# BREEDING

**Pedigree Analysis**

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## INBREEDING TRENDS

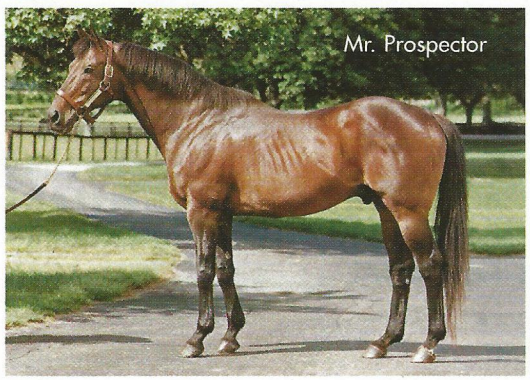
Some people consider inbreeding a bad word, and believe that many of the racehorse's weaknesses, such as unsoundness and bleeding, are because there's too much inbreeding going on. In fact, the Thoroughbred gene pool is one of the least inbred of all domestic strains of animals, livestock and pets included. If you own an American Kennel Club registered dog, it's probably more inbred than the average Thoroughbred.

Informal studies from a decade ago suggest roughly 25% of Thoroughbreds have a pedigree we call inbred, that is, with at least one duplicated ancestor within four generations. This means that the vast majority, 75%, are not inbred. Feel better?

Inbreeding is used to concentrate the genes of a top ancestor in hopes that more of its superior genes will be expressed, to "fix the type." Unfortunately, fixing a type is rarely a Thoroughbred breeder's goal, in a business where conformation is secondary to performance. We double up on ancestors hoping that their racing genetics will come forward in spades. Because Thoroughbreds come in so many sizes and shapes (more evidence in support of healthy genetic variation) we're more often blending types than fixing them. This strategy is basically reshuffling the deck constantly instead of concentrating the genes, so defeating the purpose of the inbreeding.

The most influential ancestors are the most common targets, not only because they are seen as genetically superior but also because they're the most widespread ancestors in the population. They bump into themselves more often than other ancestors just by random chance.

Let's take an admittedly small sample, the top American 3-year-olds of each crop since 2008 and see how things are shaking out. This group, classic race winners and the division male champion, consists of just 19 horses, including this year's classic winners California Chrome and Tonalist. If we use the figure of 25% inbred, we'd expect four or five of those horses to be inbred. In reality, a dozen, or 63%, are inbred, quite an unexpected majority.



Mr. Prospector

TONY LEONARD

The inbred horses are California Chrome (inbred 4x3 to Mr. Prospector), Orb (3x4 Mr. Prospector), Will Take Charge (3x4 Fappiano), I'll Have Another (4x4 Danzig), Union Rags (4x3 Mr. Prospector and 3x4 Northern Dancer), Animal Kingdom (4x4 Lyphard), Ruler On Ice (4x6x4 Raise a Native), Drosselmeyer (4x4x5 Northern Dancer), Mine That Bird (4x4 Northern Dancer), Rachel Alexandra (4x4 Northern Dancer), Summer Bird (3x3 Storm Bird), and Big Brown (3x3 Northern Dancer and 3x4 Damascus).

On the flip side, the seven runners not inbred at four generations are Tonalist, Oxbow, Palace Malice, Shackleford, Super Saver, Lookin At Lucky, and Da' Tara.

The most common inbred ancestors are the great sires Northern Dancer (in five of these runners), and Mr. Prospector (three), with representation from Mr. Prospector's son Fappiano (one), his sire Raise a Native (one), as well as Northern Dancer's sons Danzig (one), Lyphard (one), and Storm Bird (one); and the unrelated Damascus (one).

Taking a further step back, the 20 classic winners and 3-year-old male champions from 2007 back to 2000 include only three inbred horses (15%): Empire Maker (4x3 In Reality), Point Given (4x4 Raise a Native), and Tiznow (4x4 Northern Dancer). There were 17 outcrosses, or 85%. That's a pretty striking contrast.

One interpretation could be the population fluctuates between a higher level of inbreeding and a lower level of inbreeding, in cycles of possibly six or seven years, roughly a horse generation.

If we put both of these groups together, these 39 top 3-year-olds for the last 14 years, they break down like this: 15 inbreds (38%) versus 24 outcrosses (62%). This still seems high.

Without a complete survey of the population for, say, the last 14 years (Hello, Equibase!), these numbers suggest a couple of possibilities. First, if classic winners and 3-year-old male champions are significantly more inbred than average, then inbreeding is a much more effective mating strategy than we realize.

An alternative is that those worst fears are correct: that there actually is a dramatically increased level of inbreeding in the Thoroughbred gene pool and these top runners are just part of that trend, but we need accurate statistics to know for sure.

If there's increased inbreeding overall, then one would expect to see a high number of inbred stallions at stud. In Kentucky there were 17 sires standing for $50,000 or more in 2014, the crème dela crème of our proven sires. Of those, only three (17.6%) are inbred: Tapit (3x4 Mr. Prospector), Speightstown (3x4 Secretariat; and 4x5x4 to Bold Ruler), and Tiznow (4x4 Northern Dancer).

Perhaps, in an increasingly inbred population, being an outcross has major advantages, but remember, these are older stallions. Some of these younger, more inbred sires are just now stepping up to the plate.

Let's see what they can do. BH

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