



# PLAYING GOD

**DR. STEVE HARRISON**, Director of Thoroughbred Genetics Ltd (UK) reveals some of the revolutionary 'selection-enhancing' technologies now available to the modern breeder.

**A**s a nation of thoroughbred breeders and owners, Australians have a progressive outlook with regard to the use of new technology to gain a competitive edge. This puts them ahead of many of their more traditional counterparts in Europe. However, recent debates about the roles of artificial insemination (AI) and genetic testing in breeding and racing continue to raise many questions about what is possible, what is needed and what is ethical or even politically acceptable.

There is a common thread in both the AI and the genetic discussions, and that is in the potential for inbreeding to increase within the thoroughbred due to the use of 'selection-enhancing' technologies. The latter, in particular, merits consideration because it is possible to base selection on possession of specific preferred gene versions and so, inadvertently, eliminate less fashionable but equally valuable traits.

Before considering further parallels it might be worth marking out the playing field as far as the thoroughbred gene pool is concerned.

Breeding thoroughbred racehorses is unlike any other process involving different commercial species. Successful animals come in relatively variable shapes and sizes, and more often than not it is difficult to argue a precise genetic reason for their success.

It might be feasible to suggest that, after over three hundred years, useful versions of key genes involved in determining performance will have been fixed through selection and that only small differences exist. However, this may not be so. Unlike strictly agricultural animals, thoroughbreds are not objectively selected for the likes of live weight gain, milk yields or wool quality. They have the opportunity to perform over a range of distances and as a consequence, there is no uniform selection pressure.

Although broad selection is for more speed-orientated animals these days, the term 'selection' is a little tongue in cheek. Naturally, many of the mares bred from are poor quality and have not been 'selected' at all. Many will even have entered breeding careers earlier

than anticipated because they have broken down or have physical problems. Most positive gene selection is via the handful of top-class colts entering stud each year. Breeding from lesser mares diminishes selection and fixation of positive gene versions in the breed *per se*. Arguably and ironically this may contribute to breed diversity whilst, at the same time maintaining the presence of undesirable genetic factors in the population. However, there might be some mileage in suggesting that useful race mares are valuable animals and are retained by wealthier individuals with access to proven and more expensive sires. Consequently, there may be some genetic fixation within an elite 'premier division' of top class families which is distinct from the lower divisions. In actuality, although they all belong in the

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same book, there is certainly already more than one thoroughbred gene pool.

The 'general' gene pool is in a natural state of flux and adaptation. Breeding trends change and as a whole we are now selecting for stamina capabilities very different from fifty years ago, let alone two hundred. In terms of performance it is arguably futile to consider the prowess or genetic influence of very distant ancestors, as excessive tests of stamina are no longer relevant.

It doesn't take much to divert the flow of the genes in the population. Even via the natural selection methods used over the last hundred years, significant changes to the gene pool occur. Although it has been in a controlled and steady manner, one clear example of this is seen in relation to Mitochondrial DNA (mtDNA), inherited only down the dam line. The genes carried on this type of DNA have

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