

How important is conformation?

Two major studies have shown conformational defects don't necessarily inhibit the chances of thoroughbreds performing successfully on the track

In the next few weeks, the moving circus of the yearling sales will kick off in Deauville. Many thousands of hours of yearling inspections, by potential purchasers and their veterinary surgeons, will take place. Detailed notes on the conformation of each yearling, the way it walks, its physique, size and gait abnormalities will be scrupulously logged on catalogue pages. Certain horses will be damned as a result of their conformation and their sale price accordingly affected. But are we sure all of this matters?

The serious consideration given to conformation assessment during the yearling sales results from the belief that conformation is critically important, both in the success and future durability of the yearling as a racehorse. It may therefore come as a surprise to some to learn that there has been very little published evidence to support this assumption. In fact, there have been very few research studies carried out on the effects of conformation on soundness on the thoroughbred.

One would suspect that if conformation was vitally important in future racing success, then examples of poor conformation would have become increasingly rare over the years, as selective breeding would have effectively eliminated them. A brief look at the sales cohort of yearlings any year will tell you this has clearly not happened. The prime factor in deciding whether an animal will add its genes to the gene pool by becoming a stallion or broodmare is race success, and race success only. Everything else is secondary. Standing by the winners' enclosure of any racecourse quickly confirms the belief that horses of all sizes, shapes and conformational abnormalities win races, and this is why these conformational abnormalities remain widely distributed in the population.

There have been two large studies on the effect of conformation on future racing success and durability. The first of these, published in the *Equine Veterinary Journal* in 2006, was the result of many years of meticulous observation by the popular north country-based bloodstock vet Peter Calver. His untimely death prevented him from publishing the data which he had accumulated over many years of examining



Figure 1 'Toeing out' was one of the few conditions to be linked, in its more extreme manifestations, to reduced racing success, but when the effect of sire was controlled for, the association was significantly weakened

yearlings at the public sales, in his attempt to log the effect of conformational defects on future racing ability, performance and durability. Fortunately, Peter's colleagues and friends at the veterinary schools at the Universities of Glasgow and Bristol, along

.....

“Some conformational abnormalities actually seemed to have a protective effect”

.....

with veterinary colleagues within what was then the Jockey Club (now the BHA) completed the study, partly as a tribute to his memory, and subjected the findings to rigorous statistical analysis. The study took place over a seven-year period between 1993

and 1999 and included over 4,000 yearling inspections. Nine specific defects were rated, on a scale of 1-3, where 0 was considered correct.

The traits studied included all of the common abnormalities such as 'back at the knee', 'offset' knees (Figure 3), upright pasterns (Figure 4), turned-out and turned-in feet. As the sire and dam of each yearling was known, heritability of these defects was also investigated.

Race success was judged by the number of starts as two-year-olds and three-year-olds, and the overall equivalent of the BHA rating. For the first time, the frequency of occurrence of all of these conformational abnormalities was logged. These figures ranged from as low as 1.5% for 'tied in below the knee' to as high as 30% for turned-out feet ('toeing out' – Figure 1).

The first interesting finding from the study was that only 7% of these horses failed to race. These horses did have a higher proportion of conformational abnormalities than the average of those that raced, but when subjected to rigorous statistical analysis this did not turn out as a significant difference and could have been thrown up by chance.

In the group that raced, there were some conformational abnormalities, however, which did seem to impact on racing performance. For instance, at the highest grade of 3/3, toeing out (Figure 1) was linked to lower race performance. However, when subjected to closer scrutiny, the effects of influence of the sire were impossible to remove from the conformation. In other words, horses inherit from the sire line not only aspects of their conformation but other aspects important to racing ability, such as heart size, respiratory tract health, body physique and athleticism, and these impact more profoundly on subsequent racing performance than any conformational trait.

Because the outcome of this study was simply judged on race success and durability, no details of clinical problems were available, so it was impossible to say whether the reduced racing performance was the result of the conformation, or simply the result of lower ability in the sire line.

The second large study on the role of



Figures 2a and 2b Carpal valgus ('out through the knee'), in which the angle of this right fore limb changes at the knee (see lines in 2b) was rather surprisingly found to have a slight protective effect for knee problems in the Colorado study. Horses that showed a degree of valgus had fewer knee problems than correct ones



Figures 3a and 3b 'Offset knees', where the centre of the cannonbone (blue line) is parallel to the centre of the forearm (orange line), but displaced laterally, as in this left front limb. This is notoriously associated with development of medial splints (already present in this case – see arrow, 3a), and knee problems in many vets' minds, but in the Colorado study was linked only to increased front fetlock effusion

conformation in the development of subsequent musculoskeletal problems, and therefore racing performance, in the thoroughbred was also published in the *Equine Veterinary Journal* in 2004 by Wayne McIlwraith's group from the University of Colorado. This studied the conformation of 115 horses, the property of a single large owner-breeder in France, raised under the same management practices.

The animals were photographed, so that measurements could be taken of specific reference points, to remove the subjective bias that may come into the equation from simple visual assessment. All 115 horses were in full training and most of them had raced. Conformational variables measured were numerous but included, for instance, height of the wither and croup, the length of the top-line and bottom-line of the neck, the

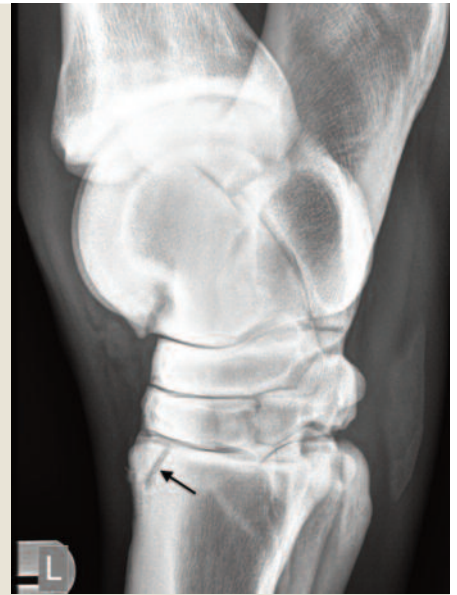
length of the major long bones, the degree of uprightness of the pasterns (Figure 4) and degree of offset (Figure 3) or outward deviation (Figure 2) of the knees. The horses were examined weekly by Philippe Douay, the clinician who looked after these horses while in training, and monthly by Wayne McIlwraith, the lead researcher. End-point clinical conditions studied included tendonitis, suspensory desmitis, effusion in the joints or tendon sheaths, fractures, surgery and osteoarthritis.

As with Peter Calver's study, there were surprisingly few strong associations between conformational defects and subsequent clinical problems. What was even more surprising was that some conformational abnormalities such as carpal valgus (angular deviation/turned out through the knee – see Figure 2) actually seemed to have a protective

effect on the future incidence of orthopaedic problems, in that the frequency of carpal chips, swelling in the knee and lameness associated with the knee decreased with an increase in the degree of angulation through the knee. Some of the negative impacts were that offset knees (Figure 3) showed a higher tendency to develop front fetlock problems, long pasterns (Figure 6) were associated with an increase in front limb fractures and steep upright hind feet were associated with hind fetlock problems. Some factors which are meticulously judged as important at the yearling sales appeared to have no impact at all on clinical problems and these included height at the wither, height at the croup, length of the topline of the neck, length of the long bones such as the humerus, radius, cannon, femur and tibia, and the angles of the scapula (shoulder blade) and pasterns. >>



Figure 4 Short, upright, pasterns. These are often over-represented in horses showing fetlock pain, but conversely many horses with this conformation still race with great success, diluting any effect on performance. They may nonetheless need careful management and repeated treatment to get there, something not revealed in simple performance ratings



Figures 5a and 5b 'Sickle hock' conformation, where there is excessive hock angulation, is often associated with development of 'curbs', and incomplete stress fracture of the top of the cannon (Fig 5b arrow – same horse). This horse did not run at two because of the hock injury, but did eventually race

problems. This must in some way be related to other aspects of bone strength and its ability to withstand abnormal loading.

As veterinary clinicians, the fact that a specific conformation is over-represented in one conformation group, such as 'curb' with 'sickle-hocks', will inform one's advice on

that conformation at purchase. But that doesn't mean that all horses with 'sickle-hocks' will develop 'curbs'. Trainers also tend to remember a certain horse which was untrainable because of conformation issues, and that in turn may make them run a mile from a yearling at the sales with the same conformation. But that doesn't mean that individual horse will be untrainable, or even lack ability, as several bargain purchases have proved over the years.

Over the forthcoming months, the great and the good of the thoroughbred veterinary profession will be out in force at the sales ring, imparting their wisdom following conformational assessment of the yearlings presented to them irrespective of the facts, which are that conformation has very limited impact in many cases on the subsequent ability, durability and performance of the horse.

At the end of the day, soundness and race success are not always inextricably linked, some racehorses manage to perform at a very high level in the face of serious soundness issues, and many of these studies, as we have seen, are looking solely at race success as an outcome, not soundness. It is race success only which informs the decision whether to breed or not to breed with each individual animal. So our judgement and wisdom on selection by conformation will forever be doomed to throw up outliers who defy our predictions and perform well, with awful conformation (see Figure 6).

And be assured, trainers and bloodstock agents will endlessly remind their vets of these individuals, the ones that got away, for many years to come!



Figure 6 A very weak hind leg, sickle hocked and with long sloping pasterns. This conformation is often linked to a range of problems, including 'curbs', suspensory desmitis, and hock fracture, and just the type of horse to confound the experts. This horse raced at two, three and four without showing any hind limb lameness, illustrating the difficulty of firmly associating conformation and racing soundness

>> As racehorse clinicians these studies are frustrating, as we often encounter clinical problems which are associated with a specific conformational abnormality over and over again. For instance, short upright pasterns (Figure 4) are incredibly common when dealing with horses suffering from subchondral bone pain in the front or hind fetlock joints. Sickle hocks (Figure 5) are almost always present when one encounters horses affected with 'curb' (usually tearing of the connective tissue around the tendons at the back of the hock), or fracture of the upper cannon in front of the hock. Marked offset knees (Figure 3) are often associated with medial 'splints', and problems in the third carpal bone of the knee.

What stops these conformational traits being inextricably linked to specific disease problems in research studies, however, is the huge variability of tolerance within the thoroughbred. So although one may see four or five cases in succession where subchondral bone pain is associated with short upright pasterns, there would no doubt be another 20 or 30 horses in the yard showing the same conformation that have not developed the problem. This confounds large epidemiological studies on the effect of conformation, in that while some horses undoubtedly develop their problems as a result of a conformational defect, other horses, for reasons unclear, seem to cope with this defect without developing