Rasmussen Factor (RF) Inbreeding in Stallions: The Effect on Their Racing and Breeding Career

The "Rasmussen Factor" (or RF) is a term used to describe inbreeding to superior female families through different individuals. As defined by the originators and developers of the idea, the late Daily Racing Form "Bloodlines" columnist Leon Rasmussen and his colleague, Rommy Faversham, the inbreeding must occur through the sire and the dam (i.e., be on both sides of the pedigree) and the duplication of the inbred female must be within five generations. Thus, inbreeding to full or half siblings within four generations would qualify, while inbreeding to the same son would not.

Rasmussen and Faversham claim an advantage for RF inbreeding based on a study of starters at the 1996 Del Mar and Oak Tree meets. They found 4.0% of the starters exhibited the RF in their pedigree while 6.0% of graded stakes winners in the 1990s did the same. Their conclusion was that RF inbreeding occurred 50% more often among the top class runners than it did in the general population. This would be equivalent to an Impact Value (IV) of 1.50.

In 2001, pedigree expert Roger Lyons questioned the significance of the Rasmussen/Faversham study by noting that inbreeding is not distributed evenly across the Thoroughbred population, with graded stakes winners having more fifth generation and beyond inbreeding of all types than less talented runners (http://www.werkhorse.com/Teamwerk2001.pdf). According to Lyons, this results from the fact that "ancestries that are swirled into the shallows of the breed have less in common with one another than ancestries that are swept along in the mainstream". In other words, higher-class runners descend from a narrower range of breeding stock than the population at large. His evidence comes from data on RF frequencies in yearling sales in 1998 and 1999. Lyons found that the percentage of RF yearlings at the Keeneland July, OBS August and Keeneland September sales exceeded the percentage of RF yearlings at the FTK July, Texas August, Louisiana August, Washington August and CTS August sales. He noted that the breeding of yearlings at the first three, higher quality sales was more typical of graded stakes winners than the breeding of the yearlings at the other sales, especially the California sale. It should not have been surprising then that Rasmussen and Faversham found the result they did. Unfortunately, they were comparing dissimilar populations that make their observed IV unreliable. At the same time, Lyons was also quick to point out that the superior performance of graded stakes winners is not necessarily related to their enhanced inbreeding.

Since the RF seems to be of general interest to the Thoroughbred community at large and breeders in particular, and because meaningful research on the RF is relatively limited, we have undertaken a study of our own that examines the importance of the RF in the pedigree of stallions, both on their racing career and, to a lesser extent, their breeding career.

The population in question is all of the stallions found in the Register of Advertised Stallions in the The Blood-Horse Stallion Register for 2003. Although not a truly random population, it is certain that their inclusion is independent of any association with the RF. In all, there are 817 stallions included in the analysis. Of these, 49 display the RF pattern while 768 do not.

Furthermore, we will not compare separate and distinct populations as did Rasmussen and Faversham. Rather we will measure the distribution of effects within the single population

of advertised stallions. In this manner, we hope to avoid any potential issues arising from the improper use of control groups.

For this exercise, racing class was divided into seven categories designating the highest level of racing success:

1 – Grade 1 winner
2 – Grade 2 winner
3 – Grade 3 winner
4 – Non-graded stakes winner
5 – Allowance winner
6 – Maiden winner
7 – Non-winner

A separate group comprised stallions that were unraced.

Table 1 summarizes the results for those stallions that did race and includes information on starts, earnings and racing ability.

Table 1. Racing Statistics for RF and Non-RF Stallions

	RF	Non-RF
Number of Examples	49	768
Average Number of Starts	20.1	20.0
Average Earnings	$901,377	$686,756
Median Earnings	$413,284	$413,719
Average Earnings/Start	$49,928	$38,010
Median Earnings/Start	$21,951	$21,592
Average Racing Class	2.7	2.8

The only apparent differences are in average earnings and average earnings per start, where it seems that RF stallions have a distinct advantage. However, the respective median figures are virtually identical. If we remove the top two leading earners in each group, the averages shift dramatically to $620,554 for the RF stallions and $666,177 for the non-RF stallions. Clearly the averages are skewed by unusual earnings at the top end. The leading two in the RF category are Fantastic Light and Singspiel while those in the non-RF category are Skip Away and Silver Charm. The distortion in average earnings compared to median earnings may be attributed to the inflated purse structures of several key races in the US, Japan, Hong Kong and Dubai. Overall, however, the data indicate no difference in racing ability between the RF and non-RF stallions.

A more detailed examination of RF and racing class is presented in Table 2.

Table 2. RF Stallions by Racing Class

Racing Class	%RF
All	6.0
G1	6.0

G2	6.4
G3	6.8
SW	5.7
Alw	5.0
Mdn	5.4
Non-winner	4.8
Unraced	6.7

The variation in RF horses by racing class is minimal, although the 6.3% average for graded stakes winners is slightly larger than the 5.3% average for non-graded stakes winners. Nevertheless, a chi-square test involving the two populations (RF and non-RF) affords a P-value of 0.58, indicating that the groups are not different in a statistically significant sense. In addition, the increase in %RF from G1 to G2 to G3 winners is the opposite of what one expects from a RF effect favoring performance.

The last analysis of RF and racing performance for stallions involves the distribution of racing class within each group, as shown in Table 3.

Table 3. Distribution of Racing Class for RF and Non-RF Stallions

Category	%G1	%G2	%G3	%SW	%Alw	%Mdn	%Non-wnr	%Unr
All	30.5	17.3	16.2	13.0	12.4	4.5	2.6	3.7
RF	30.6	18.4	18.4	12.2	10.2	4.1	2.0	4.1
Non-RF	30.5	17.2	16.0	13.0	12.5	4.6	2.6	3.6

Here again, the distributions are essentially indistinguishable and further suggest no effect on racing performance resulting from the presence or absence of the RF.

Finally, we will examine briefly the relationship between RF and stallion breeding performance. In this case, we isolate those stallions from within each subpopulation that have a Proficiency Index (PI) of 2.00 or more through 2001. PI is a measure of stallion performance including an earnings and a stakes production component. Fewer than 200 sires of North American runners normally qualify with a PI of at least 2.00. Table 4 summarizes the results.

Table 4. Leading Sires From Among RF and Non-RF Stallions

Category	%Among Leading Sires
All	8.3
RF	2.0
Non-RF	8.7

Among the 49 RF stallions, only one (2.0%), Quiet American, has a PI of 2.00 or more. This contrasts with 8.7% for the non-RF stallions. Although it may appear as if the RF in a sire's pedigree is detrimental to stud performance, we observe once more through the chi-square test that the difference is not statistically significant (P-value 0.12, which is greater than the P-value of 0.05 required for statistical significance).

Conclusion

This study confirms that the racing performance of stallions is unrelated to the appearance of a RF in their pedigree. Stud performance seems to be similarly unaffected. In general, the results support the arguments made earlier by Lyons and, more importantly, raise serious issues about the actual validity of the RF concept.