Breadth of Pedigree

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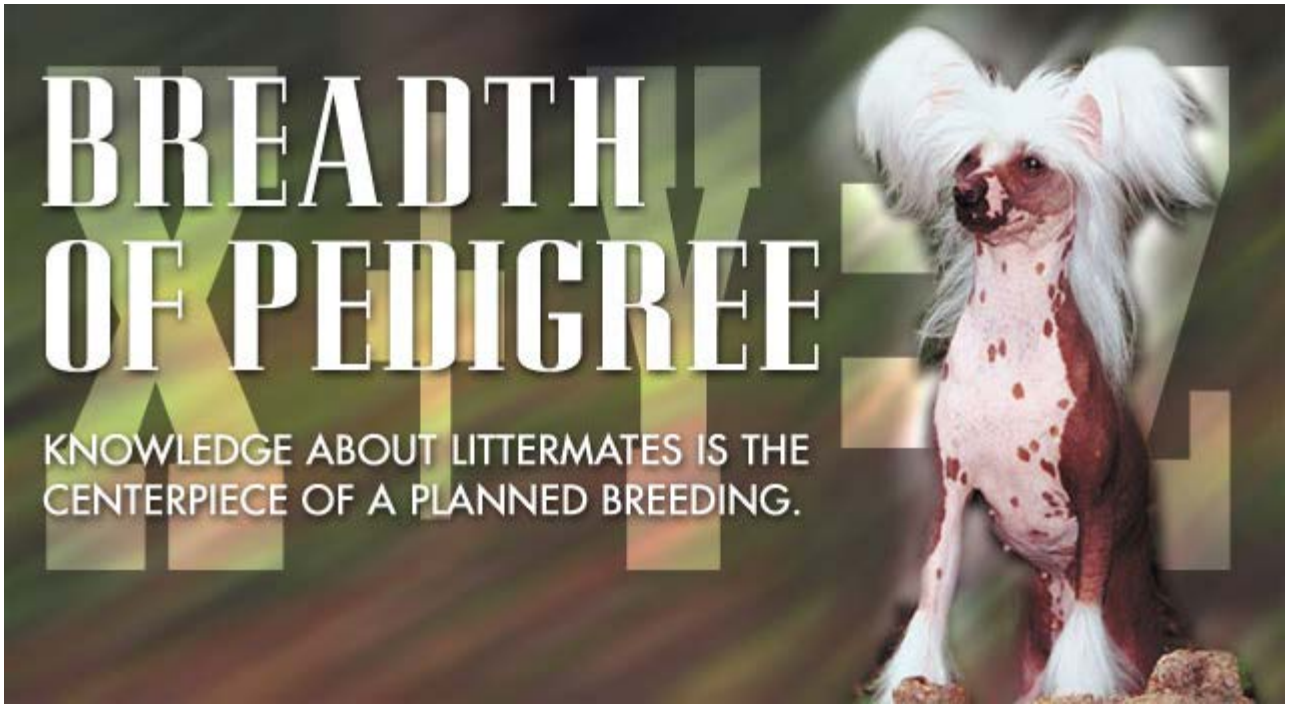
published in Canine Chronicle



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Introduction

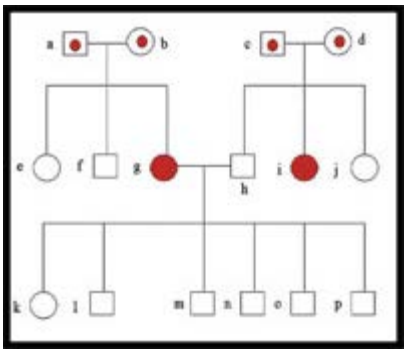
Analyzing the pedigree of a sire and dam before making the decision to breed has always been one of the best ways to understand the strengths and weaknesses of the breeding pair. Breeders have used this approach for centuries to make improvements. While successful, this custom has recently come under close scrutiny because of changing technologies and the competitive nature of competition. New methods coupled with better ideas have replaced the old way of doing things, causing breeders to want more and better information for analyzing their pedigrees. Even when they were able to make improvements, there lingered behind one important and troubling problem. When something worked, the breeder could take credit, but when it didn't or when the unexpected occurred, there was no record or source of information to review. There was no useful way to learn from mistakes. Too often, guesswork and finger pointing resulted. This dilemma called attention to the real problem-the lack of specific and detailed information about the immediate ancestors.

Historically, the most popular approach to pedigree analysis involved the 14 ancestors in the first three generations. This approach provided insight into their traits and characteristics. This technique is called "depth of pedigree" meaning that analysis included the ancestors in the first three generations. When the right sire-dam combination produced a better offspring, that combination was used again. But when it didn't, the breeder was left wondering if they were going in the right direction. At the root of this problem was the uncertainty about the carriers. Those who ignored this problem continued to produce unhealthy pups and others of poor quality with nervous characters. These problems brought to light the need for a new pedigree-one that could provide more and better kinds of information about the same ancestors in the first three generations.

PEDIGREES ANALYSIS

Experience has always been a good teacher when studying the value of a pedigree. In this respect, it was the research community that confronted this problem. They found that instead of using just one pedigree to analyze their pedigrees, a second or modified version was needed. Prior to the use of this new pedigree, the oldest and most popular pedigree, called the Traditional Pedigree, was the breeder's tool of choice. It focused on the names and titles of the ancestors. Over time, the breeders discovered that focusing on the names and titles provided no advantage because this information was not heritable. This led the researchers in their laboratories to look for a new way to expand information about the immediate ancestors (14) in the first three generations. They solved this problem by shifting attention to the littermates of these ancestors. After years of testing they learned that the littermates of each ancestor could serve as useful indicators of the traits and characteristics likely to be carried in their pedigrees. This conclusion was based on the fact that littermates share the same parents and the same gene pool. Understanding their strengths and weaknesses proved to be a useful way to locate many of the carriers.

When the littermates are included as part of pedigree analysis, the technique is called "breadth of pedigree" and the best way to display this kind of information is to use the Symbols Pedigree. It gets its name from the fact that symbols rather than names and titles are used to identify each ancestor and their gender. The usefulness of the Symbols Pedigree is illustrated in Figure 1, where two breedings (a-b and c-d) are shown. The coding of each ancestor (symbol) is straightforward. Squares are used to represent the males and circles the females. Accounting for all of the ancestors and their littermates not only shows litter size and gender but it also provides a reliable way to track the genes being passed from one generation to the next. This approach expands the analysis and makes the information more useful. Specific traits and diseases are color coded. For example, heart disease might be colored blue, hip dysplasia - orange, PRA - red, etc. The breeder determines these colors and the traits to be studied. Carriers are coded with a dot of the same color that was used to code an affected individual. Color coding traits, carriers and affected individuals makes the analysis more visual. In Figure 1, the color red is used to identify the disease called progressive retinal atrophy (PRA) which is an eye disease affecting more than 40 breeds. In this illustration, the symbols of those affected with the disease ("g" and "i") have been coded red and the carriers (a, b, c, d) are coded with a red dot.



In Figure 1, the two females affected with PRA (g and i) are coded red. Because the mode of inheritance for PRA requires that both parents be carriers, the sire and dam of these two females are coded with a red dot.

When an affected individual is bred to a non-affected, the resultant offspring will all be carriers. Since dam "g" was affected with PRA, she will give one recessive gene to each of her offspring. This means that all of her pups will be carriers. Notice in Figure 2 that they all have been coded with a red dot to reflect their carrier status.

The repetition of any color can usually be taken to mean that a genetic trend or pattern may be present. By including the littermates, the known carriers and the carrier suspects, the likelihood of making a judgment error is avoided.

QUALITY INFORMATION

What makes the Symbols Pedigree (breadth of pedigree) so useful is that it produces a visual picture of the location of the strengths and weaknesses that cannot be seen using the Traditional Pedigree. In practice, the more that one knows about the relatives, the better the breeding decision. Given this as background,

the following questions should be answered before each breeding:

1. What problems need to be addressed?
2. Who are the carriers?
3. What breeding method will be used (inbreeding, line breeding, and outcross)?
4. What DNA tests are available?

Whether a stud dog or brood bitch can be counted on to improve the traits in their offspring should be of interest to every breeder. One of the best ways to reduce the risk of breeding the wrong dogs is to know what traits are carried by their close relatives (ancestors and littermates). Think how differently a breeder would go about planning a breeding having narrowed it down to the two best stud dogs. Imagine that both are outstanding in the conformation ring and both are considered to be top winners. The first is called stud dog "X". He has five littermates, three are of poor quality and have missing teeth, and another has a dreaded disease. The second stud dog is called "Y". He has five littermates. Four have good conformation with outstanding health and good temperament. By comparing the two stud dogs along with their littermates using the Symbols Pedigree (breadth of pedigree), the choice between them becomes less complicate.

With more than 35 DNA health tests already available to identify the carriers, normal's and affected, breeders can now test and color code the ancestors using the Symbols Pedigree. By color coding the results of health tests, the breeder is more quickly able to see trends and problems. Those who use breadth of pedigree and the Symbols Pedigree will give new meaning to the phrase, "pedigree analysis". The scenario about two stud dogs illustrates why the quality of information is so important.

CONCLUSION

This abbreviated explanation of breadth of pedigree highlights the need to collect the right kinds of information about each ancestor. Those who use this approach will make improvements sooner. Over time, with the continued use of breadth of pedigree, breeders will more easily be able to manage the carriers in their pedigrees and thus produce quality pups by direction rather than by chance.

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