The Thoroughbred Genetics Company helps racehorse breeders match the right mare with the right stallion. It's all a question of DNA compatibility. Pete Taylor met Managing Director, Dr Steve Harrison, and got it straight from the horse's mouth.

ONLY FOALS AND HORSES

Last year, bookmakers were offering reasonable odds that a particular baby - about to be born in North Carolina, USA - would win an Olympic sprint gold medal within the next 25 years. Why would anyone place such a bet? Simply because the baby boy's parents were Marion Jones, the world's fastest woman, and Tim Montgomery, men's 100-metres world record holder.

Clearly, there's a strong case for suggesting that inherited genetic make-up is a major factor in sporting success. But while top athletes are not brought together specifically for mating purposes (at least, not yet), the same cannot be said of racehorses. Increasingly, DNA analysis of breeding mares is being used to determine which available stallion offers a genetic match most likely to produce champion offspring.

This is a complex and highly specialised field in which one company is several furlongs ahead of the competition. Thoroughbred Genetics - based at a laboratory near Sittingbourne, Kent - was established four years ago by Dr Steve Harrison. It now serves an international client-base of racehorse breeders in the UK, Ireland, Australia and the USA.

"Let's be clear," Harrison is keen to point out, "we're not involved in genetic manipulation or any kind of animal experiments. What we do is blood-test horses to produce a genetic fingerprint of each animal and help our clients develop more effective breeding strategies. Plain and simple."

Except, it's anything but simple. The Thoroughbred Genetics lab is crammed with advanced computing, DNA sequencers and analytical equipment - operated by a team of technicians and horse pedigree specialists. Mrs Harrison brings proven PR ability to the business, while Steve himself provides expertise in the racehorse breeding field and a scientific knowledge of genetics.

"It's an unusual combination of skills," he says, "which is probably why the business has remained unique. There's a gulf between breeders and scientists. Not many people can get to grips with the genetics, but also talk the language of horses when meeting clients. I was brought up around horses - originally from Liverpool, but my family was involved in racing over the jumps in Ireland.

"When I was younger, I wanted to be a jockey, but I ended up with the physique of a rugby player. Then I did an Agricultural Chemistry degree at the University of Wales, followed by Genetics as a PhD. For many years I was a lecturer, but became increasingly interested in horse genetics which, over time, developed into a small business idea. With a couple of enterprise grants and a lot of our own investment, we've built it up from there."

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Among the horses Steve has tested and advised on are winners of the Derby, the Oaks, the Prix de l'Arc de Triomphe, the Melbourne Cup and many other high-profile races. The company is working with some of the best breeders in the world, contributing information vital to successful bloodstock management and often able to explain trends or characteristics that breeders have observed over several equine generations.

"Horse breeding is a traditional business, still very 17th century in many ways. Using genetic data drags it straight into the 21st century - but the scientific input is no more than has already been applied in breeding cattle or sheep. With so much money involved in the horseracing world, it's amazing that geneticists haven't really been involved until now."

He's not joking about money. Europe's top flat-racing stallion commands £300,000 for 'covering' a mare - and the lucky stud covers over 100 prime fillies a year. That makes £30m in annual fees which, if you live in Ireland, is tax-free. Perhaps not so happy are the less valuable stallions assigned to breeding horses for the jumping season. They can be obliged to service five or six females a day, from young mares to old nags, and require testosterone injections to keep up their libido. Still they're among the fortunate 5% of stallions and rather larger 60% of mares allowed to breed at all. The remainder of racehorses are consigned either to retirement homes or abattoirs. "You never need buy a horse as a pet," advises Steve. "Breeders will always have old racehorses they'll give away to a good home. They're not easy to ride, though; you show them a field and they tend to take off at high speed."

It's certainly a tough industry, with little room for sentimentality. "The truth is, many racehorses probably shouldn't be racing at all, as they're not really up to it, either physically or genetically. The work we do helps breeders to take a responsible view - and that means working with the most suitable animals and discouraging excessive inbreeding within the same bloodline, which can lead to genetic health problems.

"Some of our clients breed horses to race themselves; others breed purely to sell. The latter group may bear a stallion's genetic suitability in mind, but will also be guided by short-term commercial considerations: a foal sired by a well-known and successful horse will look good on paper and have immediate value, regardless of the true genetic potential. On the other hand, we can also advise potential buyers of a particular horse on the likelihood of racetrack success, so it cuts both ways.

"Of course, it's not an exact science. Beyond DNA, there are many other factors - physiological, environmental and training regime - which contribute to a horse's performance. For every success story, there are many expensive 'failures' which never make the course at all. But when huge amounts of money are committed to breeding programmes, a modest outlay on gene tests is a wise investment for breeders - given the potential to significantly increase the accuracy of the whole process. It's breeding based on data and analysis, rather than a hope and a prayer.

"The challenge is to help our clients achieve lower rates of failure than other breeders. If that sounds negative, remember that success isn't achieved easily or overnight. It can take a few generations of breeding to refine a bloodline - and thoroughbred breeders are considered successful if they produce just a handful of high-quality winners in their entire career.

One surprising fact that emerges from talking to Steve is that winners of the Epsom Derby and Ascot Gold Cup are no longer the really prized horses, in terms of stud value. "These races are now seen as very long - over two miles - and the trend is towards sprinters rather than 'stayers'. The market has become more Americanised, with the most sought-after horses being those that win at shorter distances."

But to the layman, don't all thoroughbreds look pretty much the same in build? "The physical differences are subtler than say, in human terms, between 100-metre runners and marathon runners. That's because the range of distances, from a few furlongs to a few miles, is not so great. But there's a world of genetic difference between stamina horses and speed horses. At the extreme, just to illustrate what I mean, you wouldn't race a shire-horse and, equally, you wouldn't get far with a thoroughbred pulling a heavy cart."

In growing the Thoroughbred Genetics business, one obstacle for Steve has been the slightly secretive nature of the breeding world. This has meant that word-of-mouth recommendations are very few and far between. "When breeders believe they're doing something right, they obviously don't shout about it to their competitors." Writing articles for the international thoroughbred trade magazine Pacemaker has been one way of overcoming this - helping Steve build a reputation as the leading authority on horse genetics.

The company's standard services range from a brief explanation of a mare's genetic status and a list of recommended stallions, up to a Full Mating Report - with a comprehensive DNA analysis of the mare, in-depth appraisal of genetically suited stallions and pedigree details of all potential foals.

For larger breeders, the company offers bespoke products which can answer broader genetic questions or, equally, focus on areas of particular interest or concern. "We usually start by visiting the client's stables, taking shots of each horse for size and height reference and, where testing is required, collecting blood samples. Back at the lab, we extract the white blood cells which contain the DNA and do tests to determine levels of stamina and inbreeding. These are the basic building blocks from which we construct our reports and recommendations, though a range of more advanced tests is available.

"In the future, depending on the availability of venture capital, we are looking at the possibility of developing off-the-shelf testing products for use by equine vets and even breeders themselves. This would give us more stability, with a wider product base - less dependent on pure consultancy. It would also make the company more saleable."

Steve talks enthusiastically about eventually raising enough money to set up and run his own stud farm - and, in the process, achieve financial security for his young family of "two little boys". (I wonder whether, to quote Rolf Harris, "each has a wooden horse".)

On a more serious note, though, does he fear that bringing genetic analysis into sport is the tip of the iceberg? Could this be the first step towards genetic modification and manipulation?

"No, I have no real fears on that score. Firstly, blood doping to boost oxygen capacity would be pointless in this sport, as horses naturally produce more red blood cells than they need. Some people talk about cloning of champion racehorses. But, firstly, it's extremely difficult to do. Secondly, you might as well breed naturally unless your horse has been gelded, and only lesser quality horses are gelded anyway. And thirdly, cloned DNA is the age of the donor animal, so by the time the cloned horse reached maturity, its ageing genes would make it too old to compete. And besides that, the whole idea is abhorrent, cruel and totally unethical."

"Also, the sport is very closely regulated. A thoroughbred with an identical genetic make-up to another would be spotted easily. A vet has to be present at the birth of a thoroughbred; you need certification for stallions covering mares; a horse has to be fully registered before it can race, and so on. Artificial insemination of thoroughbred sperm isn't even allowed - although personally, I think it should be, in a controlled way, to encourage international cross-breeding. But no, I don't think there's any danger to the sport from genetics."

Finally, does Thoroughbred Genetics itself have international aspirations? "Already, most of our client base is overseas. We've had several trips to Australia, where more thoroughbreds are born than in the whole of Europe - around 20,000 a year. It's also big business in the USA - so we're planning to launch both Australian and American subsidiaries soon and really go global." Something of a dark horse, then, Dr Steve Harrison.

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