



# Animal reproductive medicine

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## BACKGROUND

Reproductive medicine research has focused on two paradoxical goals: contraception and enhanced fertility.

Effective non-surgical contraception is a goal for many domestic and game species. Several approaches have been considered, including immunization against zona pellucida and GnRH. However, these techniques were found to be ineffective for some species and impractical for use on a large scale, particularly in wildlife. Another challenge in population control in the wild is the need for an effective contraceptive method without disturbing normal reproductive behavior, which often regulates the social structure of the herd. A Challenge Grant was offered to find a safe and effective (permanent) non-surgical single dose sterilant for both sexes of dogs and cats. This has sparked new interest and the development of new approaches to contraception.

Improving fertility remains one of the most important aspects of clinical services for farm animals. The cow's milk industry is the most affected, as there is a trend towards low reproductive efficiency as production increases. The first challenge in this industry was the inability to properly identify heat and re-inseminate cows in a timely manner. This was due in part to human errors in handling and also to changes in the reproductive biology of the high-yielding cow. The interaction between metabolic activity and circulating hormonal patterns is responsible for poor expression of estrus, a higher rate of anovulatory cycles, and greater early embryonic loss. Strategies to improve the hormonal profile are possible, but are always limited by regulations governing the use of hormones in food-producing animals. The interaction between metabolic disorders, reproductive function, and susceptibility to uterine infections has been extensively studied

in dairy cows.

Other factors involved in declining fertility in farm animals that continue to challenge scientists and professionals are the environment and the interaction with systemic diseases. Heat stress has long been known to be a major limiting factor in reproduction. Molecular and genomic studies have shown a profound effect of heat stress on the quality of eggs and embryos. These studies provide a model of study because the climatic changes that the planet is experiencing will continue to affect the reproduction of both wild and native species.

Reproductive medicine/Theriogenology is also an individual animal practice. Various clinical problems have been investigated to optimally care for subfertile animals or animals with high-risk pregnancies. In addition to the common uses of imaging in reproduction, new surgical and non-surgical techniques are being developed to diagnose and treat the causes of infertility. The main species that have benefited from these techniques are small animals, horses, and camelids. The combination of established techniques such as endometrial biopsy, culture, and cytology with molecular techniques has greatly improved our understanding of the pathophysiology of endometritis and has led to the development of methods for diagnosis, prevention, and treatment.

The influence of age on the dynamics of the follicles and degenerative changes in the endometrium was mainly investigated in mares. Stem cell therapy for these degenerative changes is being investigated.

Advances in our understanding of the endocrinology of pregnancy and ultrasound of the fetus and placenta have provided a more effective method for evaluating high-risk pregnancies in mares. An experimental model for ascending placentitis in this species allowed scientists to create protocols to diagnose, monitor, and treat this

common cause of abortion and premature birth.

Another area of critical importance in reproductive medicine is the diagnosis and prevention of abortion. Several infectious causes of abortion in ruminants are zoonotic and pose a serious risk to human health. With the introduction of highly specific and sensitive molecular techniques, strategies are available for the rapid diagnosis of infectious causes of abortion. Studies of the pathophysiology of some of these diseases allowed a better understanding of host-

pathogen interaction and the development of congenital anomalies. This has been useful recently in the discovery and research of a new disease called "Schmallenberg".

Reproductive toxicology has attracted enormous interest from various researchers. In addition to traditional toxins (i.e. mycotoxins, plants) that are known to cause reproductive disorders (infertility or abortion), steroid disruptors are of great concern to both animal and human health.