



Research into the Correlation Between Retentio Secundinarum and Inbreeding

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Retentio secundinarum (failure of the afterbirth to be expelled properly) occurs frequently among Friesian mares. Various factors could play a role in this phenomenon. This article addresses certain genetic factors involved in retentio secundinarum with an emphasis on its relationship to inbreeding. Is there a link between inbreeding and retentio secundinarum? And if so, what kind of correlation is this?

Inbreeding depression

The average inbreeding percentage in the Friesian horse population is an important point in FPS breeding policy. In addition to creating a population of Friesian horses that is both functional and beautiful, the FPS breeding program is also striving to reduce the inbreeding percentage within this population. Lowering the level of the average inbreeding percentage is necessary since certain functional properties (predominantly related to fertility) can be negatively affected by a high inbreeding percentage. When these functional properties are depressed due to inbreeding, this phenomenon is known as "inbreeding depression."

High Incidence

The questions posed in the introduction to this article can thus be summarized as follows: is the occurrence of retentio secundinarum the result of inbreeding depression? With this question in mind, a study was conducted among a limited number of Friesian mares in which data from 489 births (1999 and 2000) of Friesian foals were collected and analyzed. In 267 of these births, the afterbirth had not been expelled within three hours after the birth of the foal. In other words, in 54% of all observed births, retentio secundinarum had occurred.

Inbreeding Percentage

In addition to birth data, the FPS central registration records were consulted to find the pedigrees of the foals in the study. Using the pedigrees, the inbreeding percentages for each foal could be calculated. The inbreeding percentages calculated here are higher than the percentages usually published by the FPS. The difference is due to the number of generations used in the calculations. The FPS calculates inbreeding percentages as based on the five previous generations. [We] present the values as based on all the family members listed in all the generations at the central registration records. Using these figures, the chance that two horses have a common ancestor is much greater, thus resulting in a higher inbreeding percentage for the descendants.

Inbreeding Trend

More important than the average inbreeding coefficient at a certain point in time, however, is the inbreeding trend: the average increase in inbreeding within a population each year. It is also the inbreeding trend that determines how high the level of inbreeding depression is. After all, a high inbreeding depression is expressed predominantly in a large increase in the average inbreeding coefficient. A high inbreeding trend will thus produce a high level of inbreeding depression. Starting in 1979, the inbreeding trend was 0.2%/year. This means that the average inbreeding percentage for the population of Friesian horses over the last 20 years has increased by 4%.

Regression Coefficient: Foals

After these initial descriptive analyses, the data for retentio secundinarum and inbreeding percentages for each of the foals were obtained. Next, the correlation between retentio secundinarum and the inbreeding percentage of the foals could be estimated. This correlation is presented in Figure 1. {The version of this article in 'The International Phryso' did not include any of the original Figures that were published in 'The Phryso,' February 2002 - please see the following article by Dr. Karen Salvage - ed.} The figure shows that the incidence of retentio secundinarum is rising among the foals with a higher inbreeding percentage. The exact relationship is quantitatively expressed by means of the regression coefficient. The regression coefficient for the inbreeding percentage of the foal compared with the incidence of retentio secundinarum is 0.12. This means that for each percent of increase in the inbreeding percentage of the foal, the incidence of retentio secundinarum rises by 0.12 percent.

Regression Coefficient: Dams

The inbreeding coefficients of the dams of the 489 foals were also known. This means that the correlation between retentio secundinarum and the mare's inbreeding percentage could also be estimated. This correlation is presented in Figure 2. Here it can be seen that the incidence of retentio secundinarum drops as the dam's inbreeding percentage increases. The regression coefficient for the inbreeding percentage of the dam compared with the incidence of retentio secundinarum is -0.016.

Until this study was conducted, it had been assumed that the occurrence of retentio secundinarum was chiefly related to the mare's genetic make up. This study, however, showed that the occurrence of retentio secundinarum is chiefly related to the

foal's inbreeding percentage. The absolute value (i.e. the value without the plus or minus) of the regression coefficient for the inbreeding percentage of the foal compared with the incidence of *retentio secundinarum* is thus ten times as great as that for the inbreeding percentage of the mare compared with the incidence of *retentio secundinarum*. (i.e. 0.12 versus 0.016). This can lead to the conclusion that the genetic similarity between the parents of a foal can affect the occurrence of *retentio secundinarum* at birth.

Further Research

It is important to mention that the values given here do not automatically apply to the entire population of Friesian horses. To be able to draw conclusions for the entire population would require a much larger and more representative random sampling. Although more research would be required to draw useful conclusions, the figures cited here offer an indication of the role that the inbreeding percentage plays in the occurrence of *retentio secundinarum*. It is therefore important for mare managers to heed the recommendations published by the FPS in the choice of suitable stallions. This is important not only for the interests of the FPS but also in the interest of the mares.

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