

M. L. BALANCE

Do we trim to the right angle?

DAVID W. GILL AFCL

"The first object of attention is to bring the foot to a perfectly level bearing."

Prof. William Russell

"If only it could be that simple."

Henry Heymering

Those of you who have read my past articles and latterly my letter reiterating comments made at the BEVA / NAFB&AE seminar (October 97), will recognise my passion for unscrambling presumptive theories, in such a way as to reveal either a new truth or to provoke and encourage others to debate the accepted.

The T-square theory is today very much in vogue and has been adopted by many leading farriers and veterinarians. Whilst it not being my intention to criticise those who have re-introduced this concept, I would ask them to re-examine their facts and question their unreserved support of this tenuous theory. Their only justification, being their present unawareness of any practice which they consider to be a credible alternative.

The T-square theory was rekindled in 1987, by Reuel Darling, who had the presence of mind to have the seventh edition of Prof. William Russell's "Scientific Horseshoeing" reprinted. This reprint of a book first drafted in 1879 came at a time when we were all desperately looking for guidance. It gained respectability when those we admire greatly began to expound about its virtues, its main one being that it would seem to work.

The T-square theory is a rigid theory, which when practised, almost invariably tells the user to trim more off the lateral side of the hoof than the medial. It is this consistent interpretation of hoof balance, which has won the confidence of the user. As a guide, which tells us to trim more off the lateral side, it has achieved great success. Hooves have improved and lameness minimised but is this due to the T-square theory or simply because of this prevailing golden rule, which tells us to trim more off the lateral side than the medial?

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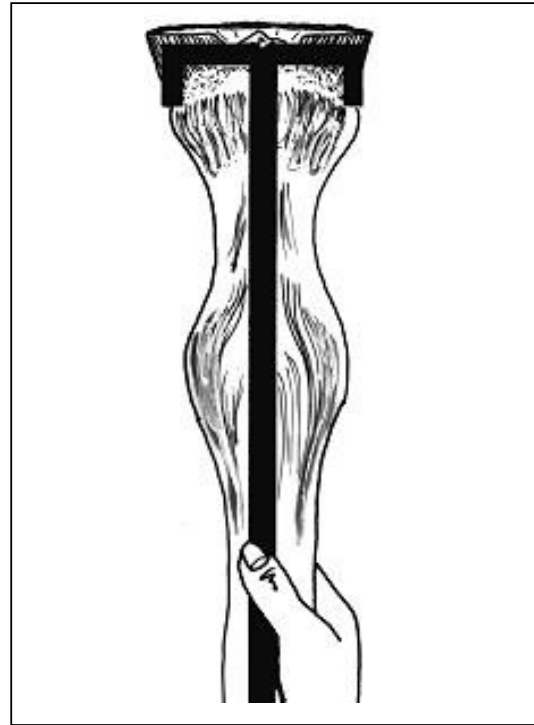


Fig 1 The T-square is a device, which when presented to the limb, is thought to highlight any imbalance and so govern any stratagem for hoof trimming

My main concern about the use of the T-square is the possible assumption of any user that the horse cannot function at its best, unless the hooves conform to the T-square concept. This concern was borne out, when an article, which was reproduced with the permission of the veterinary magazine *Equine Practice*, appeared in our very own trade magazine *FORGE 94*. In this article Robert Eustace FRCVS suggests that the use of the T-square helps assess mediolateral foot imbalance and enables the farrier to achieve flat footfall. He also goes on to say, "In some instances the angulation of the limb is such that flat footfall cannot be achieved by foot dressing alone". The article then illustrates this by showing a pair of front feet, with plastic wedges fitted to raise the medial branch of the shoe, this we are told, achieved flat foot fall and resulted in the horse going sound. My issue about this horse is, did it become sound because of, or despite of the wedges?

Are the facts used to support the T-square theory the truth? Facts are often taken as the truth but when viewed from a different perspective the same facts can change to reveal a different interpretation and a new truth, we need to remember the truth might not be the truth with a capital T. The main reasoning behind the T-square theory, according to William Russell is "if the feet and legs are not set plumb under the body, some part of the feet and legs will give out. Unless the feet and legs are breaking straight through the journals of the joints at each footfall, there will be overtaxation of some portion of the muscles and joints". This style of reasoning was echoed at the BEVA / NAFB&AE seminar, by Dr. Chris Colles whose present opinion may be found in the April 98 issue of *Forge*. In that article it reports Dr. Colles to have said that "there were still massive problems with medial-lateral balance" and that "it was unusual for him to see a horse where the medial-lateral balance was correct." and that he saw a lot of horses. So, are they all out of balance and is the accepted opinion of balance correct? Dr. Colles went on to say "ninety-five per cent of horses are trimmed a little too long on the lateral side".

One would think Dr. Gail Williams BA (Hon's) PhD must have similar findings, because in the June 97 issue of *Your Horse*, when referring to foot balance, she writes, "experience tells me that more than 75% of you will find your horse is outside high". Perhaps it is normal and quite necessary to trim a greater amount off the lateral aspect of the hoof, but why? Dr. Williams also writes about mediolateral balance "a line dropped perpendicularly down the front of the cannon bone should bisect at right angles the weight-bearing surface of the foot" but why?

Dr. Williams is a welcomed contributor to the *Forge* magazine with articles in issues, August96, December96 and August97. Her assessment of medio-lateral hoof balance would seem to be based on the idea that the hoof and limb should be symmetrical with the joints level and parallel to the ground but her own studies illustrate that the forces on the real foot are far from symmetrical. Dr. Williams even writes that the point of force is located 10-15mm medial to the centre of the foot during the majority of the stance phase. Also in the August96 issue, Dr. Williams provides us with the information that an "American researcher, using an instrumented horseshoe, observed that the medial heel lifted off the ground fractionally in advance of the lateral heel. To enable this to happen the point of force must be transmitted away from the medial heel" and that her study demonstrated the same. Does that not fit in

with the fact that the wear to the toes of the front shoes (that which is commonly called break-over), occurs in the main, to the lateral side of the toe?

These and other findings of Dr. Williams, outlined in the August97 issue, demonstrate that not only are the hooves subject to asymmetric forces when weight-bearing but the flight patterns of pairs of feet during the symmetrical trot, are also asymmetric. All of which would seem quite at odds with the T-square theory, which is based on the symmetry of hooves, limbs and joints.

However we need not make judgements on this contradictory evidence alone. One year before the publication of William Russell's first book, a stock-farm owner, Leland Stanford JR. and his friend Eadweard Muybridge, an American photographer, together solved a controversy which had been around for sometime. A question had been raised and a wager of some \$25,000 made. The dispute was about a horse; during trot, at varying speeds, would it at any point have all four feet off the ground at the same time? The wager was won in favour of those who had argued for a period of suspension and in 1878 the results were published under the general title of "The Horse in Motion". Access to these photographs and many others, may be found in the book "Animals in Motion", Dover Publications.

My interest in drawing your attention to the Muybridge photographs is that these photographs were to become the first readily accepted study of animal locomotion. Careful study of these photographs, allowing detailed analysis of the equine gaits, can provide us all with a better understanding of the asymmetry of the horse in motion.

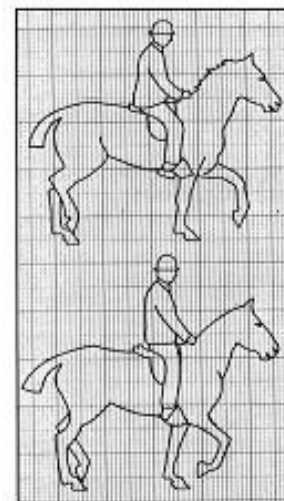


Fig. 2 An obvious asymmetry can be found in the symmetrical trot; note the difference in spacing between the supporting hooves. (A sketch adapted from Muybridge).

Gaits are in fact patterns of movement, actions which are then repeated over and over again. The walk, the amble, the trot, the pace, the canter and the gallop, are all distinct patterns of movement and yet at a glance there wouldn't appear to be any kind of unity at all. It would almost seem as if each horse moved in a unique and random way, walking, and running, jumping and standing, yet there are patterns and we can find unity.

The unique and distinctive way a horse stands and moves, forms one of its most recognisable features; inherent characteristics, that can become principal constituents of undesirable asymmetry in the hoof and limbs.

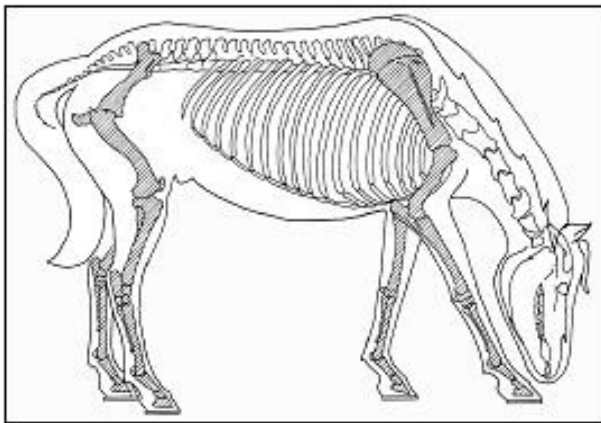


Fig.3. The grazing stance is one of the most obvious habitual acts, which affects hoof balance: see "Some odd, but not so strange, feet". Forge magazine, January 95. I illustration after Rachel Page Elliot, 'The New Dogsteps'

The horse we work on starts its life as a basic structure, the foal. From the moment the foal is born its interaction with the environment will dictate how it will develop. Habits of movement which may be linked to handedness; genetic or acquired, influencing the ossification of the epiphyseal cartilage and adapting the original structure of the foal to create the conformation of the mature equine. The equine, like all other mammals, ourselves included, probably evolved from fish like creatures. It is because of this common ancestry that certain likenesses can be found. Dr. Colles also makes this link in his article "Hoof Anatomy and Function", published in *HORSETALK*, winter 1993. In the magazine a diagram illustrates the comparative similarities in anatomy between the human and equine digit, the horse being a single hoofed animal which effectively stands upon its middle finger.

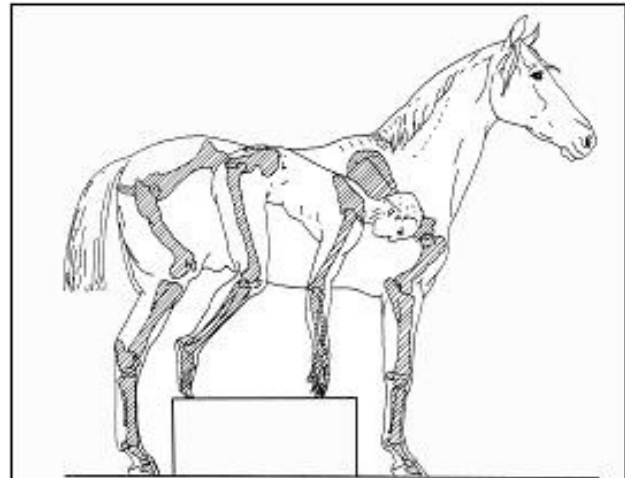


Fig. 4 Comparative skeletal structures of horse and man. Illustration adapted from Duhousset based on an idea by Garsant 1769.

The metacarpal and the phalanges, in the human and equine digit are connected to one another by Ginglymus or Hinge joints. *Gray's Anatomy*, the classic text on anatomy, describes this type of joint as having motion in only one plane. However the author goes on to write, "the direction which the distal bone takes in this motion is never in the same plane as that of the axis of the proximal bone, but there is always a certain amount of alteration from the straight line during flexion". In effect what this means is that the relationship between the axis of each bone is under constant change as any movement occurs.

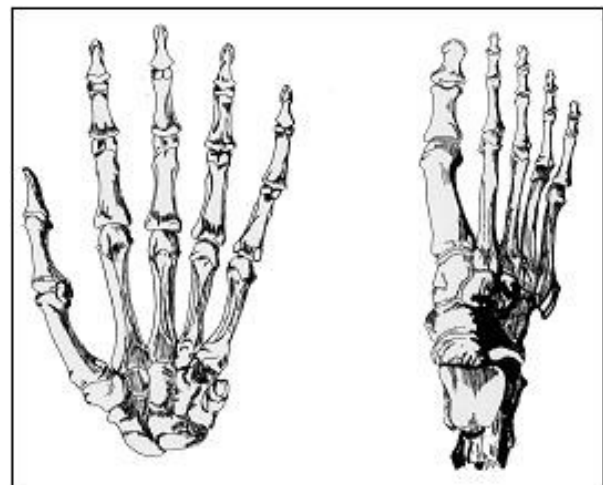


Fig. 5 The phalanges of the human hand and foot.

These changes during movement occur because of the mechanics of this type of joint, the fetlock being the most defined. Mr. Geraint Wyn-Jones BVSc, DVR, MRCVS in his book *Equine Lameness*, takes a more detailed look at this joint than other authors. His diagrammatic illustration gives us a reasonable representation of some of the important anatomical features, involved in the articulation of this joint. The distal articular surface of the cannon bone being shown to comprise of a central ridge located between two irregular facets, the medial side being the larger. The design and function of these joints is both complex and little understood, an outline of my own observations and interpretations can be found in *Forge*, February 97.

Frequently in articles published today, our thoughts and ideas are manipulated by that well known legend which precedes any description of foot balance, that is the much used phrase "should be", it is a phrase which I feel is used all too often, with little or no justification. The T-square theory is one such hypothesis, which has found favour only because of presumptive evidence, which is assumed to be true and valid until the contrary is proven.

The T-square provides us with a plan and it has been said those who have a plan will prove to do a better job than those without. However to remain bogged down with a plan, which is shown to be flawed; to become intransigent, well that is to lose sight of our objectives. In the words of Steve Jones, 'Conviction kills the search for truth because it does away with argument altogether'.

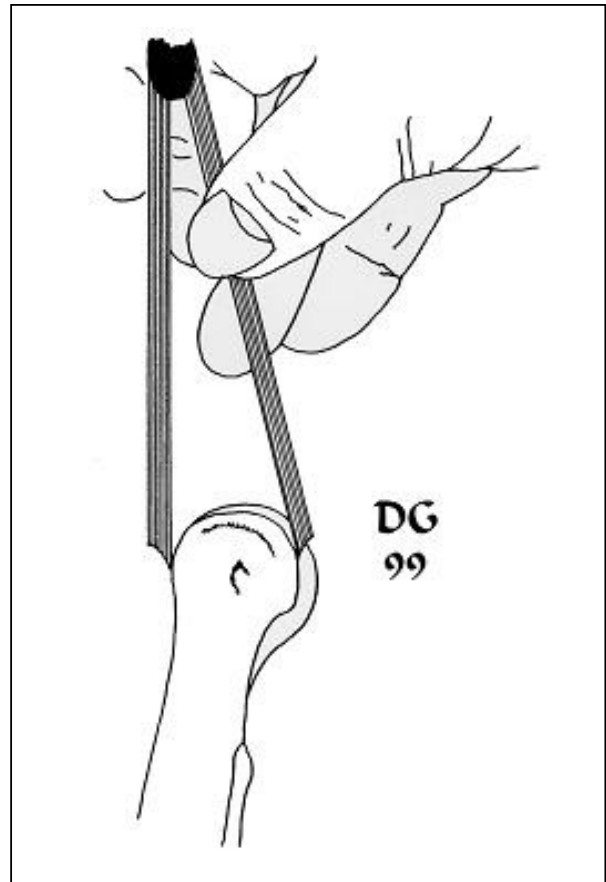


Fig. 6 Measuring the lateral condyles of the fetlock joint.

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