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MEMO ON INBREEDING

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Debates and questions about inbreeding reappear at regular intervals in spite of the fact that the contents of the “file” have been known for some time. For example, we are amazed by the pertinence with which some 19th century authors already presented the indications, guide lines for the implementation and the risks of inbreeding. As the subject could give rise to lengthy considerations, it goes without saying that this memo has no purpose other than to stipulate some essential elements.

From a genetics point of view, inbreeding has the fundamental effect of increasing the frequency of homozygous genotypes. The consequences of which are:

- the quantitative characteristics offered for selection – especially morphological (beauty) – tend to be fixed more rapidly,
- in parallel we are able to observe a more or less important deterioration of breeding qualities (fecundity, resistance),
- the increased frequency of recessive autosomal hereditary incidents.

The deterioration of breeding qualities and the onset of hereditary abnormalities in abnormal quantities create what we refer to as “inbreeding depression”. This is exactly the opposite to the “heterosis” phenomena, observed in animals born from cross-breeding, which characterizes itself especially by an improvement in breeding qualities and a reduction of the incidence of genetic pathologies.

The effects, positive and negative, of inbreeding are generally even more incriminated when the relation between the parents is closer. We are often happy to distinguish *close* inbreeding when referring to matings concerning 1st to 4th degree related subjects, and *wide* when farther related but, in the tradition of important 19th century English breeders, we can go even further by distinguishing;

- breeding in and in or close inbreeding which is limited to 2nd degree relations (brothers x sisters, parents x offspring),
- breeding in or inbreeding for matings between subjects which are 3rd or 4th degree relations (uncle x niece, second cousin x second cousin),
- line breeding where at least 5 degrees separate the parents,
- interbreeding which simply consists of mixing very far removed relations between each other and which, properly speaking, no longer constitutes inbreeding.

The breeder generally resorts to inbreeding when he has a remarkable dog whose characteristics he wants to reproduce. When he mates it to an offspring, he obtains animals which possess 75% of its genes. With brother to sister matings, even if the coefficient of inbreeding remains very high, the results are more diversified but equally interesting. We can understand why the method appeals: it constitutes a very powerful selection tool. Before undertaking such a method, the breeders always evaluate the risks they are taking. It is, unfortunately, impossible to foresee if hereditary

abnormalities have a chance of arising; if it is known that some exist in the parents' ascendants, we have, of course, an interesting indication but no certitude.

DNA tests themselves, even if certain are presently operational, only provide information for given genes. There is always a risk in the practice of inbreeding. This is inevitable but it constitutes part of a breeder's strategy. It cannot be either encouraged or discouraged. In answer to a request for information, we can only underline the advantages and the risks of inbreeding and, if the breeder decides to use it, advise that it be only used punctually.

Inbreeding should not be an end in itself, even if some breeders maintain true inbred lines based on the model of famous historical examples. It is even more difficult to uphold such practice when there is a strong tendency, in extremist animal protection circles, to have such practice forbidden. We even hear talk of "animal rights" not to be inbred..... On the other hand, the practice of line-breeding could be a good aim for a breeder. We can understand that, if he is satisfied with the zootechnical and health qualities of his animals, he wants to protect them from outside risk factors (unexpected alteration of their "beauty", introduction of a gene responsible for an abnormality...) and conserve their characteristics. Kennels can carry on for a long time using line-breeding. When, eventually, an outcross is used, it should be done with many precautions concerning hereditary pathologies; thereafter a new line-breeding program shall be undertaken.

Note that if a breeder wants, at all costs, to keep his breeding on an inbreeding level, thus refusing outside input from time to time, and if serious inbreeding related problems occur then he must assume the consequences alone as the breed, as a whole, is in no way concerned. This is to say that, for a given breed, the existence of large and well separated inbred lines does not pose a problem as opposed to inbreeding which weaves its way insidiously throughout an entire breed.

It is certainly this insidious reduction of genetic variability within breeds which constitutes the greatest problem related to inbreeding today. It can be seen in a population when a small number of stud dogs – sometimes just one – then their offspring assume reproduction. There is no deliberate wish to resort to inbreeding; this just happens, little by little, without the breeders being aware of it. The resulting loss of genetic variability undermines the evolution of the breed in another direction and favors the onset of lethal genes. Many breeds are in this situation which gives cause for concern and which should incite breed clubs to undertake true genetics management in the aim of conserving sufficient genetic diversity.

To summarize, inbreeding is one of the methods a breeder can resort to within the limits of his selection program. He cannot be advised either for or against inbreeding when the eventual risks only concern his kennel; it is his private affair. However, we cannot stress enough about the dangers resulting from an excessive reduction of genetic variability resulting from the use of the same stud dogs and their offspring throughout the entire breed.

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