

One of the most common and severe complications when mares give birth is fetal membrane retention (FMR). This is a life-threatening condition that can affect one out of four mares, particularly heavy draft mares. This breed of mares is especially popular in the region of Warmia and Mazury in Poland.

During parturition, if the fetal membranes are not expelled within 3 hours, the mare is classified as having FMR. Without rapid veterinary intervention, a mare with FMR can die. Unfortunately, despite years of research, the exact cause of FMR remains unknown, making it impossible to diagnose it earlier than 3 hours after foal delivery and a challenge to choose the most effective treatment.

In the mare, the start of the process of giving birth remains a mystery. What is known is that levels of hormones called progestagens start to decrease rapidly a few days before birth. This leads to an increase in the availability of prostaglandins, which not only induce contractions of the uterus but also stimulate an inflammatory response that is an important part of giving birth. Prostaglandins are synthesized and degraded in the placenta, and in our previous study, mares that developed FMR had significantly lower levels of an enzyme involved in the production of these compounds. Only small quantities of prostaglandins are released to maternal peripheral blood, where they can be detected in inactive forms that have been metabolized. Although levels of these prostaglandin metabolites normally increase in the peripheral blood during the birthing process, they have not been measured in mares undergoing FMR.

This research aims to investigate causes leading to FMR in heavy draft mares and measure hormones or their metabolites in blood. Mares from two herds will be monitored during their entire pregnancy for maternal and fetal well-being. We will supervise births and collect blood and placenta samples from the mares. Once 3 hours have passed from foal delivery, we will assign the mares to the FMR or the control group. We will need 15 mares in each group in order to have enough statistical power to detect important differences between them.

Once the sampling is done, we will perform RNA sequencing on placental samples, which will allow us to analyze differences in gene expression. After determining the differences in gene expression between our two groups of mares, we will follow up by investigating the expression and location of proteins in placenta tissues.

Additionally, we will take two blood samples 12 hours apart (pre- and post-foaling) to measure the content of different hormones (like progestagens and prostaglandin metabolites), which may help to develop an early diagnostic test for FMR.