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The adoption of horse shoeing marks an advanced stage of civilization in a country. Good roads are essential and these necessitate horse shoeing. Without shoes the horse is vertually useless to man where hard roads prevail. Many experiments have been tried where the horse is worked without shoes and it is surprising what the hoof can withstand during dry weather, but after a wet spell horse shoeing again becomes necessary.

In scientific horse shoeing our object is to maintain the conditions that nature has laid down. Shoeing is after all a necessary evil but its benefits are apparent to all who use horses. Shoeing is necessary to prevent wear but this leads inevitably to excessive growth of horn. Good shoeing, therfore, entails regular removal of shoes and dressing of feet and this operation requires a knowledge of the normal form of the horses foot. As the farrier is required to shoe, not only the foot, but the limb as well, it is essential to have an intimate knowledge of the structures below the knee and hock. These bones and their attachments are liable to suffer from various conditions to affect the gait and balance of the horses foot whether caused by disease or merely bad shoeing. There are nine bones below the knee, the largest being the large Metacarpal, a long bone, flatish in shape being compressed from before backwards. Together with the small metarcarpals or splint bones, which are held together by an interosseous ligament, form a flat table for the bones of the knee. At its lower end is has a

median ridge and two condyles which articulate with the suffraginis and two sesamoid bones,which increases the articulate surface of this joint.The suffraginis is one third the length of the large metarcarpal and on its lower end shows two condyles while its upper end articulates with the large metarcarpal and two sesamoids.

Several roughened prominences on the sides of the bone are for the attachment of ligaments while on the back there is a triangular shaped area for the same purpose.The next bone to take our notice is the short pastern or coronet bone,cuboid in shape and about half the length of the suffraginis On the upper end the articular surface consists of two swallow concave bearing surfaces and on the lower end two convex prominences,again rough areas appear for the attachment of ligaments.On the smooth area on the upper border is the gleniod fibro cartilage over which the Flexor pedis Perforans tendon glides.The pedal bone resembles the hoof in shape and it is possible to tell near foot from off foot and front foot from hind foot. When viewed from the front, the highest point is called thepyramidal process to which is attached the Extensor pedis tendon.It articulates with the coronet bone and the navicular bone.The wings are divided into the basilar process above and the retrossal process below and is divided by the preplantar notch.The groove running forward is the preplantar groove.On the under side is the semi lunar crest to which is attached the Flexor Perforans tendon.The pedal bone is very light and porous for the circulation of blood needed to carry on the repairative process of the foot.The navicular bone acts as a kind of pulley for the Flexor perforans tendon to glide over.When examining a bone it will be noticed that there are many holes or foramen for the passage of blood vessels needed to nourish the bone.Covering all bones,except where covered by cartilage is

a membrane called the Periosteum.It is tough and fibrous on the outside ,soft delicate tissue on the inside which is highly vascular and nourishes bone through the foramen.The periosteum is thickest where the bone is exposed to injury. The capsular ligament encircles the joint like a cuff.Its outer surface being connected with the periosteum while the inner surface is lined by a hgihly vascular membrane which secretes synovial fluid to lubricate the joints.The ends of bones which form a joint are covered by articular cartilage,which is bluish white in colour.

The bones which form a joint are held together by ligaments but it must be remembered that the capsular ligament is a vacuum,thus keeping the ends of the bones together even when the ligamants are removed.

We have said that shoeing is merely for the protection of the foot against ware.Unless this is carried out correctly the natual functions of the foot are impaired.Instantaneous photography has proved beyond doubt that under natual conditions the heel touches the ground first.The frog does or should take the first shock of concussion,compressing the plantar cushion and forcing the lateral cartilages apart.The main changes of form are the expansion or widening of the whole posterior portion of the foot from the coronet downwards to the bearing surface of the heels and quarters and the white line allows a slight flattening of the sole. The coronary cushion gives the coronet its prominence and elasticity and gives protection to the enormous number of small blood vessels and nerves needed for the secretion of the wall,but even with this cushion we have many serious conditions following bruises to the coronet.The angle of the pastern is usually between forty five and fifty degrees and the more slope there is to the pastern the better the animal is for riding purposes.We usually find that horses with upright pasterns cannot stand work as well as horses with sloping pasterns, as much of the jar is transmitted up the

leg,resulting in overshot fetlocks.With the bending backwards and downwards of the phalangial bones we get a depression of the sesamoids and the suspensory ligament being very slightly elastic also helps to reduce shock. As three fifth of the horses weight is carried on his front legs it is interesting to note th the limbs are joined to the trunk not by joints but by x muscular attachments. This is another factor to reduce jar, ie., a horse landing over a fence.The blo supply in the foot also plays an important part in the protection of the foot. As the foot is placed to the ground the pumping action of the frog empties the vessels of blood only to be filled again when the foot is lifted.As there are no valves in the foot the blood is free flowing.When horses are allowed to stand in the stables for some days without exercise the circulation is slow and nutition of the foot is not so perfect and a swelling of the leg usually place,especially the hind which are furthest away from the heart.The special function of the foot is to carry the weight of the animal while standing or moving,the weight chiefly resting on the lower circumference of the wall. The sole being arched takes no direct bearing except at its junction with the wall. When the wall for some reason has been damaged or stripped away the sole is capable of carrying weight but only on soft going such as a marsh or a box deeply litted with peat.The bars which are a continuation of the wall help supports the heels and in preparing the foot for shoeing should not be cut away as they help keep the heels of the foot expanded.The horse in its wild state has to travel many miles in its search for food thus keeping the foot worn down to its proper proportions, but as soon as domestication takes place the feet need frequent dressings to keep them in this order.As the direction of growth is downwards and forwards the toe becomes long,often causing stumbling and strain on the Flexor tendons and the bursa of the fetlock joint.(Windgalls).In the case of the sole and frog,however, exfoliation takes place when the sole has reached a certain thickness and

the frog is cast off in shreads or shed in a mass.According to the rate of growth the hoof should be lowered every three to four weeks if the balance and angle of the foot are to be kept in proportion.When the toe has grown in the shod foot, the heels of the shoe, especially when using pencilled heels, bed themselves into the seat of corn,causing corns and bruises to the angles of the heels.When preparing the foot for shoeing,not only should the foot surface be level,but the hoof should be viewed standing on a level ground, as frequently it may not be level from coronet to ground surface.This of course does not apply to a horse with ~~xid~~ uni-lateral sidebones as you do~~n~~ not get growth where th~~e~~re is concussion.This is also noticed when a mordax stud is put in the outside heel quarter of the hind shoe.In the case of a long toe, ie,laminitis, it is better to take the foot forward and dress to a reasonable shape before attempting to fit the shoe.The bearing surface of the hoof prepared to receive the shoe consists of the ground surface of the wall,outer border of the sole white line and the bars at their turning in point,remembering always to ease out the seat of corn so that no direct bearing of the shoe takes place. Badly prepared feet which are unlevel and improperly balanced to the proper Proportionof roughly ~~threexto~~ one to three, may cause the horse to interfere with his action,may strike himself badly,stumble or even fall.The long term effects may contribute to the formation of sidebones,ring bone and damaged joints and tendons.Many young horses have,however,through neglect or disease deleloped twisted feet and joints, but with a little care and skilful foot dressing combined with common sense many youngsters can be rendered servicible again.The sole and frog need but little attention as the sole is better at its full thickness to protect the sensitive structures of the foot and none but loose flakes should be pared away.We have previously mentioned that the ground surface shoudd be level,but if however,we examine the front foot of a horse in its natual state we find the breakover point at the toe is worn

slighly,thus giving the horse more freedom of movement.One glance at a farriers scrap heap is enough to prove that nearly all horses wear the toes of the fore shoes while the quarters are often intact.It is adviseable, therefore, that the toes of the front shoes,especially on hunters should be rolled up slighly,thus enabling the horse to get his front feet away quicker and prolonging the life of the shoe.

The foot surface of the shoe for a normal horse should in all cases be flat with the sharp inside edge taken off with the hammer as this has a tendency to rise when the toe is being bent.This prevents the shoe becoming bedded in the sole.Possibly the best shoe to allow the foot to function naturally is the one made for a land horse out of say, 1" and one eight by seven sixteenths It gives the horse plenty of cover while not being too thick to lift the frog out of action.The heels of this shoe should be atleast one quarter of an inch longer than the last bearing point of the heel,so that after a month the shoe is still not pressing on the seat of corn.The heels should be slightly wider to allow for expansion but the edges should be boxed with a hot rasp to prevent the shoe being torn off if the horses happen to be working in pairs.With regard to nail holes,these should be placed so that one is nailing on the white line which gives the full thickness of horn to nail to,thus minimizing cracks and torn out nails.If the shoe is holed four and three, the outside heel nail should be just over the half way from toe to heel.The inside heel nail,being the finest,as the horn is thinest at this part,should roughly be between the third and fourth nail holes on the outside.A shoe holed in this way should not interfere with the natual expansion of the foot as the toe quarters are mounted on bone and the heel quarters in flexible cartilage.In the hind foot of the cart horse the outside heel can stand wider by a quarter of an inch as this gives the horse a good base to stand on.When shoeing hunters one has something completely

different to deal with as these horses have to travel over often wet ground at a fast pace. The best shoe for a hunter is off the fullered concave variety, nice and wide in cover without being too thick. The heels of these shoes require special attention as if left longer than the foot will inevitably be torn off. Provided the heels of the shoe are not harrowed up to much part of the bars can take their share of the weight. The ends of the heels should be pencilled and the points slightly bedded into the last bearing point of the heel. I like four nail holes each side and the inside heel quarter bevelled so as to prevent the horse brushing as many hunters run close in front, when tired. The outside heel of the hind shoe can be set out wider than the foot but should be boxed well. The inside heel quarters should be made to allow for brushing. I like the toe of a hunter hind shoe squared accross the toe and well bevelled through a half round tool. The over-hanging foot should not be rasped but merely the sharp edge removed. The Quarter clip should be strong and the inside clip let into the foot. If a hunter has a tendency to overeach badly, the heels of the hind shoe should be made thinner and the heels of fore shoe thicker with the toe rolled. This Delays the action of the hind foot and promotes the front foot to get away Quicker. Care should be taken to make the heels of the shoes flat on their foot surfaces so the heels do not have a tendency to contract on account of resting on surfaces which slope inwards. The use of too heavier shoes not only causes the horse to carry unnecessary weight but need large nails to hold them on which damages the wall unecessarily.

When dealing with hunters with hunters which brush and cut their joints, wether in front or behind, the first thing to do is to establish which part of the shoe is doing the damage. This can be achieved by putting soot mixed with grease

onto the part which is hit. The horse is run up and down untill the part of the foot which is doing the damage is marked with the grease. The foot is then viewed fronst the front as often a horse will brush if the foot is lower on inside quarter. The outer quarter is then lowered so the inner is slighty higher thers throwing the foot away from the opposite joint.
Brushing horses should be shod as light as possible, and the more weight on the foot, the greater arc is formed when the foot is in motion

So bearing in mind the anatomy of the foot and leg,which were outlined earlier,with the examples of shoeing cart horses and hunters.THis illustrates the principles I wish to emphasise, that the shoes should be well fitted, whilst giving grip,good wear and most important that the foot should carry out its natual function, so balancing the foot.The best guide as to making the new shoe, is the old shoe itself,thus showing where the wear has taken place and allowing for disease or malfunction of the foot and leg.It should be every farriers ambition to have a horse leave the forge going as comfortably and as inhibited as the wild horse of the plains.So remembering that good work not only satisfies the customer but assist the horse to carry out his work well and maintains him in good health for the future. Remember the old saying 'No foot, no horse', and never a truer saying.