Proceedings of the 8th International Symposium on Canine and Feline Reproduction

ISCFR

June 22-25, 2016
Paris, France

In a joint meeting with the XIX EVSSAR Congress

Reprinted in IVIS with the permission of the ISCFR Organizers
Congenital and genetic diseases of puppies before the weaning: can we prevent them?
Margret L. Casal,
Section of Medical Genetics, School of Veterinary Medicine, University of Pennsylvania, Philadelphia, PA, USA

Neonatal losses and/or disease can be significant in purebred dogs and may be caused by infectious pathogens, congenital or inherited defects. Inherited diseases are based on changes in the original DNA and typically passed on from one or both parents. Congenital diseases are present at birth and refer to certain traits or individualities, malformations or disorders, which may be either inherited or due to an occurrence during gestation. It is of utmost importance to determine the causes to avoid further losses. A detailed, comprehensive history including pedigree analysis and careful physical examination of the affected and normal neonates will provide clues as to the nature of disease and systems affected. If deceased neonates are present, a post mortem examination can provide valuable information that may help those neonates that are still alive.

If one thinks about all of the possibilities of errors that can occur during gestational development, it is surprising that the majority of neonatal dogs are born healthy. There are hundreds of thousands of sequences of events that must happen properly in order to produce a normal puppy. Intervention or interruption of any of these steps may lead to congenital defects. These interruptions can be caused by defects in the parental DNA, which has been passed on to the affected offspring or by effects that occurred during development, such as toxins, infectious diseases, mechanical influences, and irradiation. Recognizing the cause of congenital diseases will assist the conscientious breeder in producing healthier litters in the future.

Malformations can have extrinsic (environmental) or intrinsic (inborn or genetic) causes. Extrinsic agents must pass through the maternal system, which may be protective (e.g. by metabolizing harmful compounds or removing infectious agents) or harmful (e.g. by converting non-teratogenic compounds into teratogens that can produce malformations). On the other hand, the intrinsic (genetic) makeup of the embryo regulating development is often affected by the extrinsic cause, either directly or indirectly. In other words, there is a distinct relationship between the genetic background of an embryo and the affecting toxin/agent. This may sound familiar as the or "nature versus nurture" concept that is usually applied to postnatal life. It represents variances in susceptibility between different breeds and even between individuals of a breed. Experimentally, gene-environmental interactions have been shown and should be considered in assessing a cause of a given malformation.

Prevention of congenital and hereditary diseases will depend on the cause. In the case of genetic diseases, DNA testing and the development of careful breeding programs is key in preventing future occurrences of disease. Congenital diseases can also be caused by teratogenic drugs and supplements, environmental influences or infectious agents and can be avoided by removing the insult during pregnancy.