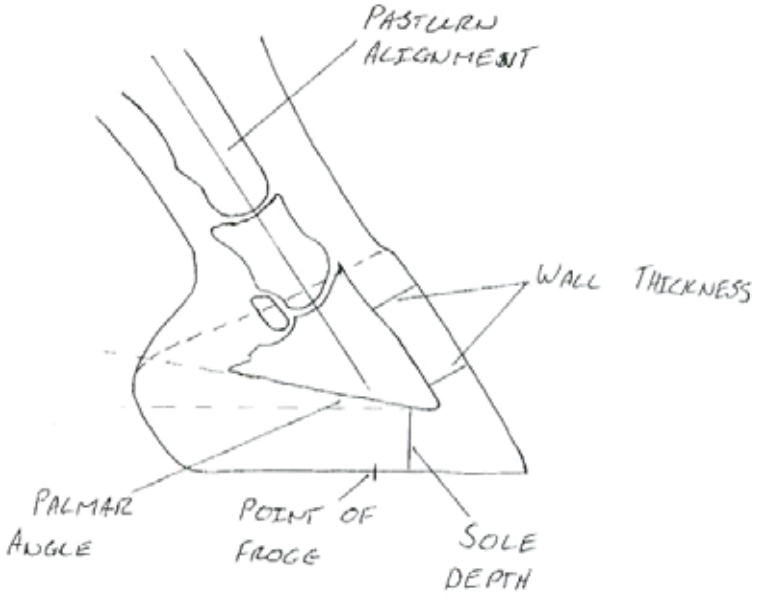
# REPORTS ON BLUEGRASS LAMINITIS SYMPOSIUM 2004

*Editor's Note: For several years the New Zealand Equine Research Foundation in conjunction with the Pye Foundation have offered scholarships to a veterinarian and a farrier to attend the Bluegrass Laminitis Symposium and to spend a short time with colleagues in the USA to study conditions of the horses' foot. The following reports are from Andre Fisher the successful farrier applicant and Warren Mitchell, the successful veterinary applicant in 2004.*

## 1. FARRIER'S REPORT - by A J Fisher*

I would like to begin by thanking the Pye Foundation and the Equine Research Foundation for the opportunity to travel to the United States of America to attend the Laminitis Symposium. While there I took the opportunity to stay an extra ten days to spend observing and working in Doctor Ric Redden's clinic. This was of great benefit as 1 gained a much better understanding of the things discussed at the Symposium as 1 was able to see everything put into practice. This was helped greatly by Doctor Redden and his teams amazing hospitality end infectious enthusiasm.

At the Symposium I took the opportunity to attend the extra session on Radiography. As a farrier it is important to be able to identify the main structures of the lower limb on x-ray so that 1 can understand a given diagnosis from the veterinarian. It is also important as a farrier to be able to explain exactly what 1 need to be able to acquire from the x-rays in order to accurately apply a given shoeing technique. In order to accurately fit a therapeutic style shoe a farrier must know the dimensions, angles and position of the internal structures of the foot as in a laminitis case for example it is impossible to know these things just from external observations.
The most important things to a farrier on x-ray are:

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These measurements are important when determining the type of shoe, how much elevation, positioning of the shoe and knowing how much foot there is to work with. It is important to have reference points such as the dorsal wall and point of frogg marked. Dimensions are crucial as it is impossible to accurately measure sole depth or wall thickness if the x-ray image is larger than the foot or is not perpendicular to the foot. Follow up radiographs should also be taken when fitting therapeutic shoes to determine whether or not the desired result has been achieved. There is no point leaving a shoe on if it has not achieved its intended purpose, this will probably be more detrimental to the foot.

Venograms also give a much clearer picture of the condition of the internal structures of the foot as in most cases of laminitis or serious trauma it is the blood supply and the improvement of it that is a major factor in the success of any treatment.

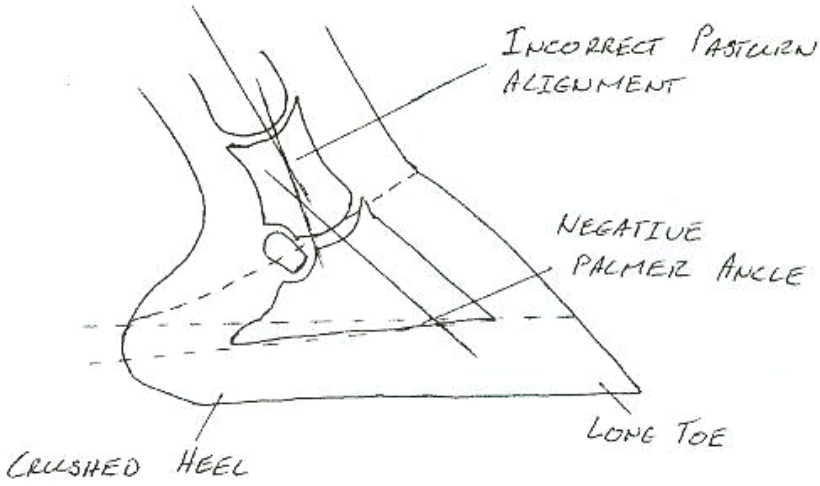
X-ray may also be used to determine the extent of soft tissue damage. Abnormal soft tissue parameters are a precursor to hoof capsule abnormalities.

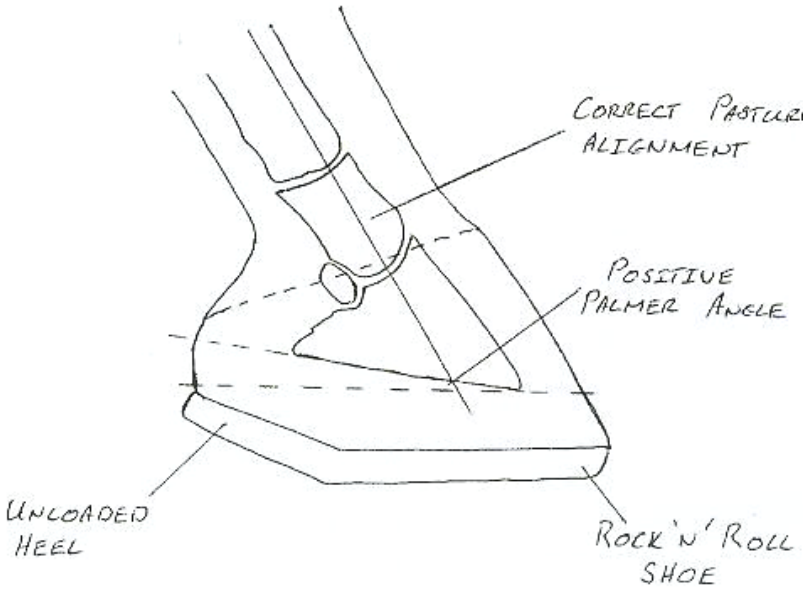
In order to obtain the desired information from radiographs a disciplined, methodical approach must be taken to establish a clear picture of the internal structures and their relation to each other. When reading x-rays it is important to know the 'range of normality', the palmar angle for example may range from 0" to 20° depending on the breed of horse and the type of foot.

Ultra sound can also be used effectively to establish soft tissue parameters within the hoof capsule. Particularly when there are no significant radiographic findings in cases such as a horse displaying typical symptoms of conditions such as navicular syndrome. The deep digital flexor tendon, impa ligament and collateral ligaments of the navicular bone and the attachments of them along with the bone surfaces may be examined within the foot via the frog coronet and digital cushion. Thickening of the tendons and ligaments, evolution fractures, osteolysis and sitention of synovial fluid can be identified in these structures. When using ultra sound it is important to compare the injured structure to the symmetrical structure of the same limb and to the equivalent structure of the opposite limb. All structures should be examined both longitudinally and traversely. Treatment of injuries with traditional methods such as ease of break over, elevation, width and support for the injured structure may be enhanced by a better understanding of the location and extent of the injury.

Dr Redden's 'rock'n'roll shoe' is an adaption of the rail shoe design to restore normal mechanical function to the structures of the pasturn. An abnormal palmar angle has a direct effect on the alignment of P2 which reduces all the structures ability to cope with loading efficiently which will result in injury to one or more of these structures. One common abnormality is long toe low heel syndrome. When x-rayed a palmer angle that is less than would be considered normal for the given case will be evident. In the thoroughbred this may range from negative palmer angle to around 5°. To manage this type of foot the rolled and crushed heel must be brought back to solid horn and to restore balance to the foot but this will in most cases exaggerate the abnormal palmer angle. A simple elevated shoe may be used to correct the pasturn alignment but in most cases the concussion upon impact is exaggerated by this style of shoe causing further damage to

the heels. The rock 'n' roll shoe allows the foot to land in a normal fashion, heel to toe then roll forward unloading the heel. When at rest the horse is able to rock forward on the shoe to restore a normal palmer angle and pasturn alignment while easing the pressure on the heel enhancing circulation which will result in the production of quality horn and sole.




The rock 'n' roll technique may be applied to any style of shoe to enhance the treatment of most conditions.

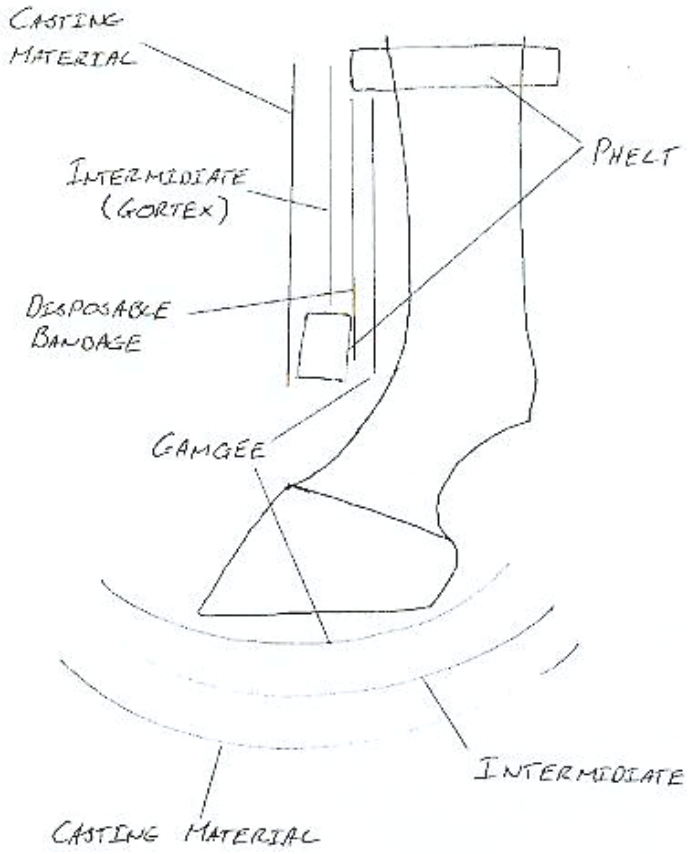
High Low syndrome or mismatched feet, is a common occurrence especially in thoroughbreds. It is common practice for aesthetic or commercial reasons to try to bring both feet into symmetry. However it is important to identify the difference in the internal structures that are the reason for the differences in the size and shape of the hoof capsules. Many similarities can be drawn between an upright or club foot and a laminitic foot, for example, exaggerated or faster heel growth, contracted heels and retracted frog. Upright or club feet should be treated as individual entities. Palmar angles and the size and shape of the pedal bones of both feet are

different, therefore the pasturn angles, dorsal wall angles and the shape of the hoof capsules will also be different.

Lacerum or platelet rich plasma is being used by Dr Redden in cases of severe trauma or injury to induce heeling of wounds. This utilises growth factor technology that was originally developed in human medicine. Lacerun promotes rapid production of granulation tissue which will the stabilise. Dr Redden found it particularly useful in cases of severe puncture wounds and in one particular case that involved the removal of peace of necrotic pedal bone he believed the heeling time was dramatically reduced.

Transportation of horses suffering acute laminitis or trauma to the foot can be detrimental as the stresses involved can further aggravate an already unstable foot. However it is sometimes necessary to move these horses in order to properly treat them. To do this Dr Redden has developed a casting technique to support the foot and lower limb while in transit.

This technique can also be used in cases where wall resections are done or the hoof capsule has sluffed or is removed. Surgical pins are placed through the cannon bone in order to take all load bearing off P3. Dr Redden has used his technique for up to seven months while re growing the hoof capsule. Careful attention must be paid to the pins as they are the main load bearing structures.



In any laminitis or severe trauma case the treatment can be very involved and require many specialised skills. Therefore and organised team approach involving a veterinarian, farrier, owner and the horse is essential. A full understanding of the conditions, financial restrictions, coarse and duration of treatment and possible outcomes is also essential for all parties. There is no point embarking on a $500 diagnostic programme on a $200 budget. There is no substitute for experience and the opinions of colleagues should not be discounted without thought. Communication is vital, for example a farrier cannot fit a heart bar shoe accurately with only instructions over the phone, he/she must be included in the diagnostic process. The farriers knowledge of the limitations of a given foot, for example whether shoe can be nailed on or not is an important part of the process of deciding a coarse of action. Sometimes such cases present as quite daunting tasks, when approached in a positive, disciplined manner we can 'Make it happen'.

## 2. VETERINARIANS REPORT - by W Mitchell[β]

In January 2004 I attended the 17th Bluegrass Laminitis Symposium held in Louisville, Kentucky. This annual event brings together veterinarians and farriers from all over the world. On route to the conference I spent a day at UC Davis, the Californian veterinary college.

The large animal teaching hospital has a very full caseload providing state of the art treatments. The equine medicine section contained an impressive array of diagnostic equipment; digital radiography, ultrasound, computer assisted tomography (CAT scans), scintigraphic imaging and magnetic resonant imaging.

The Davis Equine unit sees a lot of referral colic patients. The most common complaint being intestinal obstruction caused by enteroliths. Enteroliths are smooth laminated rocks consisting of ammonium magnesium and phosphate salts. Suspect obstructive colics routinely have abdominal radiographs taken looking for enteroliths.

The high prevalence of enteroliths in the horse population in Northern California is thought to be due to the mineral make up of the soil and a high alfalfa content diet.

The Bluegrass Laminitis Symposium is organized by Dr Ric Redden, an innovative farrier and veterinarian, whom is very passionate about equine podiatry.

The first presentation was by Dr Redden entitled "How to make it happen" - evaluation, strategy, planning and execution.

Equine podiatry work requires a farrier and a veterinarian both committed to work in unison to solve a problem.

Seldom do we a find simple primary diagnoses with the foot, most problems are multifaceted and each area involved must be dealt with mechanically or surgically. The goal being for foot problems is to simply enhance the healing environment; Mother Nature does the rest.

The importance of the visual examination was stressed looking at the foot from all angles, noticing body posture and conformation - each foot will give you either subtle or strong messages concerning the unhealthy areas.

Obtaining meaningful information about the foot remains a challenge for veterinarians and farriers. The key is to use a disciplined methodical approach that is designed to disclose the various normal soft tissue parameters, normal bone anatomy and normal hoof capsule anatomy as well as the inter relationship of each component. When examining a foot or radiograph look for all normal areas first. What is left over, points to the problem.

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[β] *Matamata Veterinary Services, Matamata*

A paper entitled the descriptive and functional anatomy of the equine foot was presented by Dr J Denoix from France. The anatomy of the interphalangeal joint was reviewed. During locomotion the interphalangeal joints undergo a variety of combined movements in the sagittal frontal and transverse planes, especially on uneven surfaces or during turns. Each movement induces specific stresses on the articular surfaces and ligaments. From his research he concluded that the distal interphalangeal (coffin) joint is:

- One of the most affected joints in the horse.'
- The most influenced by hoof placement and orientation.
- *The most directly manipulated by hoof trimming and shoeing.*

Medial or lateral hoof wall imbalance induces collateromotion and sliding on one side and rotation on the opposite direction of the bones in the coffin joint.

Ligament and deep digital flexor tendon injuries are often considered in the differential diagnosis of foot problems in which there have been no radiographic abnormalities detected.

In Dr Devoix's study the two collateral ligaments (CL) of the affected DIPJ were examined ultrasonographically (utilizing dorsal and collateral approaches to the coronet with longitudinal and transverse sections made by 7.5 or 10 mHZ linear probes) and then compared to the CL of the opposite normal limb. In all cases the injured ligament appeared thickened and hypoechogenic compared to the opposite sound one on the same limb and the homologues one on the normal limb. Bone changes at the insertion sites were also clearly seen with ultrasonography. These included entheseophyte production, osteolysis and avulsion fractures. On radiographs most of the affected limbs presented with entheseophytes on the second or third phalanx. Synovial fluid distension of the DIPJ dorsal and or palmar recesses was also documented Ultrasonographically in most horses in the study.

Collateral ligament injuries treatment options:

- Acute Cases
  - Joint immobilization.
  - Casting.
- Chronic Cases
  - Corrective shoeing
    - Rolling toe.
    - Wide shoe on side of injured ligament.
    - At least four months rest.

**Growth Factor Technology**

Dr Dave Jolly gave a presentation on wound healing and hoof repair using a newly developed equine product called Lacerum. Lacerum contains platelets isolated from mares plasma, which when activated with thrombin induce release of growth factors.

This technology using platelet rich plasma gel has been used in human medicine for some time for treatment of chronic ulcers and pressure sores.

A series of case studies were presented showing a variety of severe wounds to the body and limbs that were refractory to traditional treatment, which responded and healed through the use of Lacerum.

In an experimental study 2.5 $cm^2$ full thickness wounds were created below the knee and hock in Thoroughbred horses, one group received platelet rich plasma on the wounds; the other group was left untreated.

The platelet rich plasma (PRP) gel treated wounds at day 79 contained abundant dense collagen bundles orientated parallel to each other and to the overlying epithelium, where as the control tissues contained fewer collagen fibres that were orientated randomly. Wounds treated with PRP gel induced accelerated epithelial differentiation and produced tissue with organized interlocking collagen bundles.

**Quarter Cracks and Lacerum**

Often quarter crack wounds are insulted with bonding products, which are hot, caustic prevent water movement.

In a study of quarter cracks which were cut down to the sensitive laminae examination showed they continued to dehydrate and open up for an additional 12 to 14 days.

The aim in quarter crack repair is to produce growth of healthy tissue.

Lacerum applied, to these cracks under a tefal pad and adherent bandage did promote healthy coronary band hoof growth.

Using growth factor treatment it is possible to return to a functional hoof in sixty days.

It was interesting to hear a series of case reports by Dr Redden about his experiences using Lacerum in treating high scale foot damage, severe puncture wounds and third phalanx sequestrum, with some very encouraging results.

**Treatment Protocols for Chronic Laminitic Foot and Club Foot**

Gene Ovnicek RMF

Hoof distortion in chronic laminitis has similar characteristics as a clubfoot hence hoof management is similar.

1. Trim the heels to the live, functional sole from the frog apex caudally.
2. Leave ample hoof wall length forward of the frog apex to ensure sole clearance.
3. Optimal breakover may need to be caudal or directly below the tip of the third phalanx initially, to help reduce rapid heel growth.

Complications occur when heels are trimmed continually and aggressively into the functional soles and the toes are left long.

1. Increased tension on the Deep Digital Flexor Tendon (DDFT) will cause the heel to re grow and the walls to flare.
2. The heels will contract.
3. The horse will not land heel first.
4. The horse may develop pedal osteitis.
5. Long-term aggressive trimming may cause laminitis.

**Recognizing and Treating, Heel and Navicular Pain Before They Become Irreversible**

Through studying feral and domestic horses feet researchers have discovered that the widest part of the foot offers the most reliable reference to the dorsal distal edge of the third phalanx. Research has shown the hoof capsule can migrate forward of the widest part of the foot. This long toe short heel hoof distortion in early phases causes:

- Horses to stumble
- Land toe first
- Decline in performance.

Long periods of this hoof distortion can cause:

- Navicular syndrome
- Coffin joint pain o Ring bone
- Pedal osteitis
- DDFT problems.

Alignment of the distal phalanges is the common goal of farriers. Using the widest part of the foot for balance is more reliable than using the frog apex as this can be stretched forward in distorted feet.

With breakover placed slightly anterior to the tip of the third phalanx and caudal frog contact made, substantial improvement is seen in the position of the navicular bone and coffin joint.

Horses that land toe first usually have a longer than normal toe which causes a delay in breakover and are inclined to momentarily sublux the distal end of the second phalanx caudally and cause undue strain on the navicular bone and impar ligament.

Repeated activity of loading the navicular bone improperly by creating strain seems to cause interruption of blood flOW to the navicular bone.. It is believed that substance P receptors' that assist in regulating blood flow through that region are destroyed. Relieving strain in this area at the time of breakover and at the time of ground contact is extremely important in preventing and treating lower limb pathology:

What to look for:

- Recognise how a horse lands.
- Look at the bottom of the foot and see if the distance from the widest part of the foot is greater to the toe than from the heel.

Early treatment by moving the- point of breakover back with most likely save the horse from future lameness issues. Some horses also need extra heel support (rocking rail shoes).

The flat or thin soled foot will change to a more upright foot if the heels are not over trimmed and the breakover is placed below or just slightly forward of the tip of the third phalanx.

**Digital Venograms**

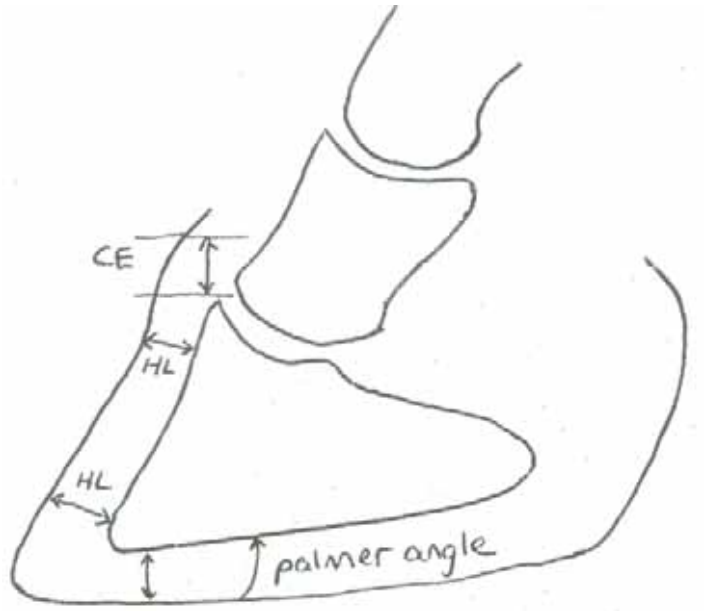
Recently, the use of venograms of the foot has been advocated for assessment of the laminitic foot. The technique is described in Equine Veterinary Education (2001) 1:3 (3) 128 - 134.

In short, venography involves placing a tourniquet around the fetlock and injecting omnipaque dye into the palmar digital vein, the foot is then immediately radiographed. It is then obvious what part of the foot has or has not got perfusion and where the blood supply is compromised. This information helps:

1. Give a prognosis (in extreme cases a lack of blood supply will mean a hopeless prognosis).
2. Helps farrier and veterinarian determine where to focus their treatment to improve blood supply eg. mechanical shoeing, hoof wall resection, coronary grooving.
3. Identify pedal bone outside vascular beds in sequestrum and space occupying lesions keratomas.
4. Serial venograms can provide information about response to treatment i.e. improvement in blood supply may precede clinical improvement. If there is 'no improvement in the blood supply after six weeks, a poor prognosis is given.
5. Dr Redden suggested there might be therapeutic value in venography through mechanical dilation of vessels in the foot.

**Foot Radiography**

Soft tissue pathology is present to some degree in every foot sore horse; evaluation of soft tissue structures can be performed radiographically. Radiographs of the feet show many points, which assist the farrier, veterinarian and owner in deciding the best treatment.




**Information From Radiographs Include:**

- **Sole Depth**
  - Measured from the apex of the third phalanx in the healthy foot this should be at least 15 mm.
  - Less than this is clinically significant. **Dorsal Horn Lamellar Zone (H-L)**
  - Measure two locations just below extensor process and distal tip of the third phalanx.
  - Both measurements should be the same; normal is 15 - 16 mm.
  - Third phalanx rotation when distal measurement is greater than proximal measurement.
  - Third phalanx sinker without rotation of third phalanx, H-L measurements 25mm or greater with bulging of coronary band.
- **Coronary Extensor Process Distance (C-E)**
  - It is the vertical distance between the most proximal extent of the outer hoof wall (immediately below the coronary band) and the top of the extensor process of third phalanx.
  - To measure this you need a radioopaque marker from coronary band down the dorsal hoof wall.
- **Palmar Angle**
  - The angle between the bottom of the pedal bone and the sole.
  - Provides information on structural integrity of soft tissues in the heel and is indicative of mechanical effect of any shoe attached to the foot.
  - Healthy feet have a positive palmar angle,,the wings of third phalanx being higher than the apex. A palmar angle of approximately 5° is considered normal.
  - High palmar angles are found with club or laminitic feet.
  - A negative palmar angle occurs when the wings of third phalanx are lower than the apex.This indicates substantial loss of heel bulb area and a small digital cushion.

- The depth of digital cushion can be estimated by placing your thumb in the depression between the heel bulbs and the index finger of the same hand in the centre of the frog. In a medium horse with healthy heels this measurement, will be around 8 cm. If the distance were well short of this you would expect to see soft tissue compromise radiographically.

After the conference I spent a very interesting day at Dr Redden's podiatry centre in Versailles, observing veterinarians and farriers from the clinic working in tandem on a variety of foot problems.

Dr Redden is continually experimenting with new procedures and treatments for severe limb injuries with some amazing results. The most spectacular that I saw was a horse moving freely in a paddock wearing a prosthetic hind limb that had been fitted six years ago. The podiatry centre deals with referrals from throughout North America.

My final two days in Versailles, Kentucky, was spent at a large private equine practice Hagyard Davison and McGee. ' The clinic has a staff of around forty equine veterinarians working with state of the art medical, surgical and reproductive facilities.

The latest equipment addition being a hyperbaric oxygen chamber. The principle is to maintain horses in a pressurized cabin where they breathe 100% oxygen at three atmospheres of pressure, which has been demonstrated to improve oxygenation of the tissues. This technique is particularly useful to treat areas such as bones and tendons in which the blood supply and hence the oxygen supply is lesser than in other parts of the body. It is also used to improve oxygenation of tissues that may have been impaired by disease, injuries or infection. Benefits of this type of therapy have been scientifically documented in humans and include:

- An increase in new blood vessels in affected areas u Decreased oedema
- Decreased inflammatory response
- Antibacterial affect against anaerobic bacteria
- *Production of new cells in bones and connective tissues, which hasten recoveries of injuries to such tissues.*

I would like to thank the Pye Foundation and the New Zealand Equine Research Foundation for their generous support of this scholarship.