

The Science of Selection

Susan McBane interviews
Dr. Stephen Harrison of The
Thoroughbred Genetics Company.



The various traditional aspects of selection of thoroughbreds for breeding and racing have been fascinating and essential pursuits for breeders and trainers since the breed developed. Closely following the business builds up a priceless bank of knowledge of families' qualities, good and bad, but, as we all know, even when we're sure we've got it all right, the failures far outnumber the successes.

Isn't it time to take on board a proven scientific technique right at the start of the planning process, whether you are breeding or buying to race, a technique which is far more reliable than - but complimentary to - the traditional ones and which is set to become a major factor in thoroughbred selection - the genetic analysis of thoroughbreds.

Proof where it's needed

Developed specifically for the industry by scientist and experienced horseman Dr. Stephen Harrison through his Thoroughbred Genetics Company, the systems, already advanced in other species, are based on knowledge of actual and proven genetic phenomena.

Genes, which are responsible for mental and physical traits, are inherited randomly in equal numbers from both parents in the form of a substance called DNA (deoxyribonucleic acid), large molecules which look like twisted rope ladders made of chemicals. Different horses possess different versions (or alleles) of the same genes and some affect a trait more favourably than others. The DNA comprises three types of genetic components, each carrying different genes and inherited in different ways:

1. Regular chromosomes found in the nuclei (or 'control centres') of cells.
2. Mitochondrial DNA found in the cell mitochondria (tiny structures or organelles responsible for energy production) and
3. Sex chromosomes, the inheritance of which determines the foal's sex

Because traditional analysis of pedigrees and individuals cannot take these into account, the results are fairly uncertain, but because the inheritance of genes can be predicted accurately when monitored by DNA analysis, The Thoroughbred Genetics Company can provide the industry with a much more reliable selection method.

It's in the blood

The body tissue used is normally blood which can be taken by a vet or a company representative. It is analysed in the company's own laboratories and a pattern of banding is produced according to the alleles present in a particular horse which ultimately tells a number of things about the genetic status of that horse. Furthermore, it can show which horses are genetically compatible with each other and, so, which matings are highly likely to produce the type of horse the breeder wants.

"But" you may be thinking "what if the stallion owner does not want his horse analysing in this way?"

"No problem" says Stephen Harrison. "You can tell from the mare only and you also probably know what traits that particular stallion passes on and what each family is known for, so if you only know the mare's analysis that is often enough." In fact, some stallion owners are happy to have their stallions analysed and so would be able to advise mare owners on which of their horses will be most compatible with their mares.

He explained how animals which seem inbred on paper may be genetically less related than anticipated because of the way their genes have been inherited - and vice versa - which shows up another disadvantage of traditional pedigree analysis. An excess of inbreeding can result in animals which do not perform well because they cannot stand up to the stress of training. Outbred horses may be actually healthier, like mongrel dogs as opposed to some pedigree ones, but they may not be prepotent.

"The importance of the female line has been long recognised," said Harrison. "Mitochondrial DNA is inherited down the female line only so traits from those genes can only come from the dam. The stallion's prepotency for various traits will have been proven anyway in most cases. By genetically analysing the inheritance of the mitochondrial DNA, we can point the mare owner in the right direction towards a stallion who should overcome family weaknesses. In this way we can help the family as a whole."

He continued: "Commerciality plays a major part in breeding, of course. If a mare owner, for instance, has a short list of four or five stallions, we can, by genetic analysis, advise which horse should produce the qualities needed in the foal whilst still being a good commercial bet, and often the final choice is not what the owner was first thinking of."

"You also have to create a balance. If, for example, an owner has a mare which produces mostly filly foals, we have to think ahead and try to produce a foal which is going to be a good broodmare after a successful racing career. Only about five per cent

of colts go on to breed but 60 to 70 per cent of mares are bred from, and that includes an awful lot of bad ones which have been nursed through a racing career. For instance, a mare may have been Hobdayed and later tubed when that hasn't worked, then she's sent to stud to pass on that same weakness. The genetic analysis can help upgrade the mare's breeding potential to help improve matters."

All in the game

He said that today it is necessary, for commercial reasons, to produce horses which can win over eight to ten furlongs, because you then open up the American market where shorter distances and speed are the main factors considered. Another interesting comment which came out of our conversation was that many breeders are only regarded as successful because their failure rate is not as high as most! "It's a numbers game at the top end of the market," said Harrison, "where studs which produce a handful of successful horses out of hundreds of matings are commercially viable and successful."

The company is developing new gene-specific tests all the time, trying to develop new tests for different characteristics. It has a Department of Trade and Industry award to develop a new test which will identify horses which will be sounder because the key to producing winners is to produce sound horses which can withstand training.

Stephen Harrison is able to use his scientific skills in conjunction with his practical ones for his own ends as well as those of his clients: he breeds horses and he used to ride point-to-point himself so is well versed in all the necessary scientific, artistic and practical aspects of breeding, producing, training and riding Thoroughbreds.

The company has extensive business with most Thoroughbred breeding and racing countries of the world, but less in the conservatively-minded UK. It believes it can help all breeders, large and small. In addition to routine tests carried out for everyone, larger breeders can also commission tailored projects which can be aimed at more in-depth studies of their particular breeding stock structure and the study of breeding phenomena of interest.

Why not get ahead of your rivals here by availing yourself of the advantages his company offers you? You can contact him at The Thoroughbred Genetics Company, 10/26 Innovations Buildings, Sittingbourne Research Centre, Sittingbourne, Kent, ME9 8HL, tel. 01795 411544, fax. 01795 411543 Email, office@thoroughbredgenetics.com and you can also visit the company website by clicking on to www.thoroughbredgenetics.com. □