate records, communication between experienced breeders, and knowledge of the breed's history are so important.

Modern DNA testing adds another dimension to this process. It provides information that pedigrees and breeding histories alone cannot reveal, but it does not replace the knowledge required to interpret those results and make sound breeding decisions.

One needs to understand what each of these tools actually measures, how they differ, and how they can be used together to make better breeding decisions while preserving the genetic diversity remaining in the Shiloh Shepherd.

The traditional pedigree system remains valuable. It explains which dogs created the modern bloodlines and where repeated ancestry is concentrated. However, pedigree COI is an estimate based on recorded ancestry and the database’s starting assumptions. It cannot directly measure how much matching DNA an individual dog actually inherited. Today, breeders have additional tools available to help them make more informed breeding decisions.

Understanding the Tools

Pedigree Reports

The pedigree report tells us where the dogs came from. It identifies named ancestors, repeated dogs, historical bloodlines, founder and outcross representation, percentage-of-blood estimates, and areas where particular lines are concentrated.

Embark DNA Testing

Embark measures genomic inbreeding (runs of homozygosity) in the dog being tested. When two existing dogs are tested, Embark can compare them to predict a future litter, but each puppy must be tested to know that puppy’s actual genomic COI.

UC Davis Genetic Diversity Testing

UC Davis does not provide the same type of genomic COI as Embark. It identifies genetic diversity at selected markers, breed-relative allele frequencies, Internal Relatedness, and DLA haplotypes. Its strongest value is helping breeders preserve genetic variants and immune-system diversity that may be uncommon within the Shiloh population.

BetterBred

UC Davis performs the laboratory test and gives you the genetic data. BetterBred organizes those results so breeders can compare dogs, identify underrepresented genetics, examine possible matings, and watch how the breed changes over time.

> **Understanding High Internal Relatedness (IR)**
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> A dog may have a high Internal Relatedness (IR), meaning its parents were relatively similar, but still carry uncommon alleles that are valuable to the population. That dog should not automatically be removed from breeding. BetterBred can help identify a genetically different mate so that the dog's underrepresented genetics can be passed on while reducing the likelihood of inheriting matching alleles at the tested markers.
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> This moves the conversation beyond asking, *"Is this individual dog inbred?"* and asks, *"What does this dog carry that the breed may need, and how can we breed it responsibly?"*

Quick-Reference Comparison

Tool	What It Measures	Primary Strength	Key Limitation
Pedigree Reports	Recorded ancestry, line concentrations, founder/ outcross percentages, and estimated COI.	Reveals family health history, structure, temperament, and historical patterns.	Only a statistical estimate; cannot measure actual inherited DNA.
Embark DNA	Genome-wide matching DNA (genomic COI) and specific disease/trait markers.	Shows the exact level of inbreeding an individual dog inherited and screens for known mutations.	Does not provide the same STR-based population diversity analysis offered by UC Davis and BetterBred.
UC Davis & BetterBred	Targeted STR markers, Internal Relatedness (IR), Outlier Index (OI), and DLA haplotypes.	Identifies rare alleles and immune diversity across the tested breed population to guide mate selection.	Does not measure genome-wide inbreeding or predict physical structure and temperament.

Using the Tools Together

The pedigree report tells us where the dogs came from. Embark tells us how much matching DNA is actually present in an individual dog. UC Davis tells us which portions of the breed's remaining diversity and DLA haplotypes that dog may help preserve.

For a well-informed Shiloh Shepherd breeding decision, the three tools should be used together rather than treated as interchangeable tests.

How to Use the Tools Together When Planning a Breeding

1. **Begin with the pedigree and test-breeding report.** Examine shared ancestors, repeated dogs, line concentration, founder and outcross representation, and expected pedigree COI. Consider the known health, temperament, and structural characteristics of the dogs behind the proposed pairing.
2. **Compare the parents' Embark results.** Examine each dog's genomic COI and their DNA-based relatedness. When both dogs have been tested, use the available mating comparison to estimate the expected genomic COI of their offspring.
3. **Examine the UC Davis results.** Compare the dogs' alleles at the tested STR markers, Internal Relatedness, and DLA class I and II haplotypes. Determine whether the dogs carry uncommon genetic variation and whether their genetic profiles complement one another.
4. **Use BetterBred to evaluate the proposed pairing.** Compare the dogs' pairwise genetic relatedness (GR), as well as their Outlier Index (OI), Average Genetic Relatedness (AGR), and DLA haplotypes against the tested Shiloh population. Consider whether the pairing could help preserve underrepresented genetic variation.
5. **Evaluate all the information together.** Consider health, temperament, structure, pedigree risks, genomic inbreeding, and preservation of genetic diversity. Avoid relying on any single number or repeatedly breeding the same dog simply because it carries uncommon genetics.
6. **Evaluate the puppies individually.** Puppies from the same litter share an identical pedigree but inherit different combinations of DNA. Embark can measure each puppy's actual genomic COI, while UC Davis testing can identify which tested alleles and DLA haplotypes each puppy inherited.

These results should be considered alongside the breeder's knowledge of the dogs behind the pedigree, including their health histories, temperaments, structure, and the strengths and weaknesses of their bloodlines. Test-breeding reports can also help identify repeated ancestors and line concentrations.

Together, this information can help breeders determine which puppies are the best candidates to retain for future breeding, considering both the preservation of genetic diversity and the qualities they want to maintain in their lines.

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