**Whole genome analysis reveals aneuploidies in early pregnancy loss in the horse**

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**Abstract**

The first 8 weeks of pregnancy is a critical time, with the majority of pregnancy losses occurring during this period. Abnormal chromosome number (aneuploidy) is a common finding in human miscarriage, yet is rarely reported in domestic animals. Equine early pregnancy loss (EPL) has no diagnosis in over 80% of cases. The aim of this study was to characterise aneuploidies associated with equine EPL. Genomic DNA from clinical cases of spontaneous miscarriage (EPLs; 14-65 days of gestation) and healthy control placentae (various gestational ages) were assessed using a high density genotyping array. Aneuploidy was detected in 12/55 EPLs (21.8%), and 0/15 healthy control placentae. Whole genome sequencing (30X) and digital droplet PCR (ddPCR) validated results. The majority of these aneuploidies have never been reported in live born equines, supporting their embryonic/fetal lethality. Aneuploidies were detected in both placental and fetal compartments. Rodents are currently used to study how maternal ageing impacts aneuploidy risk, however the differences in reproductive biology is a limitation of this model. We present the first evidence of aneuploidy in naturally occurring equine EPLs at a similar rate to human miscarriage. We therefore suggest the horse as an alternative to rodent models to study mechanisms resulting in aneuploid pregnancies.