WHAT MAKES A FAST HORSE FAST? A small and complex answer to a large and simple question

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Fast is first. To be recognized as fast, a horse must be first past the finishing post.

Just as a "successful poem has all the best words in the very best places under the best circumstances" (Ted Kooser) so does a successful racehorse have all the best qualities (genes, conformation, attitude) in the very best races under the best circumstances (i.e. trainer, jockey, the competition and all of these factors, coupled with a large measure of luck).

But how can you recognize a fast racehorse *in advance*?
It's like expecting to spot a future Poet Laureate in a nursery

As I think Sam Goldwyn said, something to the effect that "Prediction is difficult, especially if it is about the future."

The short answer is, "I don't know."
A longer answer would be to say that if I did know I would be richer than Bill Gates.
An evasive answer would be to say that the way to make a fast horse is to enter him consistently in the company of slower horses.

Getting down to specifics…but not perhaps the indisputable ones that horsemen have been hunting for for generations: -

It is true to say that a fast horse has a longer stride than a slow horse
As stride rate is synchronized with respiratory rate (something that I discovered years ago, in the same year that someone in Germany published the same finding), those horses that can breathe most freely and easily are likely to be the best striders.
Stride length is not correlated with height. If it were, the tallest horses would be the fastest.

My own impression is that short horses are more likely to be faster than tall ones. In my book, "Specifications for Speed in the Racehorse; the airflow factors" I point out that it is easier to cite a list of successful short horses (e.g. Gimcrack, Hyperion and Northern Dancer) than tall ones. This could have something to do with the fact that tall horses are especially prone to a serious disease of their

voice box (hereditary in my opinion) called recurrent laryngeal neuropathy (RLN, laryngeal hemiplegia or laryngeal paralysis) that obstructs their airway and prevents them from breathing properly. Additionally, perhaps a small horse is, mechanically, a more efficient racing machine. Obtaining more oxygen than a tall horse and carrying less weight, it has a more favorable supply-and-demand equation. In my book, I express a preference for short horses with wide jaws (i.e. large airways) and the least amount of RLN. Northern Dancer was my 'hero horse' and model. He was tiny, had a hugely wide jaw and no detectable RLN on the basis of laryngeal palpation when I examined him a few years before he died. Sadly, it has not been possible to prove this correlation by a scientific study (such a study has never been done). Nevertheless, this is still the model that I would favor, were I buying racehorses.

I had an idea that the least inbred Thoroughbreds might have the greatest inherent vigor and fewer hereditary diseases. So I spent some years developing a system for measuring the coefficient of inbreeding for the Thoroughbred, in the hope that such a figure would provide a sound basis for selecting yearlings. But an analysis of a 20-generation pedigree showed that there was insufficient variation to make selection viable. The *average* degree of inbreeding in the Thoroughbred is alarmingly high and is, inevitably, getting worse with every generation.

For some years, yearlings have been selected on the basis of heart size, as judged by ultrasound measurements. Others have more recently been working on a selection process based on a horse's mitochondria. I started to develop a nerve conduction test for RLN in the hope that this would prove an objective guide to the diagnosis of RLN but the test needs some mathematical analysis to bring it to a finished product and this I have not (yet) done.

Success on the racetrack does not appear to be correlated with the usual guidelines for conformation, as many a crooked legged horse has been a superstar. But conformation has been the most commonly used basis for selection nevertheless.

Curiously, two research projects, neither of which was aimed at finding fast horses, has, I believe, a great relevance to the making of a fast horse.

- My own research into the effect of the horse's bit leads me to maintain that a horse will perform better (faster and with fewer accidents, less DDSP and EIPH) if the bit (a foreign body) is removed from the mouth. I am convinced that the bit is the major cause of DDSP and EIPH. DDSP because the bit breaks the airtight seal of the lips and allows air into the mouth. EIPH because the bit results in the horse avoiding the bit by pulling its tongue back in the mouth and blocking its own airway. Racehorses could be raced in the crossover bitless bridle (see www.bitlessbridle.com) if the stewards of racing would permit its use. .

- A colleague's research in Germany, Dr. Strasser's, indicates that horses will perform more safely and better (faster in the case of racehorses) if their shoes are removed. This gives them better traction but also it assists their heart, as a barefoot hoof acts as an auxiliary heart pump. By improving the circulation, it may well be yet another factor in reducing the incidence of EIPH. Once again, the stewards of racing have to be convinced of the soundness of this research.