

## Follow up notes: Sponenberg Presentation - 2012 National Specialty

With this in mind, breeders here in the USA need to decide what to do with the very real possibility of more color variation in African dogs than in American dogs. While this situation does not mean the African dogs are less “pure” (after all, it IS an African breed), it can equally be the situation that the Americans find the limited color array of their dogs worth guarding as a breed characteristic that helps with easy recognition of the breed.

It can be tricky to manage a breed that is a standardized breed in one country (USA) and a local landrace in a second (Congo). The direction of flow of genetic material can be important to the breed and its future, and will generally (and likely always) be in the direction of Congo to USA. Importantly, the dogs in the two locations are under different selection pressures for different purposes and roles, and that in itself is going to cause differences (however subtle) in the final product. This is not saying that one place is right and one place is wrong – they are just different and that difference needs to be recognized and accepted for what it is if the two gene pools are to effectively serve the breed.

The very basic approaches to managing the breed have been outlined above. If the breed is completely closed, then the only question is how to maintain genetic variation sufficient to provide for long-term breed health. The most practical strategy

for that is for breeders to assure that a fairly wide array of unrelated or distantly related dogs are available for breeding. This is usually assured by breeders working more towards maintaining distinct lines with occasional line crosses in order to not mix everything thoroughly together so that all dogs are related to one another. Basically, this is to assure that the breed structure is more the “bag of marbles” than the “pyramid,” which sounds easy in theory but is actually difficult to achieve in a system with easy communication and transportation because individual dogs can be widely used and contribute to the pyramidal structure.

Depending on how breeders choose to go forward, it can be important to monitor founders and their contributions to the breed. This is true whether these are the original early imports, or later contemporary imported dogs. The reason for monitoring founders and their level of contribution to the breed is to try to assure a reasonable mix of founder genes in the breed in the USA. At one extreme, a few founders could swamp the breed’s genetics due to popularity and increased use at the expense of the contribution of less popular dogs. Depending on the reasons for that difference in popularity, the consequences for the breed could be a slowly constricting gene pool and the decreased vigor that comes from that.

The contribution of founders can be usefully tracked by computing the percentage input of each founder in the population of dogs alive at any given year. Done over several years this can track the relative success of the various founders.

An equally important piece of information is to know the maximum percentage of contribution of each founder to any living dog. This helps to pinpoint opportunities to enhance the contribution of a “low percentage” founder. For example, if a newly imported dog is considered, the percent contribution to the entire breed may be well under 1%. That dog itself, though, is 100%. If that dog were used over several

mates in the breed, then the resulting percentage throughout the entire breed could be boosted considerably over the 1% initially present. In contrast, if the maximum percentage of a “low percentage” founder is only 3%, then opportunities to boost that are really not available.

If and when new animals are imported to the breed, it becomes important to have strategies for using these wisely for the future of the breed. A few strategies are sure to fail, and several have good chances for success.

In several breeds it is easily possible for newly imported animals to end up swamping the domestic bloodlines. This happens when the imported animals are widely used, with breeders all rushing in to use imported animals and their offspring in their breeding programs. This is somewhat less likely with dog breeds than with livestock, but it still is a risk that the lure of the imported makes the domestically produced dogs somewhat less attractive. The situation of the imports swamping the domestic breed is short-sighted because the result is the extinction or near extinction of the domestic bloodlines, and that serves the breed poorly. Basically, it replaces the breed, completely or nearly so, with the newly imported stock.

At the other extreme it is possible to end up swamping the newly imported bloodlines with the domestic breed. This happens when the imported animals meet with little approval or use from the breeders of the domestically produced animals. This is more likely than the previous situation, especially in dog breeds, because the imported animals are likely to have differences of type that may result in diminished show ring success. In this situation the importation has minimal influence on the breed, and the expense and hassle of the importation is therefore wasted.

In between these two extremes are strategies that have different breeders taking different routes in order to assure that future generations have a wide array of bloodlines and breeding stock to choose from. This does not necessarily have to be tightly organized, but if some breeders specialize in domestic bloodlines, some in imported bloodlines, and some in combinations, then the breed is well-served with a diversity of approaches and genetic lines. It is most likely that the breeders cooperating to use the imported dogs will have to communicate and plan closely, because due to the relatively low numbers of these dogs it is easy to lose the genetic influence of some of them unless the breeding is carefully planned.

In any discussion of imports and how to use them, the question of how many founders, or imported dogs, comes up. This question makes sense in dire conservation situations with wild animal species that are facing extinction, and also with some domesticated animals that are vanishingly rare. For the Basenji, this question may make somewhat less sense because their situation is less dire. The more important questions to answer are the ones dealing with how the dogs in the Congo (or neighboring areas) relate to the Basenji breed in the USA. If the answer to this question is that the African dogs and American dogs are no longer the same breed, then close genetic monitoring of the American dogs needs to be initiated so that the genetic health of the breed is safeguarded. This is because the isolated American breed has few founders, and with that comes some level of inbreeding that is unavoidable.

If, alternatively, it is decided that at least portions of the African dogs are the same breed as the American dogs, then strategies for including these in[to] the American breeding lines need to be developed. Introduction of these dogs could be cut off at some magic number, but that is essentially saying that the African dogs are really not quite the same as the American breed. That strategy needs to be closely examined, because it can easily not be based in genetic realities but in efforts to protect the stake that certain individual breeders have in a given situation. While this may be politically expedient, it should not be put forward as a decision based in biology, because it is in fact a political decision rather than a biological one.

The short answer is that there is no magic number that can be given for the number of founders a population needs. It depends on a host of factors, not all of which are knowable. The short answer is always “plenty” and this usually means more rather than fewer. A more important question is how the imports and their descendants are used to assure the future of the breed. This means that they are not allowed to drift to extinction, but neither are they allowed to swamp the domestic breed.

Any breed needs to have adequate genetic variation in order to continue longterm without outcrosses (whether these be other breeds or imported dogs). While Basenjis have the relative luxury of a potential pool of African dogs, it is always wisest to manage a breed’s genetic structure as if no reserve pool existed. That way if the pool becomes unavailable for any reason, the breed still continues. However, it is always wisest, even if using this strategy, to allow for imports from that other pool as long as they are available. In order to continue long term in isolation it is essential for all breeding dogs to have potential mates available that are relatively unrelated. In the long run this makes it essential to assure that everything does not become an even mix, and that distinct genetic pools are maintained. This can run counter to the “pyramid” organization of genetic material outlined above.

Basenji Club of America, Inc. BULLETIN - 49

Follow up notes: Sponenberg Presentation - 2012 National Specialty

One way to do this (and there are several) is to assure that each breeding animal replaces itself with a breeding animal or two. The alternative situation, where only a few families generate the breeding animals of the next generation, assures a constantly shrinking gene pool.

Assuring this broad participation in breeding can run counter to the culture in many breeds where only dogs that are successfully campaigned can have reproductive success. Tackling this is a tricky assignment. One strategy that can help, though is freezing semen from a wide variety of dogs to assure that unrelated matings are available through this mechanism. This is especially wise in the case of imported dogs, so that their availability is assured even if a mishap or accident removes the dog from the actively breeding population.

The challenges facing the Basenji, and many other dog breeds, are serious challenges. No single answer is guaranteed to work. Discussions of basic goals and philosophies can be helpful in shaping a shared culture among breeders that provides for unified action towards making the breed genetically sound for long

into the future, with broad participation from a wide range of breeders  
Basenji questions with answers.

1. How do we both manage breeding to a breed standard AND incorporating genetic diversity? Various BCOA members have varying degrees of comfort with phenotypic variability.

This harks back to the basic definition of a breed. If the definition is that the breed is a standardized breed, then variation is relatively negative in the sense that all dogs are evaluated according to one single standard. A landrace philosophy, in contrast, will embrace more variation. That makes incorporating genetic diversity relatively easy, but thwarts competitive showing considerably.

2. Some members have suggested we have plenty of genetic diversity without any new founders? How do we know if that's true or not?

You really do not know the answer to this issue prospectively. You only know this retrospectively, generally after problems arise in the frequency of genetic diseases or with inbreeding depression. Unfortunately it is impossible to know in advance of problems, although an "early warning system" can help to head off huge problems before they get too large.

3. There is a concern that while we may or may not be fine now from a genetic diversity standpoint, we certainly will not be in the future. This is due to some inherent dog breeding "truths". One of these is more breeding to the winning stud dog. Another is we don't manage by committee; each breeder does their own program.

Breeding to a few winning dogs does take the breed into the population structure of a pyramid, with an ever-shrinking base of support.

4. Should we start a national/international steering committee on maintaining genetic diversity? Similar to zoos? Are we short sighted not to do this (in some form)?

This could be done in some form, although the strict control that zoos place on mating of animals is unlikely to succeed with dog breeding. A periodic update on the contributions of founders could be a role for such a committee, with an early alert to founders lines that are declining.

5. What is the difference between the approach used by zoos and the approach that you have used with breed clubs? For example, I know that zoos tend to avoid selection, whereas breeders expect to select in choosing their breeding stock.

Selection is one difference, and also the strict planning of matings for issues of genetic management and little else. This is unlikely to work in a dog breed.

6. Is the idea of separate parent strains part of this difference? When is a strain a strain? Different founders?

"Strain" has no really good definition, but distinct ancestors back to grandparents or beyond can work for a start. This is easier to do retrospectively than prospectively, and the idea is that certain gene pools are unrelated to one another.

7. What about physiological and behavioral traits – not just appearance – don't

those also have a role in preservation? I.e., things like resistance to extreme heat, good mothering, easy whelping, hunting behaviors, and other distinctive behaviors like yodeling.

These are important, and nearly impossible to evaluate in a show situation. How to evaluate these would be the difficult to assess and score. They are critically important to the breed and its identity.

8. Should we pursue a formal population study, or get consulting help in managing our populations?

Probably a less formal evaluation, with contributions of founders as well as low and high individuals for each founder would be sufficient.

9. Can you give us some examples of inbreeding stress on a population? Would smaller litters, greater incidence of birth defects be examples? When would folks expect to see these things - 10, 20, 30, 100 years?

Usually inbreeding depression results in decreased fertility and growth rate, as well as general vitality. It is nearly impossible to predict when it will occur, because each population is going to be different in its relative resistance to inbreeding depression.

10. If we're not seeing inbreeding stress now, does it mean we've dodged the bullet and are safe?

Maybe! The problem is you cannot really tell until it starts showing up!

11. Since we breed to a standard, are we over reacting by being concerned about imports, since any offspring will be eliminated from gene pool if not "show quality"? Other breeds, Dalmatians as an example, used entirely different breeds to create some genetic diversity. Would the problem of potential dilution of type self-correct?

The standard would indeed remove "off type" dogs relatively quickly. The catch here is to try to retain genetic diversity without losing breed type. If all "off type" dogs are removed quickly from the breed without considering founder effects, then it is possible to completely remove the influence of some founders. A multi-generation process of selection might help preserve type without eliminating founders.

12. For most "domestic" pedigrees, the dogs have the same 8 or so founders making up 90-99% of the pedigree - differences being a slightly higher percentage of one founder or another, or a trace of an ancestor in or not in another line. You don't really see much variability in pedigrees until after World War II. Does that mean our domestic pedigrees are really subsets of the same line?

Essentially these would be the same line by founder-descent, although this could re-branch from further isolation and selection as the breed fragments through time.

13. Does this make New Africans more important?

Yes, at least potentially. It does provide fresh genetics to the breed.

14. What are the benefits of keeping a full New African line? Could more than one line, with different individuals featured, be useful? For example, there is interest in lines that represent the type of dogs found in one area, such as Avongaras.

Keeping “full lines” of various sorts assures that breeders have outcrosses to all other lines. That can be important if and when a line starts to have inbreeding depression. Multiple such lines are good insurance, but no “magic number” can cover this. Two is likely insufficient, more is always better, but three or four can likely be made to work well.

Basenji Club