

Application of veterinary cytogenetics in domestic animals: a review

ABSTRACT

Cytogenetics is the study of chromosomes; their structure and properties, chromosome behavior during cell division, their influence on traits and factors which cause changes in chromosomes. Veterinary cytogenetics is the application of cytogenetics to clinical problems that occur in animal production. It has been applied to understand problems such as infertility and its types, embryonic and fetal death, abnormality in sexual and somatic development and hybrid sterility and also prenatal sex determination and other forms of chromosomal abnormalities. These are achieved through conventional and banded karyotyping techniques and molecular cytogenetic techniques. Although conventional techniques are still useful and very widely applied, the nature of cytogenetics has gradually changed as a result of advances achieved in the molecular cytogenetic techniques for example fluorescent in situ hybridization and array-based techniques. These changes are evident in both molecular diagnostics and basic research. The combination of conventional and molecular cytogenetics has given rise to high resolution techniques which have enabled the study of fundamental questions regarding biological processes. It enables the study of inherited syndromes, the mechanisms of tumorigenesis at molecular level, genome organization and the determination of chromosome homologies between species. It allows the ease with which animals are selected in breeding programs and other important aspects of animal production. In this paper we discussed a number of techniques employed in cytogenetics and their methodologies, and recommend where future focus should be for the benefits of animal production.

Keyword: Cytogenetics; Karyotyping; Chromosomal aberrations; In situ hybridization