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.

Acknowledgment

We would like to extend our sincere thanks to the Koninklijke Vereniging "Het Friesch Paarden-Stamboek" for the opportunity to make use of its registration records. In addition, we are also very appreciative of the fact that all the owners of the mares and foals were so kind as to supply us so freely with the data about their mares and foals and the births of the foals.

What does the Retentio Secundinarum Study Mean - Statistically Speaking?

GUEST ARTICLE

By Dr. Karen Salvage, PhD, Professor, Geology Department, Binghamton University, State University of New York at Binghamton.
Reviewed by Dr. Pat Shipman, Anthropology Department, Penn State University

The article is based upon a study of 489 births in 1999 and 2000. Of these, a total of 267 (or 54%) involved retentio secundinarum. There are a total of 18,192 registered mares worldwide, based on data presented by the studbook in 2001.

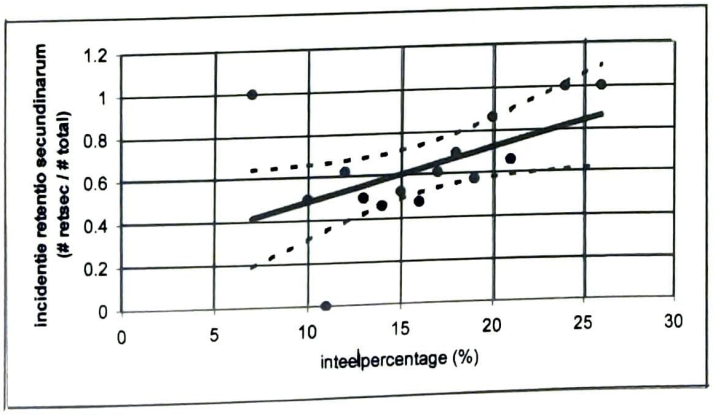
1) Is the 489 (2.7% of the total number of mares) a representative sample?

There is a wide variance (s=0.498) around this 54% value for observed problem births. A 90% confidence interval for this value is 51 - 58%.

The sample is statistically significant. It is not positive if it is representative, but it is quite likely.

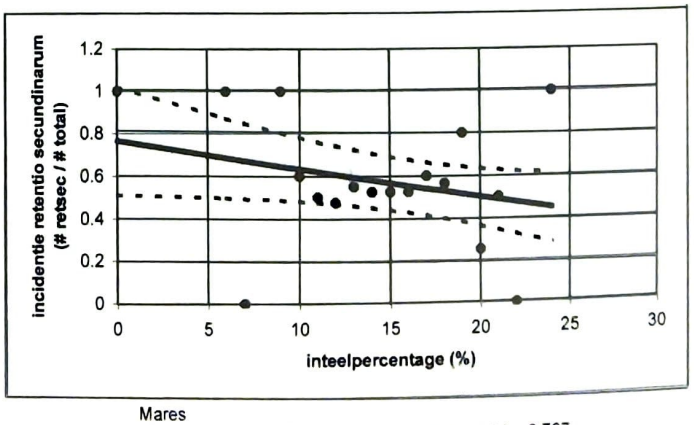
2) The article presents two graphs which show "best fit" lines for the data for (% problems) vs (% inbreeding of the foals and the mares). The slopes of these lines indicate a trend or relationship between these variables:

continued



Foals
Linear trend of the data: $y = 0.0234 (x) + 0.254$
$R^2 =$ 0.22
90 % confidence interval shown.

Figure 1 A.



Mares
Linear trend of the data: $y = -0.0134 (x) + 0.767$
$R^2 =$ 0.08
90 % confidence interval shown.

Figure 1 B.

Scanned graphs from the original article, in Dutch, from the "Phryso," with 90% confidence interval (shown as the fine dotted line) added by Dr. Salvage. The data points have not been altered.

Statistically Speaking? cont.

Figure 1 A. Slope of the lines showing % problem births vs. % inbreeding of foals is +0.0234 (as reported in the article), indicating an enhanced risk of problem births with increased inbreeding of the foal. However, there is a fair amount of "scatter" of the data around the "best fit" line. On the revised figure (previous page) a 90% confidence interval is shown. The confidence interval means that 90% of the cases fall between 51-58%. There is no test indicated that shows the relationship is statistically significant.

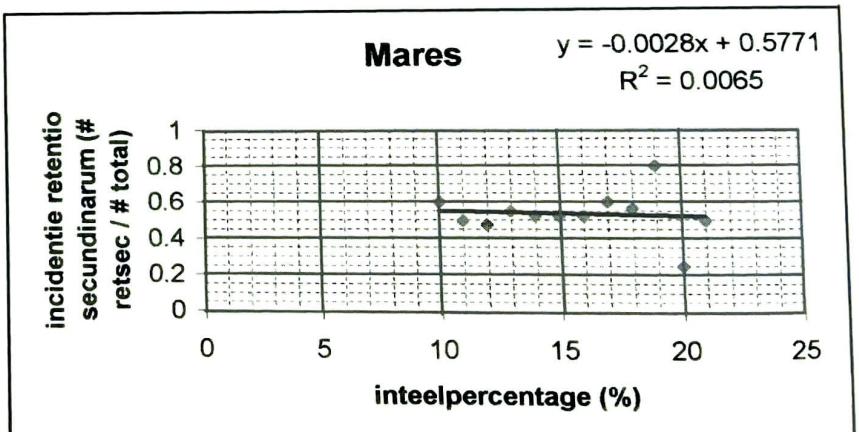
Figure 1 B. Slope of the lines showing % problem births vs. % inbreeding of mares is -0.0134 (as reported in the article) indicating a slightly decreased risk of problem births with increased inbreeding of the mare. On the revised figure (previous page), a 90% confidence interval in shown, and seven of the 18 data points fall outside of this interval. A broad scatter may indicate that the relationship isn't significant, but no test is indicated that shows statistical significance.

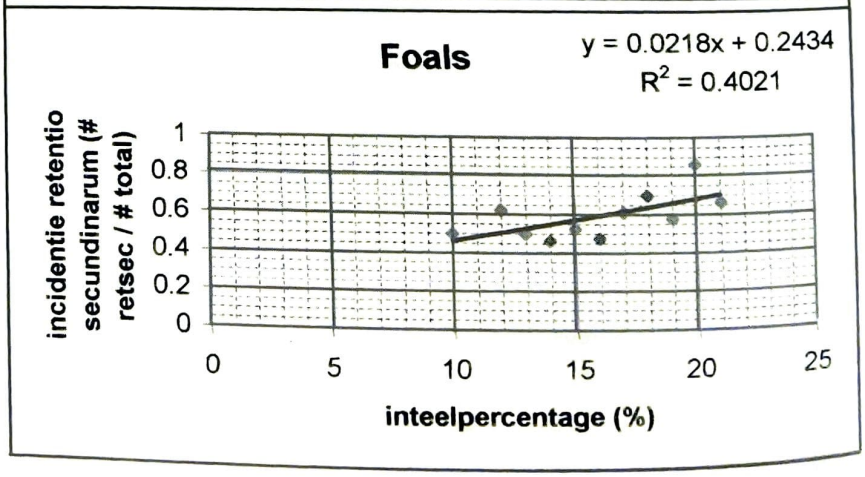
For both sets of data, it would be informative to have the total data set available (i.e. to have the data used to derive the "y-axis": the actual number of problems versus the number of horses having the specific inbreeding percentage). For 6 of the data points on Fig 1 B. and 3 on Fig 1 A., the value is either 0 or 1 (no problem births or 100% problem births for that category). It would be interesting to know if these data points each represent 1 birth (that had or did not have a problem) or multiple births that all either had or did not have a problem. If we remove the 0 and 1 data points, the relationship for foals is still +0.02 but the relationship for mares is -0.003 (i.e. almost a straight line showing no relationship between inbreeding of the mare and problem births).

Conclusion: The hypothesis that inbreeding influences retained placentas cannot be evaluated without more information.

Isis - Photography by Kris Fulwiler

Figures 1 B and 1 A showing the 0 and 1 data points removed - original data points; "best fit" line revised by Dr. Salvage.





Galaxy - Photography by Kris Fulwiler