CONFORMATION

THE RELATIONSHIP OF FORM TO FUNCTION

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Reprinted from *The Quarter Horse Journal*

CONFORMATION...

THE RELATIONSHIP OF FORM TO FUNCTION

PART I

AN ILLUSTRATED LECTURE BY MARVIN BEEMAN, DVM

Editor's Note: We are extremely grateful to Dr. Marvin Beeman for granting the Journal permission to print excerpts from one of his informative lectures. This material was taken from a tape recording of one of Beeman's lectures concerning conformation and the reasons for unsoundnesses of horses. Much of the material appears without editing to capture the flavor of Beeman's manner of lecture presentation.

Marvin Beeman of Littleton, Colorado, graduated in 1957 from Colorado State University with a degree in Veterinary Medicine. He has conducted numerous lectures and seminars on the soundness of horses at such places as AQHA Judges Seminars and the All-American Quarter Horse Congress.

The real conformation principle behind a horse is the fact that you are going to use him, not just look at him. We look at horses to evaluate their conformation. However, the basic principle is that we are going to use him and he must be able to perform. That's where the dynamics of equine locomotion comes in. In other words, all of the things that a horse is expected to do like cutting, roping, racing, jumping, polo and so forth. His center of gravity and all of his fantastic meshed-in mechanism of operation are the dynamics of equine locomotion.

Development of growth factors can be altered; age is going to increase; training can be altered; physical fitness can be altered; health can be altered; but the one thing that cannot be altered, with but very little degree, is conformation. And, that conformation is going to be very similar to that of his mother and his father.

We must put conformation in the right perspective. We have three choices — we're either going to use a horse in some sort of activity, we're going to feed him to the dogs or we're just going to look at him. The majority of us are going to ask our horses to perform, so let's try to relate conformation to that animal and to his dynamics of locomotion.

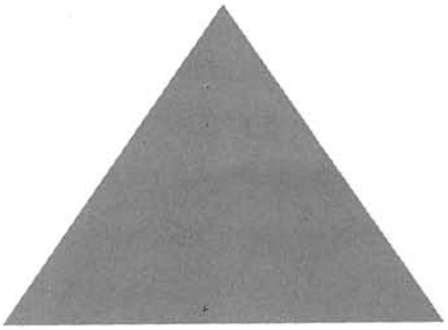
I stress that this conformation is going to be inheritable and it is going to be something that you cannot change. The projection of a breed lies in the hands of the judges or those who are breeding horses, so they have to have an understanding of the dynamics. Otherwise, we are lost.

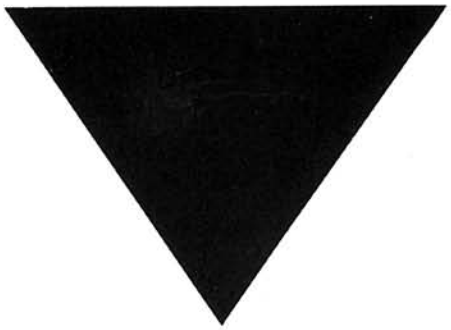
Professor Byron Good of Michigan State University has defined conformation simply as the "relationship of form to function". I like that definition. With that definition, you cannot argue and say, "Well, that's a good horse but I'm going to use mine for a different thing." That's why the conformation of a Quarter Horse is a little different; that's why the conformation of Arabians is a little different; that's why the conformation of a horse that runs a mile and a quarter is a little different — relationship of form to function.

There are other definitions which I think are good. Conformation is the key to a horse's method of progression. All right, that tells us that the way he is put together determines how well he is going to go.

Conformation is a fact too, not just an opinion. How many times have you sat down and had a guy say, "I don't care what everybody says, but I had a Roman nosed horse with a ewe neck and he was really quite a horse." So, every Roman nosed horse with a ewe neck is quite a horse. Conformation has got to be more factual than that. And, that's why I say that judges are certainly entitled to their opinions, but they'd better be learned opinions.

We have definite guidelines to go by. For instance, there has got to be an optimum angle of the shoulder in relation to a horse's front leg and to his total body. I believe there is an optimum angulation for a horse's shoulder. I think there is an optimum length of the arm or the humerous. I am sure it has to do with relation of the total body, because it is a lever. It is an attachment for muscles. The angulation down the front leg of a horse — why do you want one straight? Simply to utilize all of the bones and tissue he has because this





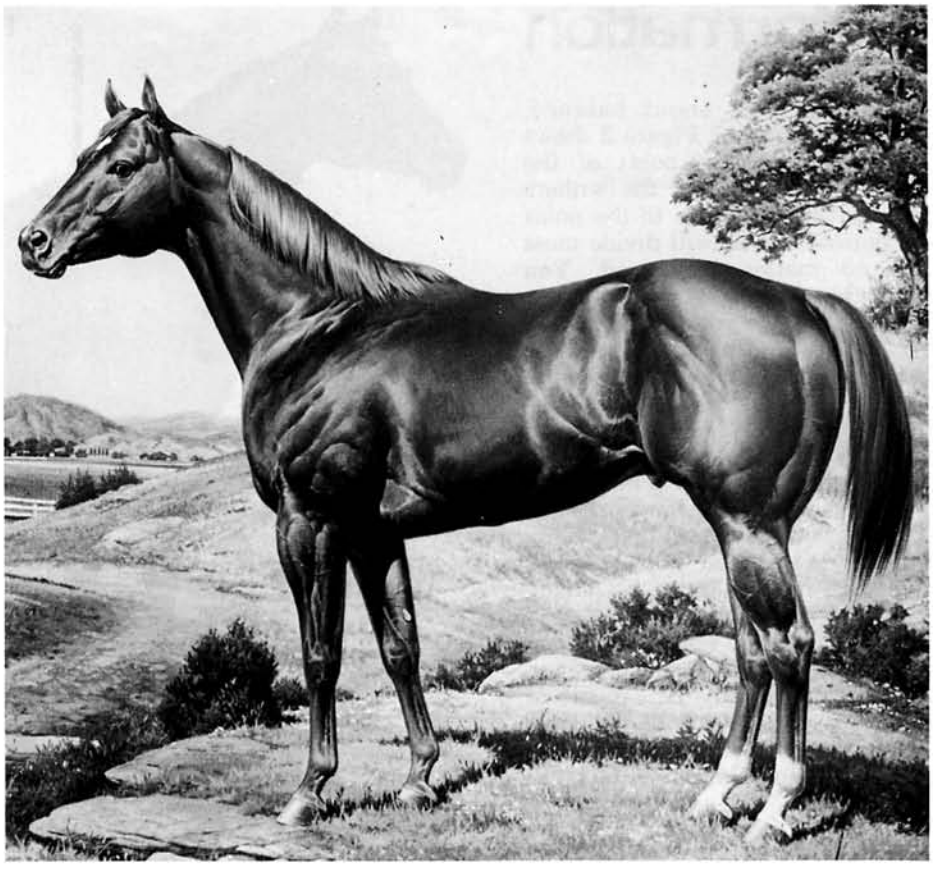


Figure 1. A standard of excellence is first and foremost, regardless of breed.

fantastic amount of stress coming down that horse's leg has got to be disseminated. If the leg is straight, that stress is disseminated equally. If it is crooked, one part gets abused and the other gets neglected. That's one reason horses break their knees. You can see where the line of stress goes.

As we work down the train of conformation and as we talk about how it ties in, I finally come to this part in my definition of conformation — that is, conformation is a major factor in the soundness of the limbs. The degree of soundness determines the useful lifetime of a horse. Now, granted, a lot of horses get hurt, but most horses' useful lifetime ends because they go lame. That's why a gelding is finished; that's why a broodmare becomes a broodmare — it's usually because of unsoundness.

Now, most unsoundnesses are the direct effect of stress, strain and concussion, in other words, anything you do with them besides lead them at the end of a halter shank. And, the common denominator, or how well a horse can withstand stress, is conformation. So, that is the tie in, then, of conformation to unsoundness.

The more I see of this, the more I believe it. Granted, we may be racing horses at two when they shouldn't be, but that's beside the point when you really figure that all two-year-olds are going to be raced. Let's see why some hold up and some don't.

Conformation, good and bad, is inheritable. I like to make that point clear. Most of the time if a mare isn't fast enough to stay sound and run past four years old, she goes to the broodmare band. And, if she's too crooked legged to train, she goes to the broodmare band. And, if she doesn't win in the show ring, she goes to the broodmare band. Now, this isn't always true, but many times it is, and I don't think I can get that across enough. I think it is an obligation of the breeder, the buyer, the seller and the stud manager to be conscious of this instead of just propagating bad faults on down the line.

Realistically speaking, there are no perfectly conformed horses. I don't think there ever will be one. But, I know there are many which come closer to the ideal conformation than others.

Years ago, nature and necessity were the judges who selected the horses to be bred and propagated, but today, the world over, that's not true. We have taken away nature and necessity — we let man be the judge. His target is not fixed and his judging system is not fool-proof because it is based on opinions rather than on the cruel, hard proving ground that was provided by nature. Years ago, if a horse didn't make it in the remuda his owner turned him out. If he lived through the winter maybe he could be used the next year. But, usually the gods got him. In the desert, if horses weren't fit, owners didn't fool with them. They were turned out and allowed to die.

Today, men try to select, and in too many cases men's opinions aren't well established. Someday, maybe we will have that accomplished.

In judging horses, one must decide when the good qualities exceed the bad, or vice versa. And, only by understanding the fundamentals of conformation can good judgment be formed in a rapid examination. We must establish a standard of excellence (Figure 1) in our minds if we are going to judge Quarter Horses.

Now, I realize that people discuss and argue about this horse, but there is not a man that has ever ridden a horse over five miles that can argue about that horse meeting criteria. There will be some little whims here and there, but he has balance, he has beauty and he has the things that make him function — the relationship of form to function.

Conformation

Everybody talks about balance. Well what is balance? Figure 2 shows the division from the point of the shoulder to the point of the withers to the point of the croup to the point of the buttocks. This will divide most horses, no matter the breed. You think of the total body with the legs as a big mass, then you put on a neck and a head as the balance arm. The neck is the arm and the head is the ball right on the end. Watch a cutting horse use his head and neck for balance.

This is why short-necked horses are not as desirable as longer-necked ones. You don't want a big, dumb, long head on the end of that neck, because there is no sense in having excessive weight out there.

When you watch horses that can jump six feet, a lot of them have long necks. Now, they may be all out of whack other places, but they'll have a long neck. And, they'll be able to reach and balance. Balance is fact, not just opinion.

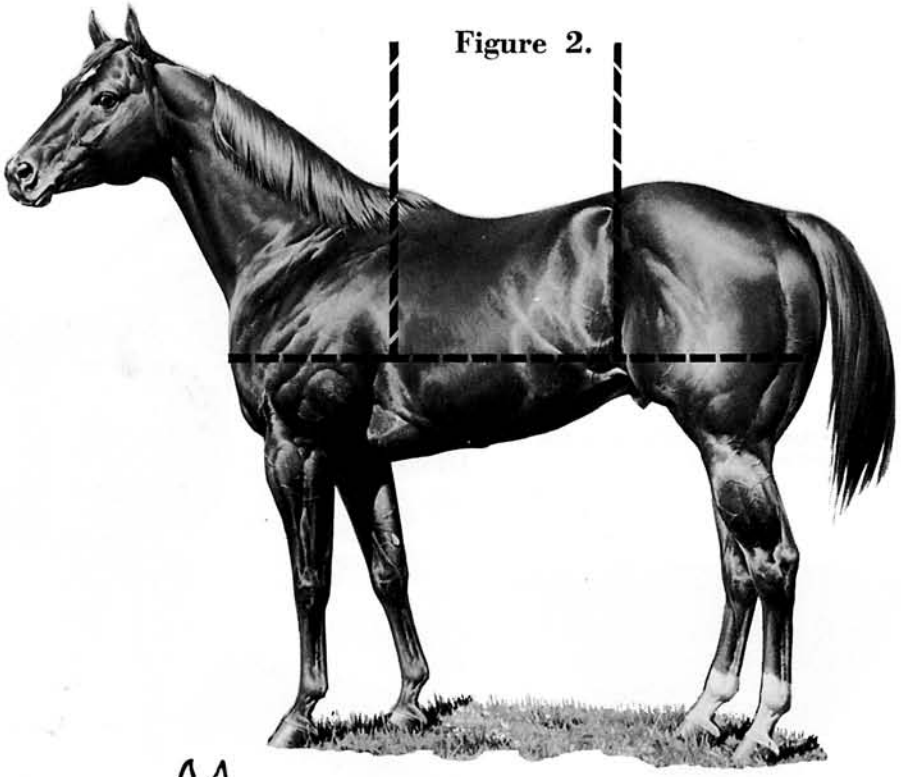
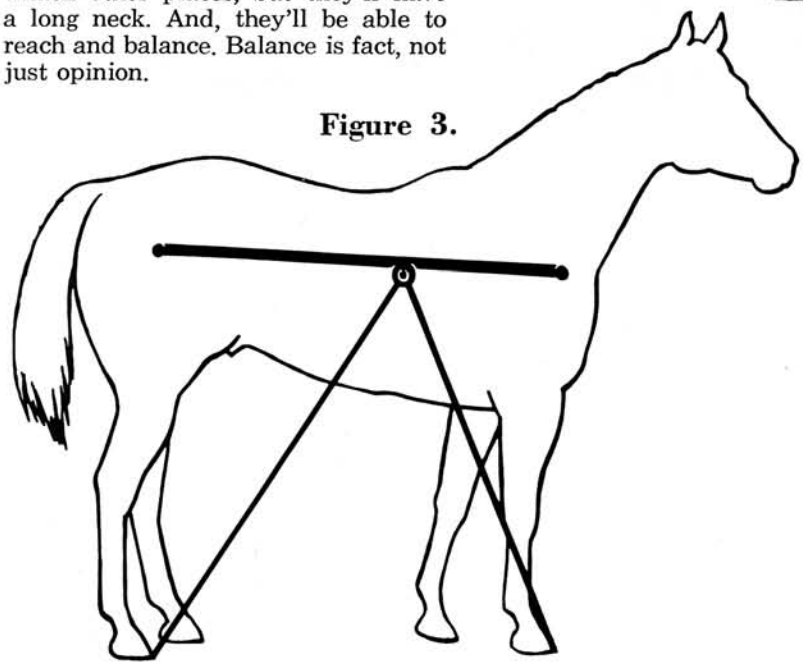


Figure 2.

Figure 3.



The center of gravity (Figure 3) becomes important when you think about the dynamics of equine locomotion. And, this has been figured out by James R. Rooney. The center of gravity of an object as I am defining it, is that point where, if you could balance it, it would balance equally.

Relate that to conformation and you can see right away that there is more weight on the front end of this horse, which then comes down and makes the front legs more important from a standpoint of judging them, because the front legs are going to bear more weight. In fact, the front legs are going to bear about 60 to 65 percent of the weight (Figure 4). This is one reason . . . getting factual again . . . why you see more trouble in the front legs. Because the front legs are going to bear all that chest and the head and the neck, and that is where the center of gravity is going to be.

This gets back to conformation as it relates to equine dynamics. The center of gravity is going to change; that is why a horse has a head and neck for balance. When you put a rider on there who's not sure where his center of gravity is anyway, you can see why a horse has this kind of balance (big heart girth, a longer neck, smaller head and his hind legs back there for pushing).

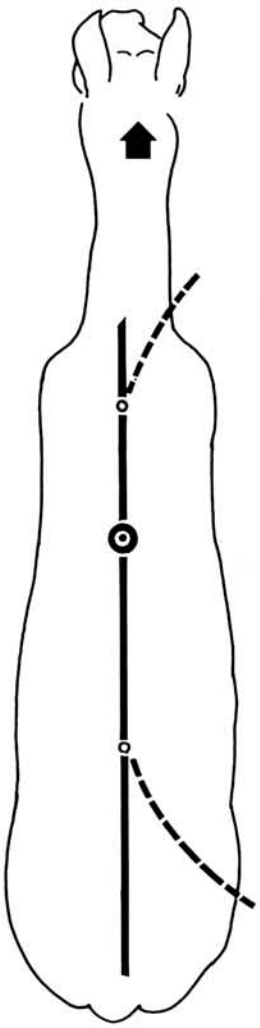


Figure 4.

Conformation

Figure 5 illustrates the center of gravity to show how it moves as a horse travels, and how he has to have the muscles and the bones to counterbalance one stress over another.

I put this in to show again the way the center of gravity changes. This is copied from a Standardbred horse, probably, but like the torque applied to the center of gravity by the legs of a pacer. Well, basically, all of these things do what this picture shows.

Figure 6 shows a standard of excellence in the head, and not just because the head is appealing to us. There is a reason for that horse's head looking the way it does. So, let's look at the reasons.

Number one is, Why do we want a horse with the big nostrils? There's only one way that horse can function, and that's on oxygen. And, if we don't have the proper inlet of oxygen, he is no good.

Why do we want a horse with a relatively short face? I mentioned earlier that we don't need a big bulky head out on the end of this balance arm. Why do we need any head at all? There is a reason for length between that horse's nose and his eye because there are a bunch of terminates in there that heat or "temper" the air. If the air is cold, the terminates heat it. If it's hot they can cool it almost to body temperature. That's why you need some length. Plus, a horse has to have room for his teeth.

Why do we want a horse that's a little bit dished or flat in the face? Because a horse needs to see in a 180 degree arc, and if he has a big Roman nose he can't see past it. That relates to why we want a horse with his eyes out on the corner of his forehead — a big, round expression. If you stick the eyes down in the socket or on the side of his head, he can't see you. That's why pig-eyed horses are unruly. If a horse can't see what is going on, he objects to it. His natural reaction is to kick and run, or fight. If he knows and can see what is going on, he can contend with it. If you don't believe that, sneak up behind a gentle horse and poke him with a pitchfork. Then try to sneak up behind a grazing horse. You can't sneak up behind the grazing horse because with his head down he can see almost 360 degrees — his eyes are placed and he's got that full arc.

We don't like a horse with an excessively large jowl. The reason is, he's going to eat and hold the bit and run away with you if he has too much muscle. So, there's really no point — plus it puts more weight out there. We've seen that in our lifetime. Remember the big heavy jowled horse? He's going out of the picture, now. It is more important that the horse be wide between the jaws so that he can get free movement in his throat. Then, that relates to his throat latch. Everything that goes through that horse's system to make him operate has to go through his throat latch. We talked about the air, his food, the blood to and from his brain —his total nerve supply has to go through that throat latch area. There are a lot of glands right behind the jaw. So, if we have a big old heavy throat-latched horse, and we try to make him tuck his head and handle properly, he can't do it. It shuts off his air, shuts off his blood — just like a man wearing a collar that's too tight.

The ears? How many times do you go to a show and hear some guy say, "Aw, that's a good horse but he's got ears just like a mule." Well, don't think of the ears as length; think of the ears as the way a horse expresses himself. His eyes and his ears are going to tell you what he's thinking about. If he's a sour son-of-a-gun, he's going to let his ears down. If he's going to buck you off, he'll pin his ears and you better get set. So, think of ears as organs of expression, and if the horse is paying attention, you can tell it. That's a lot more important to me than length. Granted, you don't like an ol' long ugly ear, but that's pretty minor.

I try to relate all of this stuff. In other words, looking at that total head, let's think of the reasons for its looking that way, not just because it appeals to you or me.

Figure 5.

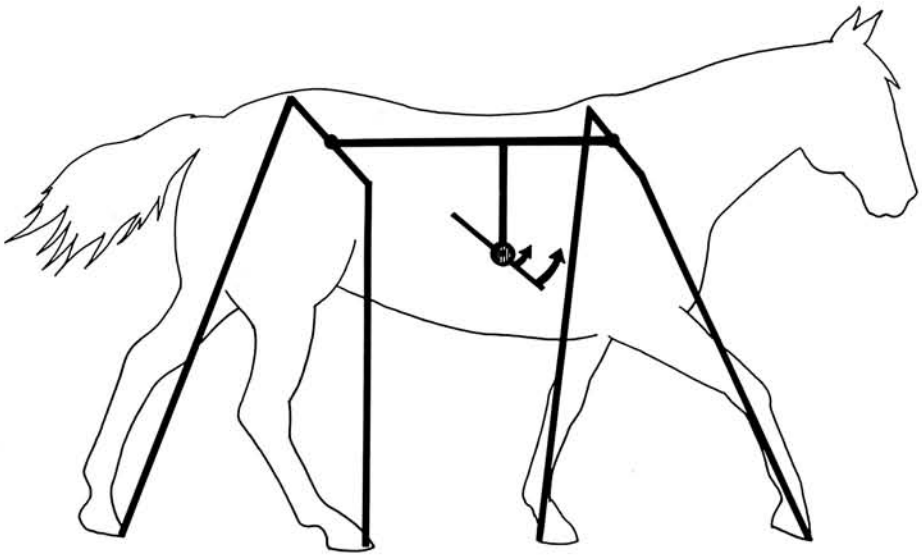
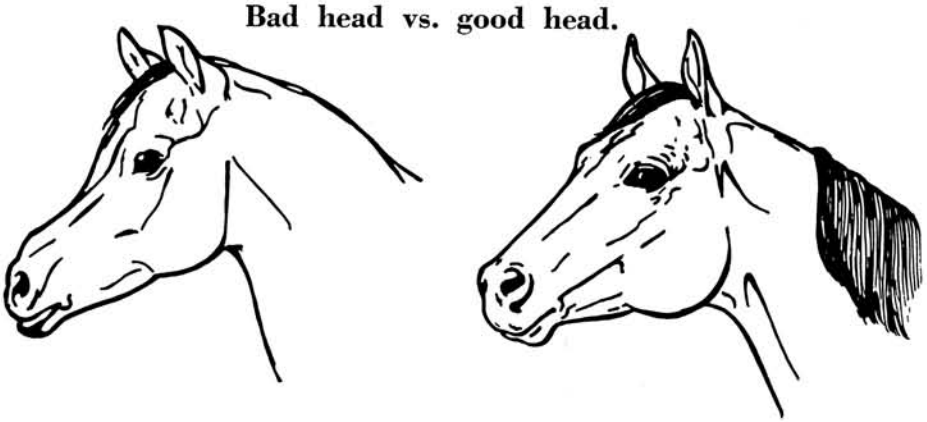


Figure 6.
Bad head vs. good head.



Conformation

Figure 7

Now, let's talk about the shoulder and the angulation (Figure 7). We want an angled shoulder, and the angulation is between the shoulder blade and the arm bone or the humerous for several reasons. First, we know that this horse supports most of his weight with his front legs. The only way the front leg is attached to the horse is by muscles and tendons, etc. — no bone. You can cut a horse's front leg off and not hit a bone. You can't do that with a man or a cat, they have clavicles.

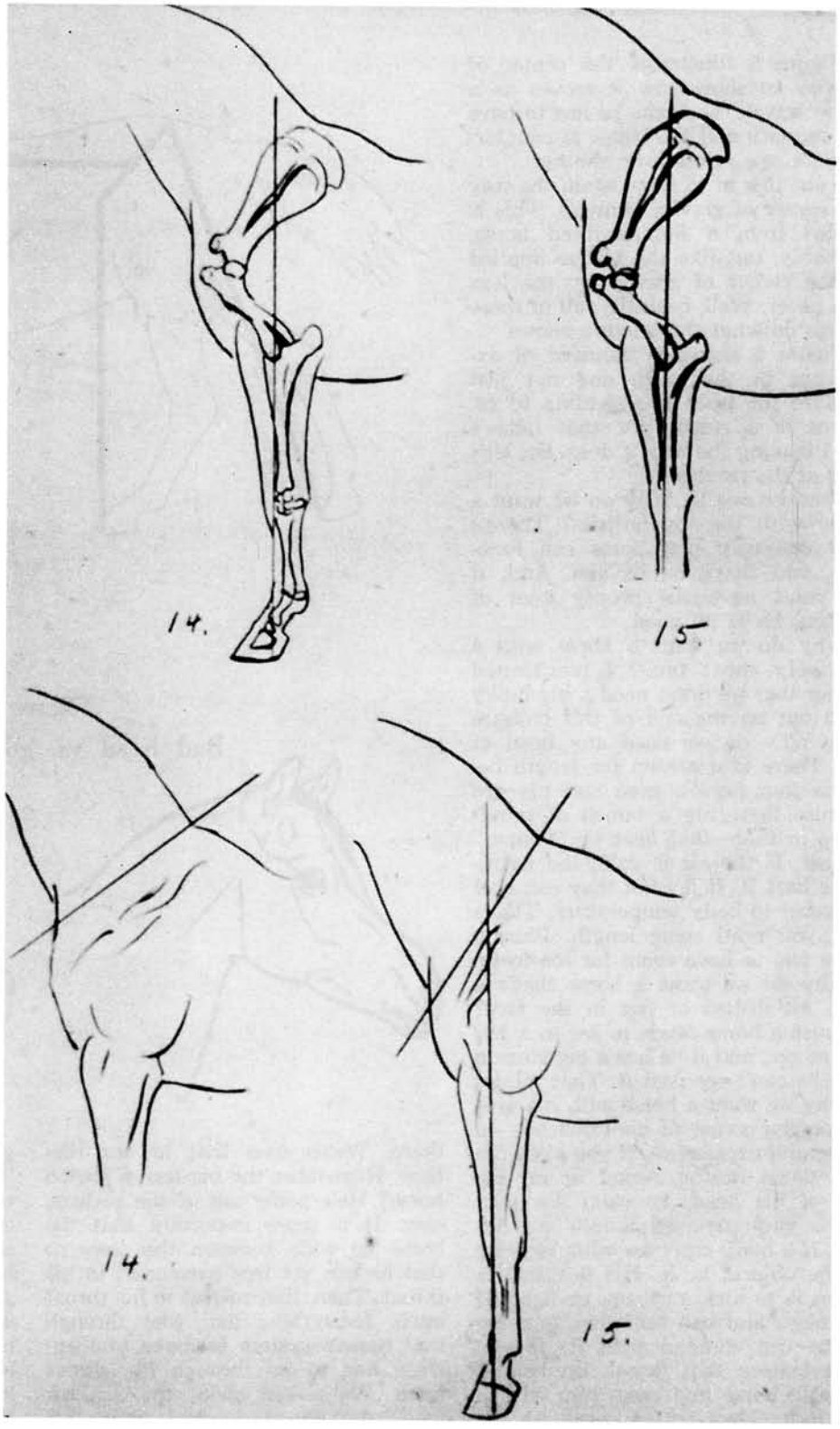
The front legs become a sling for the horse's body. They are going to support 60 to 65 percent of the weight; therefore, they must absorb a great deal of this massive concussion. So, if you have good angulation in the shoulder, you have built-in shock absorption. Plus the fact that if you straighten a horse's shoulder, the length of his anterior stride is changed by that angle. In other words, if you have a good deal of angle between the shoulder blade and the arm bone, his leg can extend further out.

If a horse is too straight in the shoulder, his stride is shortened. In measured distance, then, a horse with a straight up and down shoulder is going to hit the ground more times to go that distance than the horse with the angled shoulder. That's why the straight slope or straight shouldered horse with the straight pastern hurts a rider's back. Because he has to hit the ground more times to go that mile. Then, you add that to 10 miles, 20, 30 . . . and in a lifetime you can see why lamenesses start showing up with the straight shouldered horse (usually he has the straight pastern to go with it).

Now, again we see a factual reason for conformation and not just opinion. I use the diagrams because people should be conscious of the fact that the shoulder blade, the middle of the shoulder blade, the spine of the scapula, actually tells you what the angulation of that shoulder is going to be — more than just looking at the point of the shoulder and the top of the withers. Some horses have shoulders out on the front end of their body and they still have a straight up and down scapula. It looks like they have a sloping shoulder but they don't — it's just out on the front end.

That particular horse, for instance, is a horse . . . Have you ever seen a horse that crosses his front legs when he walks? Many times that's the horse whose shoulders are way out on the front of his chest. And, there's a factual reason for that. You see, the chest is shaped like a boat and if you stick the shoulders too far out, the horse has to cross his legs to go.

Figure 7.



Conformation

Figure 8.

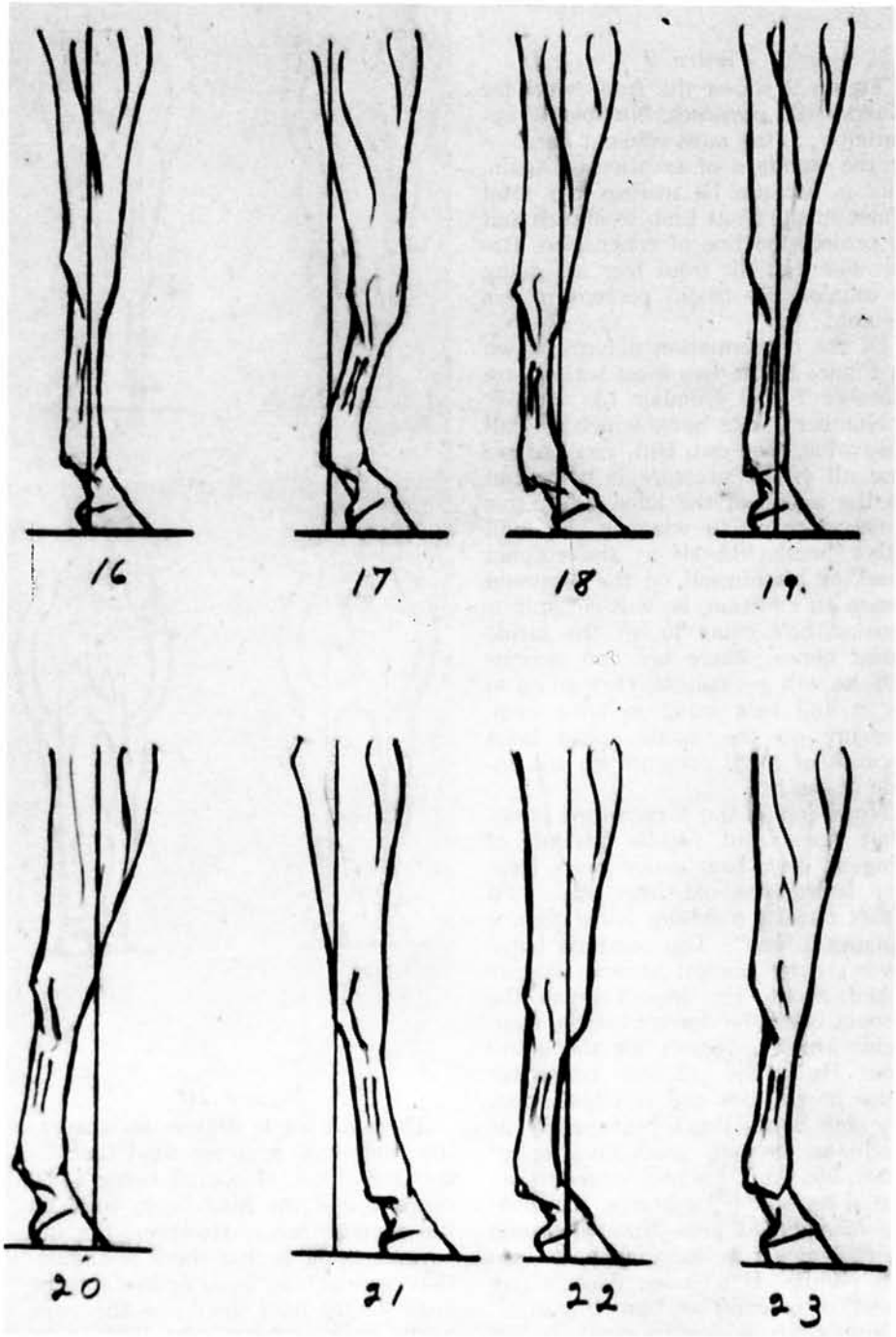


Figure 8

The front leg marked Number 16 in Figure 8 is the type we like.

Now, the reason we like that is, you see, it utilizes the total column of bone, muscle, tendon and ligament to absorb the concussion — down to the fetlock where it is placed at the right angle to be used as a shock absorber. That is why the suspensory ligament is there; that's why they have the attachment of the deep ligaments and tendons — to give the shock absorption. And, the line of concussion comes out at the heel, not at the middle of the foot.

Now, let's compare them. Number 17 is a horse that's over in the knee. Everybody can see the horse that's over in the knee and some say, "Oh look at that horse shake; he's over in the knees, he's a bad deal." Well, the knee is made to bend that way — not backwards like Number 18. And, I would wager to say that nine out of ten times, Number 18 and Number 19 will be given preference to Number 17. I'm not saying we should go out and buy horses over the knees. However, I try to get a value placed on a conformation defect. What I am saying is, the horse that's over in the knee is a better risk than the calf-kneed horse.

Number 19 is a horse that's too straight in the pastern. And, you can see where the line of concussion is. That would be the middle third of the frog. If you picked that horse's foot up and drew a line where that line is, you'd see that it goes across right where the navicular bone is. That, then, begins to tell us the reason why the straight shouldered, straight pasterned horse gets navicular disease — because he absorbs most of that concussion right out through that part of his foot.

Some people say navicular disease is inheritable. That's not necessarily so. The disease itself isn't, but the conformation defect is.

Now the other diagrams. Number 20, of course, is a horse that is what you call "camped under" in front. It's just a matter of simple geometrics to figure out that the horse cannot balance himself like Number 16 can.

Number 21 is camped out — same situation there.

Number 22 is a horse that has a small cannon bone compared to the rest of his leg.

Number 23 is a horse that's tied in below the knee. That means that his cannon bone is small plus his tendons aren't as big as the rest of his body in comparison. That usually gives a horse a tied in appearance. This, then, brings us to the point of the flat bone.

People say, "I want a horse with a big flat bone." You can't have flat bones in the round bones of a horse's body. The only flat ones are in his head and his ribs and some of the small bones. The most efficient bone is a cylinder. That's why you have "I" beams and cylinder beams.

The thing that makes a horse look like he has flat bones is the cannon bone with the suspensory ligament, a deep flexor tendon, and a superficial flexor tendon that's big enough to go with the bone. Those things make it look flat.

Again, there's a factual reason for this. The old-timers knew that when a horse had that appearance — number one, he had a big bone; and number two, he had the tendons and ligaments to go with it.

Conformation

Figure 9

Figure 9 shows the front view for diagramatic purposes. Number 6, apparently, is the most efficient horse — or the standard of excellence. Again, this is because he utilizes the total bones in the front limb to absorb and to project the line of concussion. Remember that his front legs are going to support 60 to 65 percent of his weight.

Of the conformation defects shown in Figure 9, the two most serious are Number 7 and Number 13.

Number 7 is a horse which we call base wide, toed out. But, you can see that all of the pressure is being put on the inside of the knee. Plus, this horse is going to wing in. He will either brush himself at the coronet band, or hit himself on the sesamoid bones. In addition, he will get splints because he's going to hit the inside splint bones. There are two reasons why he will get splints. He's going to hit it and he's going to have more pressure on the inside splint bone because of more pressure on the inside of the leg.

Number 8 is the pigeon-toed horse. That horse will paddle instead of wing in. But, how many times have you heard the old-timer say, "I'd rather have a paddling horse than a winging in one"? The paddling horse doesn't bang himself around like we talked about. He doesn't brush the coronet band; he doesn't hit the sesamoid; and he doesn't hit the splint bone. He might get side bones because he paddles and is pigeon-toed, but side bones don't hurt nearly as much as broken sesamoids, splint bones, etc. And, I would wager to say that if he is judging horses, the average man would pass Number 7 and reject Number 8 because he can see him paddle. If a judge doesn't pay attention, he can't see him wing in.

Number 9 is just a variation, in that the knees are straight. He's not much better off than Number 7.

Number 10 is a horse that's wide — probably not much of an athlete really.

Number 11 is a base narrow horse. Again, he has trouble getting his feet out of the way. That horse will paddle also. That is what a horse will look like with shoulders out on the front of his chest. He'll criss-cross and have to compensate.

Number 12 is off-set and base wide. He has trouble.

Then, Number 13 is the bench-legged horse. This horse has a particular amount of trouble with his knees if he is stressed.

Figure 9.

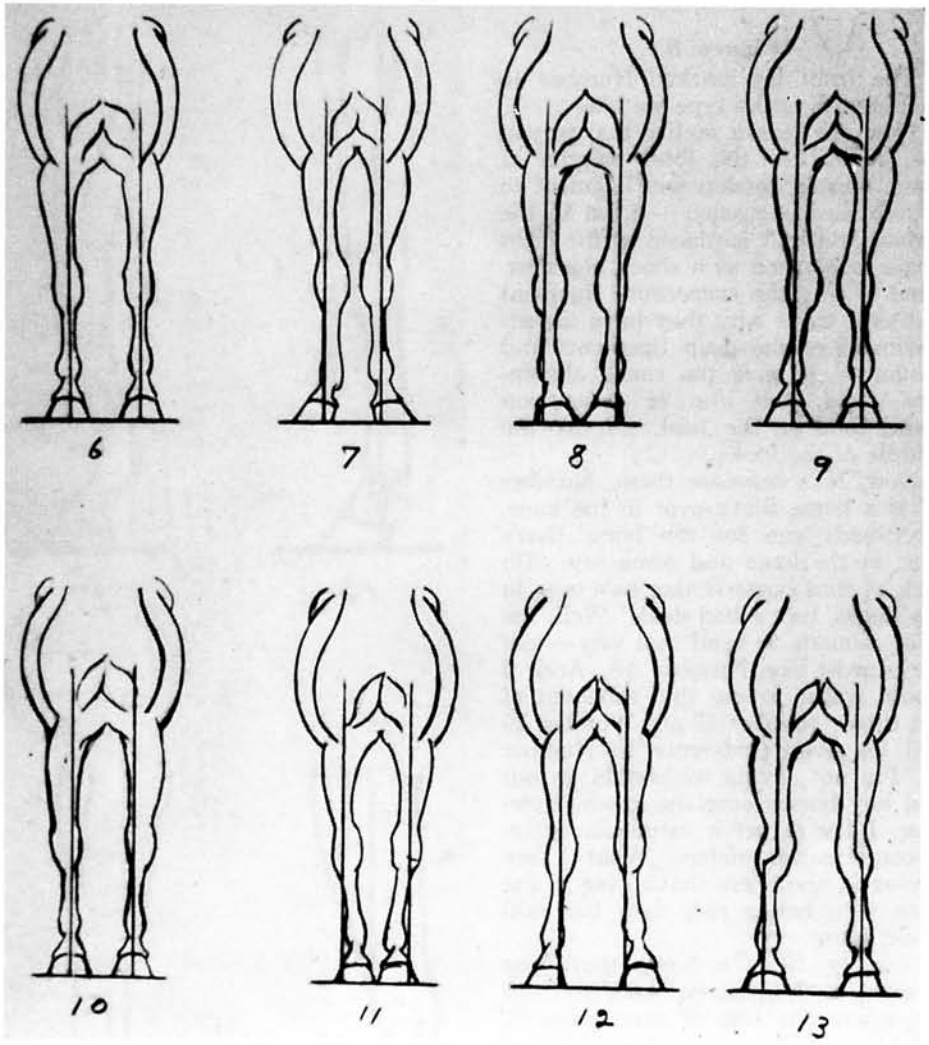
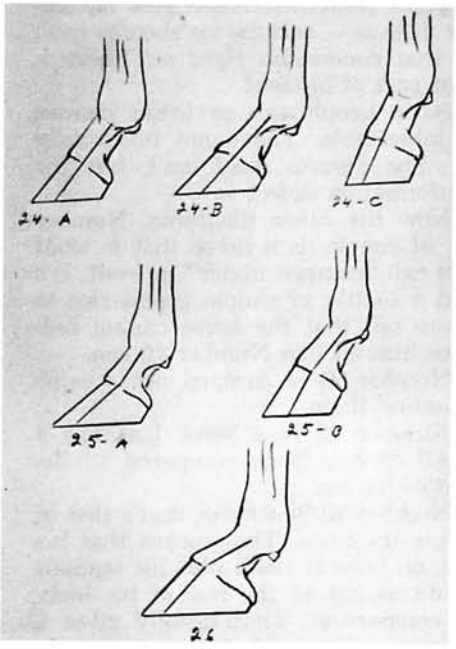


Figure 10

There are angle degrees assigned to the front limb and the hind limb — the front limb, of course, being 45-50 degrees, and the hind limb, 50-55 in the average horse. However, the important thing is that there is angulation approaching these figures and the angle of the hoof should be the same as the angle of the pastern. This is desirable to get the most utilization of the shock absorbing system of the fetlock. You want a straight pastern going into the coffin bone and the hoof so that you don't have an excessive strain on the ligaments of those joints.

Excessively sloping pasterns as shown in Figure 10 24-B cause undue strain on the fetlock joints, suspensory ligaments and the tendons. Excessively straight up pasterns (24-C) put the line of concussion right down through the center of the foot and cause trouble there. They don't utilize the shock absorbing system. Any break in the angulation of the pastern as related to the foot, as we see in 25-

Figure 10.



A and 25-B, causes undue strain on the ligaments, the attachments of the suspensory ligaments. The joint capsules will produce ring bone, etc, or I should say, they are more apt to.

No. 26 shows a horse that is excessively long in the pastern with a broken angulation commonly called coonfootedness. Such horses are going to have a tendency to run down, stick their pasterns down into the sand and the fetlocks into the dirt, break sesamoids . . . rupture ligaments. I've seen horses like that on the racetrack actually pull their sesamoids completely in two. In fact, I have seen them dislocate their fetlocks or just stick their fetlocks with the end of the cannon bone into the ground.

Figure 11

Figure 11 illustrates the flight of the foot. In other words, the shortest distance between two points is a straight line. We know the horse has got to pick his foot up to get there, so we're going to have an arc that way. But, there's no point in having an arc either inside or outside. That's why the toe wide is going to wing and hit himself; the toe-out is going to wing out, wasting room.

Then, there is the break over. I firmly believe that a horse should have the same angulation of the wall of the foot and of the pastern so that he has a normal arc. Figure 11 also illustrates what happens if the foot and pastern are too straight up and down; you see what happens when we cut the heel down away from the toe.

Many racehorses do just that. They have a long toe and a low heel, and they have a change of arc which puts undue strain on them.

Figure 12

Figure 12 shows the attachment of the barrel and the hind limbs. There's no reason that I can see for having a horse higher behind than in the withers. Because the center of gravity is more forward anyway on a normal horse, if we jack one up behind, we force the center of gravity forward, putting more weight on the front limbs. If we put a saddle on the horse which is high behind, we scoot the rider forward. We increase the concussion. It is more difficult for the horse to get this weight picked up in the front. Physiologically it makes for a much poorer athlete than a horse which is properly level or a little higher in the withers.

Let us proceed to the hindquarters.

Number 32 in Figure 12 shows that when you have a horse correct in his hind leg, you can draw a plumb line from the point of his hip down and it intersects the point of his hock and his fetlock straight into the ground. This gives us a proper angulation in relationship of the thigh bone to the pelvis. Then, come on down to the hock and the bone there (we call it the tibia) and the angulation in the hock is neither excessively straight nor excessively angulated. With this tremendous amount of drive that we

Figure 11.

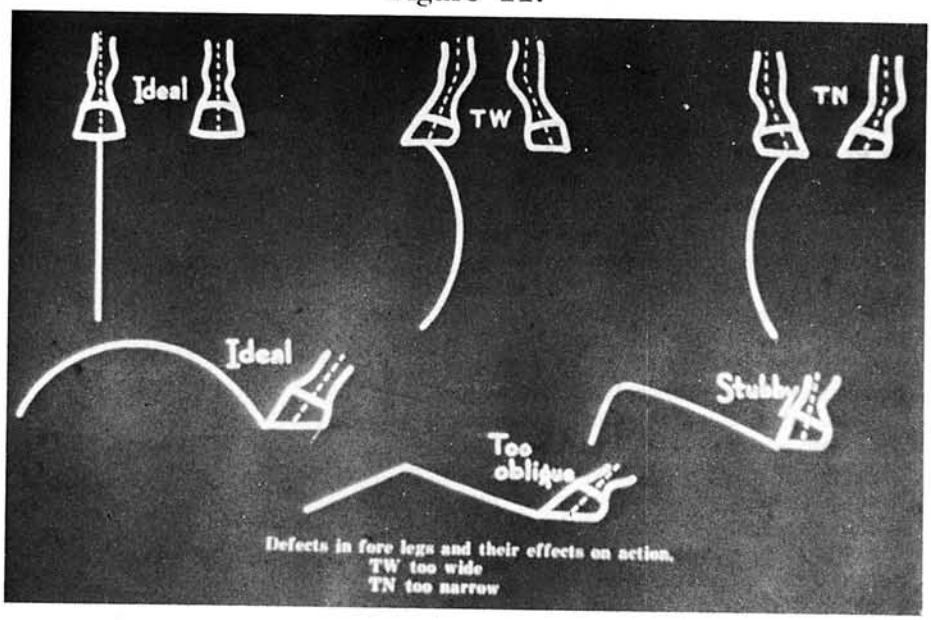
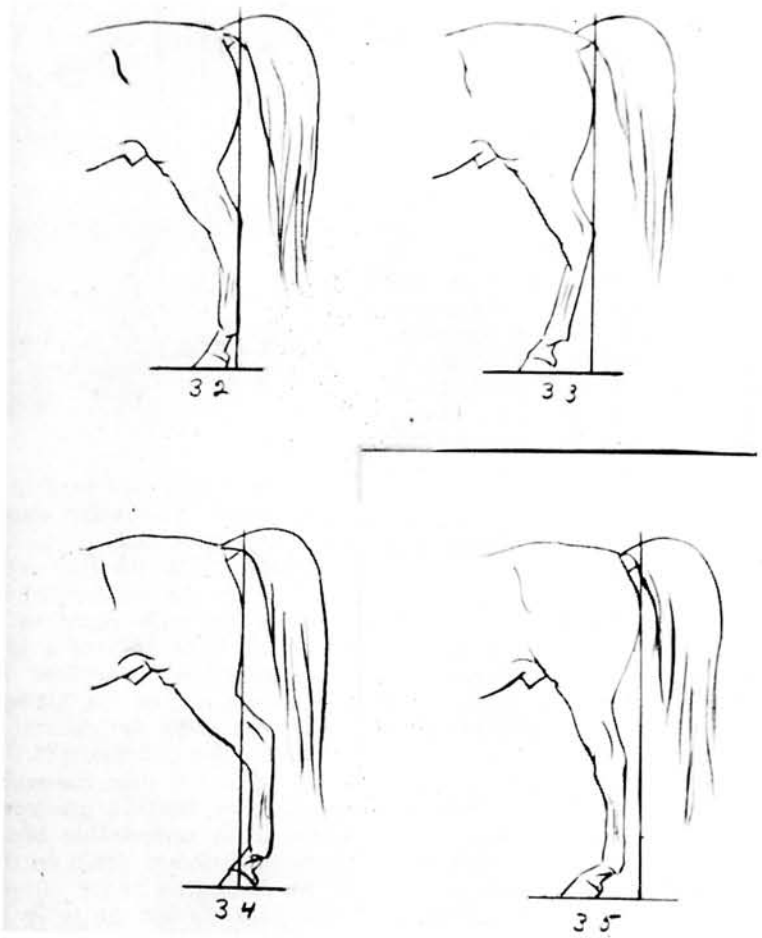


Figure 12.



want out of horses, we don't put undue strain on the back or inside of the hock. It is using the column of bones to disseminate the pressure. And, we don't want the hock too far off the ground because there is very little mechanical advantage in having a long cannon bone. The cannon is merely a short lever and there is no point in having a long lever. It is easier for the tendons to pull on the point of the hock to get drive if there is a short rather than long cannon bone.

Number 33 is a sickle-hocked horse. You can see now with the drive and the push that if you have a sickle-hocked horse you are going to put undue strain on the back of the hocks.

Some cutters and ropers desire a horse that is just a wee bit sickle-hocked. This is so the horse can get his legs up under him a little better, and this is fine as long as it is not excessive. Of course, the opposite is Number 34.

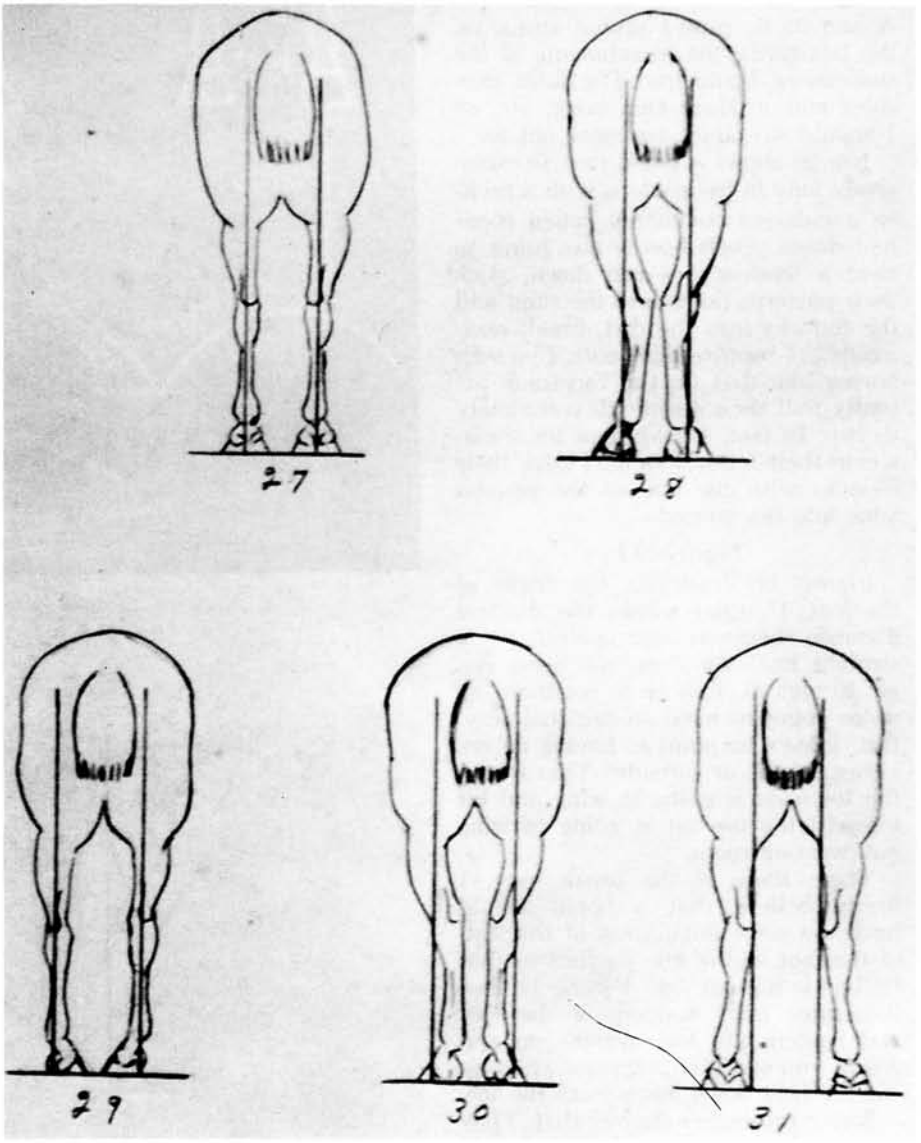
We get down to Number 34 and we see the horse is camped out behind. Think of this as a tripod with one leg sitting too far out. It doesn't support the weight correctly and makes the whole thing out of balance.

Then, there is the post-legged horse in Number 35. You can see there is not the proper angulation in the stifle. The horse is going to be prone to upward fixation of the stifle, commonly called a stifled horse. It locks and becomes a chronic thing. Then, also, in the hock itself there is too much concussion straight down through the leg and the horse can't bend it like he should. A horse can even have a tendency to straighten that leg too much and get a thoroughpin, the reason being that he has to compensate to even keep up. Again we have relationship of form to function and fact, not opinion.

Figure 13

Looking at the horse from behind, as shown in Figure 13, we can view some obvious differences. The angulation should be straight. Number 27 is our standard of excellence, regardless of muscling. One thing about muscling, it has to do with relationship of form to function. One thing we don't want to get too carried away with is the fact that rarely does a horse break down in the muscling. He breaks down in the bone, and structures down from there. I've seen a lot of horses break down in the knees or the hock, but I have never seen one break down in the gaskin or the chest or the muscling out over the stifle. Granted, that's a breed preference and that's their prerogative.

Figure 13.



And, there is a relationship of form to function. You want muscling to push and start fast.

Number 28 is the true cow-hocked horse. Note the arc formed from the point of the stifle down to his foot. Think of it as kind of a half moon from the stifle to the foot. And, the top of the arc or the highest point, if it were lying flat, is the point of his hocks. See how much farther apart his fetlocks are than the point of his hocks. Now, that's a true cow-hocked horse. It is undesirable because the horse puts undue strain on the inside of the hock and undue strain on the stifle. He's going to really toe out and when he stops, he'll flop his legs out.

Now, compare Number 28 to Number 30. There's quite a difference. Number 30 toes out as does Number 28, but Number 30 is not cow-hocked because he has the same distance between the point of the hocks as at the fetlocks. You can't make an arc from the stifle to that horse's foot. It is pretty straight up and down. Some really wide-barreled horses have to toe out a little to get their stifles by their barrels. And, if they toe out a little, they turn their hocks in and their stifles out. That's why that particular horse then is not to be criticized nearly as much as is Number 28. Interestingly enough, that's why most people say Arabians are cow-hocked. Many Arabians are like Number 30.

Number 29 is a horse which will rock out over his hocks because he toes in. That condition is undesirable because the horse has to rock out to get his leg by. He can never be as good an athlete as a horse which is correct.

Number 31 is a horse that can't keep track of his legs. You've prob-

ably seen the kind that run down there sticking their legs out. These kinds of horses can't utilize their muscling. The bone structure is such that they can't keep those legs directly underneath them.

This realization concerning correct bone structure has helped me as a veterinarian. If I walk up to a five-year-old cow-hocked horse with a bone spavin, for instance, I know immediately that there is very little sense in wasting my time and the owner's money on that horse. I can't really help him any. There are plenty of horses with bone spavins that aren't cow-hocked; but I see a lot more that are cow-hocked that do have bone spavins. It has helped me not only arrive at a diagnosis, but it helps me to prognose.

I maintain that we can be a little more discrete about picking a straight legged horse. That horse, statistically speaking, will stay sound longer than a crooked legged horse. I really believe that and I think it is time we paid more attention to it.

Figure 14.

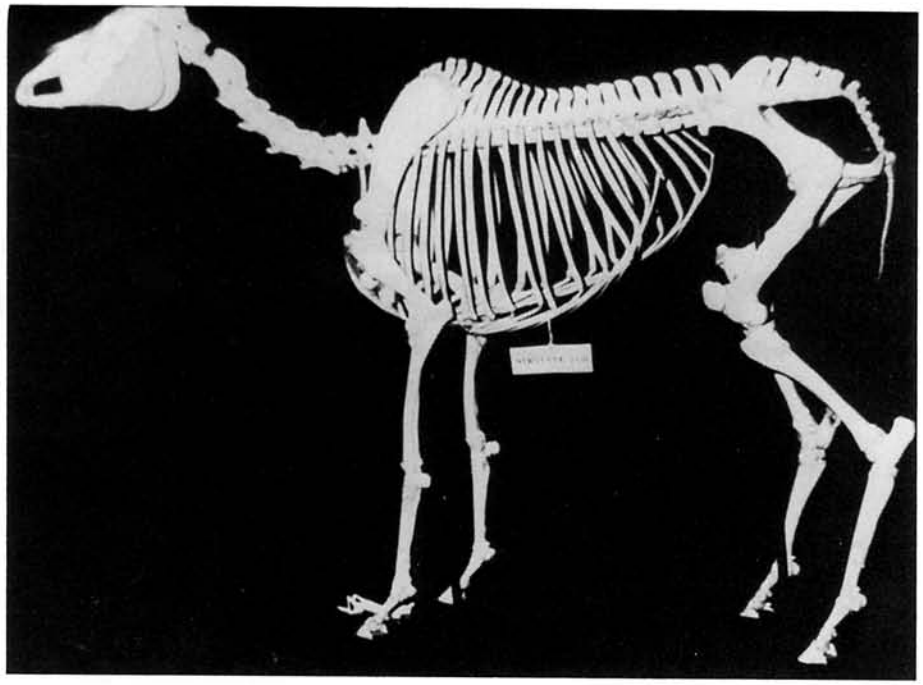


Figure 14

We've looked at the diagrams of the legs, the back, the head and so forth. Let's look at the skeleton (Figure 14) and think of it as being underneath what we're looking at in order to correlate this relationship of form to function.

The head, you see, is a mass of bone. It mustn't be too large because of excess weight. The most dense part of that animal's body is bone. All of that is related, the teeth, nostrils, turbinates, eyes and throat latch. Then look at the cervical vertebrae. We want the long neck because muscles work from end to end, not side to side, and it can swing and balance.

Then you see the relationship of the front leg, the shoulder blade, the arm, the forearm, the knee, the cannon bone, the fetlock, pastern. All of this ties in to help make up 60-65 percent of the weight.

You can see how the shoulder blade ties in to the withers. Also, why it needs to set there, not further out front, because of the bowed effect. If it were further back, it would interfere with where the saddle goes.

You've got to have length of the spine to produce the withers. If we are going to ride these horses, for heaven's sake, we want some withers.

Now look at the rib cage. You want a horse with a big barrel and lots of heart girth. Why? Because his heart, lungs, liver, and stomach are all within the confines of that rib cage. There's a separation, of course, between the stomach and the heart and lungs, but still you look in there and that liver and stomach are still protected by the ribs. That's why you need spring of ribs.

You want a horse with a straight back because his muscles have to tense that whole spinal column so that he can pick up his total front end, rider, head, neck, front legs, and propel them. That is the reason you want a horse with good heavy muscles in the loin. If he is weak in the loin muscles he can't tense that spinal column.

You want enough length in the back so that this works with the proper balance. I hesitate to use the word balance because I can't give you a numerical figure for it. But you can see why you don't want him sway backed nor arch backed but you want him as straight as possible. He is higher in front because of the weight and because of the withers.

Then you come back to the croup. Let's take Arabians for instance. They like a flat croup. The Quarter Horse likes a sloping down croup. To me there's a very distinct reason for that. A horse with a flat croup determines how the pelvis is going to be attached to that horse's body. The way the pelvis is attached determines the length of stride of the hind limb, from the hip joint — the ball and socket.

So if I have an Arabian and he has a flat pelvis, his anterior stride is going to be relatively short and he's going to push a long way back. It gives him a low, flowing stride.

We drop that croup on Quarter Horses to give them a better bite for quick starts. He's not going to flow as far but he's going to get ahold of that ground quicker.

A work horse is a good example of what I'm talking about. The croup drops off real quick because he's designed to take a short, efficient, slow step. He reaches up, plants his feet and drives. You don't want any flow out of him.

But we are in between with a Quarter Horse. So again, that gives relationship of form to function.

Look at the angulation in the stifle. You've got to have a thigh bone long enough to do what it's supposed to do to get down to the stifle. Then go down from the knee or stifle to the hock. You need the proper length there for angulation.

You can see why the sickle-hocked horse puts too much stress behind his hock, why the too straight horse can't get his hock up under him, why the cannon bone should not be long. It should be relatively short because the point of the hock is the pull and there's no use in having a big arm out on the end.

Next month we'll continue with the second and final part of Dr. Beeman's lecture.

CONFORMATION...

THE RELATIONSHIP OF FORM TO FUNCTION

AN ILLUSTRATED LECTURE BY MARVIN BEEMAN, DVM

SECOND AND FINAL PART

Editor's Note: Part 2 of Dr. Beeman's lecture includes quite a few more illustrations than did Part 1. We apologize that some of the illustrations are not as high quality reproductions as we would have liked. However, we do feel they are good enough to illustrate the points being made. Again, we thank Dr. Beeman for permitting us to reproduce his illustrated lecture.

Dr. Beeman has used the definition of conformation as the relationship of form to function. In his lectures to various groups, including AQHA judging seminars, Beeman stresses that there are definite practical reasons for good conformation. "Conformation is a fact," states Beeman, "not just an opinion."

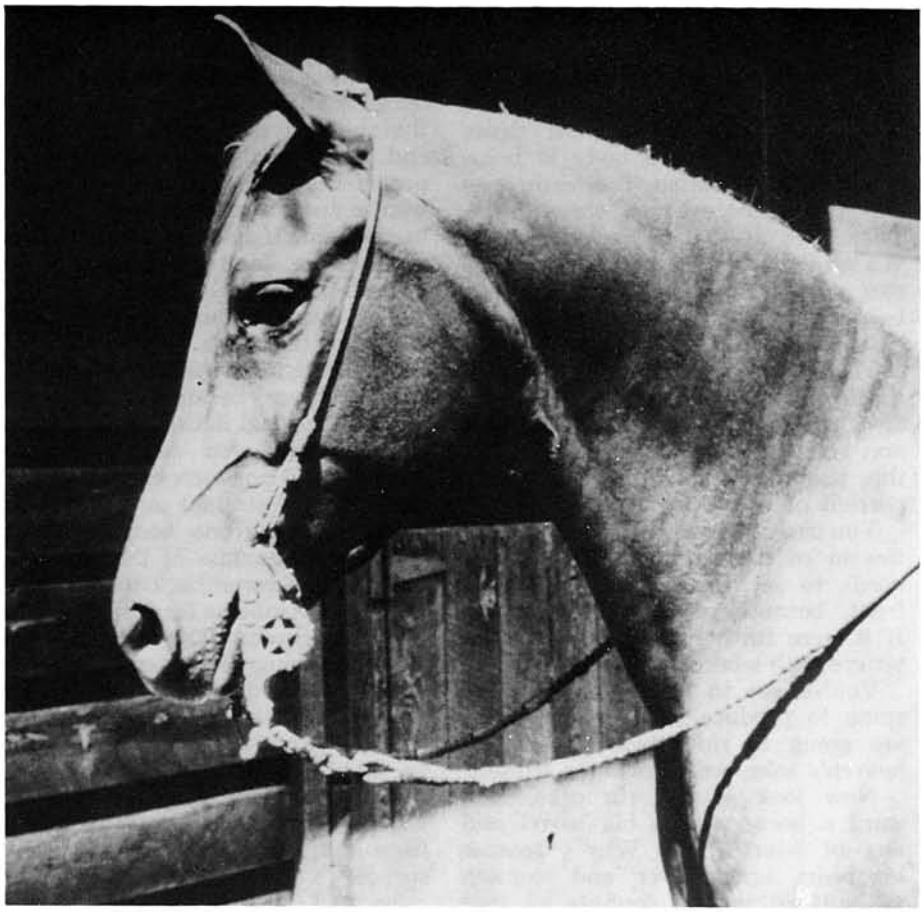
He goes on to say that certainly judges are entitled to their opinions but that those opinions must be learned.

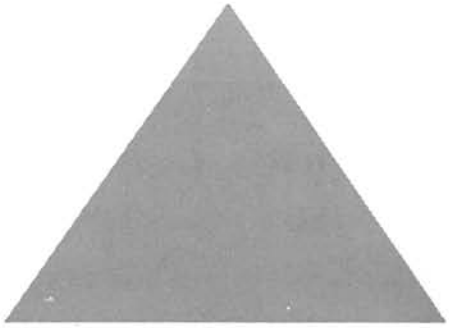
With these thoughts in mind, we will proceed into Part 2 of "Conformation — relationship of form to function."

Figure 1 shows a good headed mare. Note the long neck, clean throat latch, big nostril, large eye and dish in the face. Regardless of breed, a good head is a good head and a good neck is a good neck.

This mare's eyes are set out on the corner and she gets the maximum value from them. Her ears have a lot of expression. This mare proved that she could do things and was a whale of a working mare.

Figure 1.





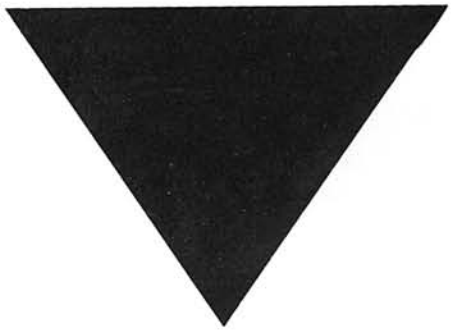


Figure 2.

Figure 2 is the direct opposite of Figure 1. I don't have to tell you that's a pig. He has a little nostril, long head and Roman nose. His eye isn't up on the corner, it's down on the side. Look at the ear; he looks like he has a bad temper. He does, too. That horse pawed me on the side of the head just before I took the picture. Note the thick throat latch. He doesn't have the criteria to be a good horse.

Figure 3.

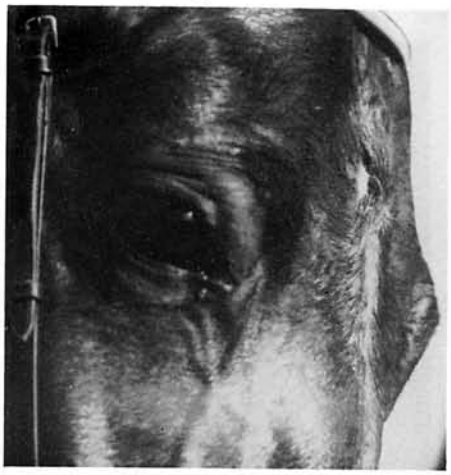


Figure 3 is a closer view of the eye showing how position in the socket can reduce or increase the arc of vision. That eye can see the full arc because of the flat face. Figure 4 shows the Roman nose and pig eye. This horse can't see a lot of things.

If you've ever been around a horse which was going blind you know how cranky and apprehensive he was. I think this is partially why pig-eyed horses have bad tempers. They simply don't see as well. They have to look around more to the side to do something and the guy riding says, "Get your head around there and pay attention to what you are doing." Pretty soon you have a problem.

Figure 4.

Figure 5.

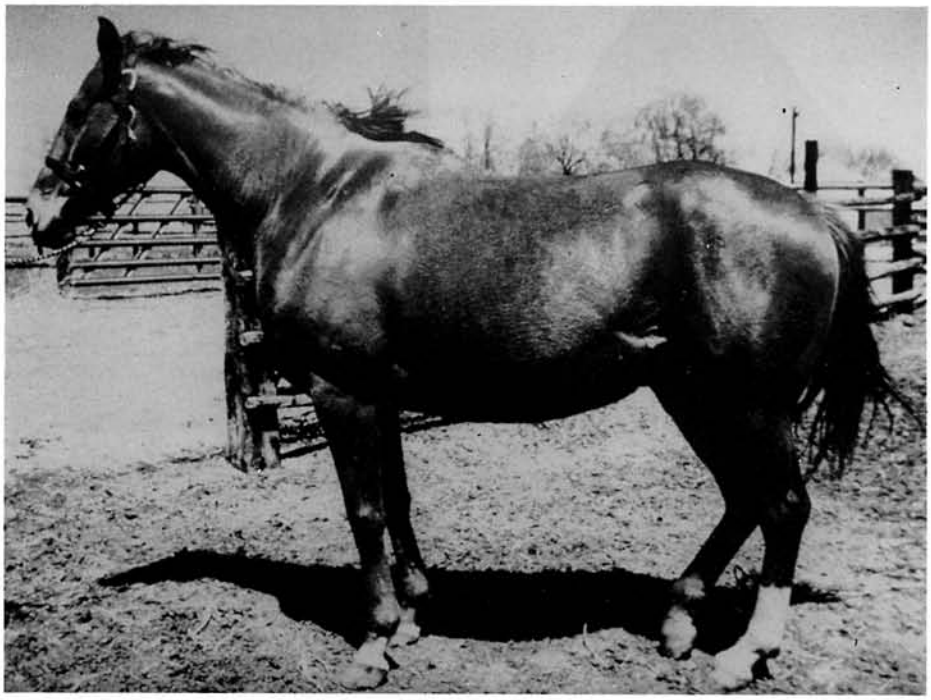
Figure 5 shows a parrot mouthed horse. This happened to be a real good barrel gelding. Years ago this horse would have died on the range because he couldn't eat grass. Today we feed him pellets and keep him going. I show it only to be sure that people are conscious of the conformation defect, and conscious of the fact that it is inheritable. Certainly, if it is a mare, never breed her and if it's a stallion be sure that he is gelded. Again we stress relationship of form to function. A parrot mouthed horse is not as acceptable as one with a straight mouth.

Now let's look at some examples of these defects we have seen diagrammatically, and see what happens.

I like to stress the fact that withers are important because we are going to ride these horses. There is absolutely no point in breeding the withers off them. Why? Because, number 1, the saddle won't stay put; number 2, to make it stay put you have to squeeze a horse's chest and shut down his air and heart girth to make it hold there.

Conformation

Figure 6.



This particular mare, shown in Figures 6 and 7, was not quite the type that some people wanted because she wasn't a halter horse. She couldn't win at halter but she could sure win performance classes. This gets back to our relationship of form to function. This mare was criticized because she was quote, "too Thoroughbredy", yet she could win the performance classes and not the halter.

Figure 7.

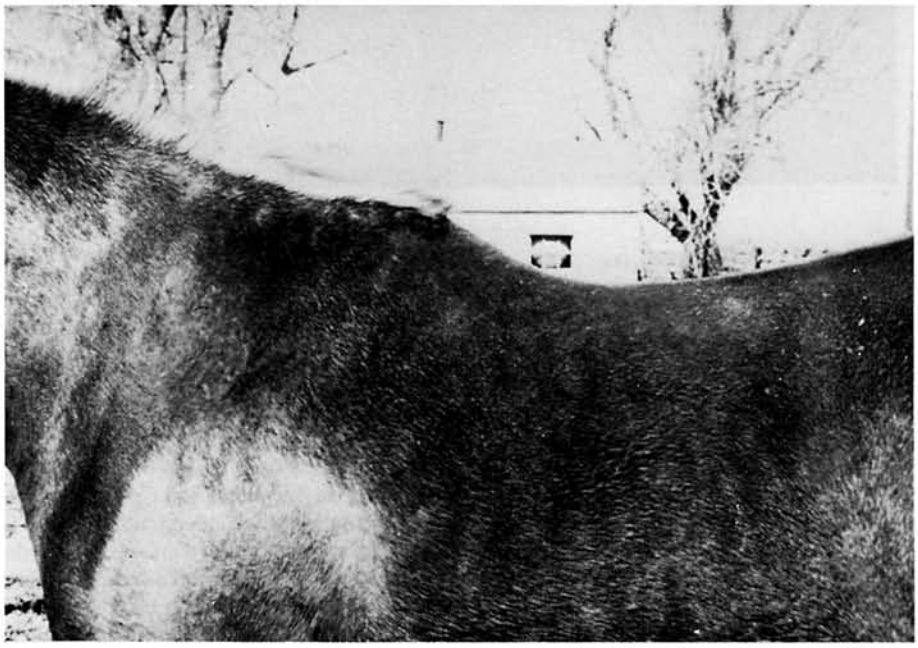


Figure 8.

Figure 8 shows a mare that could win at halter but couldn't do one thing in performance classse. No withers whatsoever. The man judging the class was a head hunter. He really liked horses with pretty heads. The truth of the matter, however, is that the head doesn't hold the saddle in the right place.

Conformation

Figures 9-12 show a horse that did well at halter when he was about two, three and four years old. Look at the massive amount of weight and the short, heavy neck, straight shoulder, straight pastern and small foot. The horse weighed about 1,250. He's five years old, has been reining about six months and is now crippled.

Looking at him from the front (Figure 10), you can see the massive amount of weight in his front quarters. This horse has wonderful muscling, but he is crippled. He's lame in the feet. Look at that straight pastern. Look at the contracted heels (Figure 11). He is only five years old and has a relatively small foot for that size horse.

Figure 12 shows the x-ray of his navicular bone (left). On the right, it shows the straight up and down pastern. The line of concussion goes straight down to the navicular bone.

Navicular disease is the most common cause of lameness in my practice today.

Figure 9.

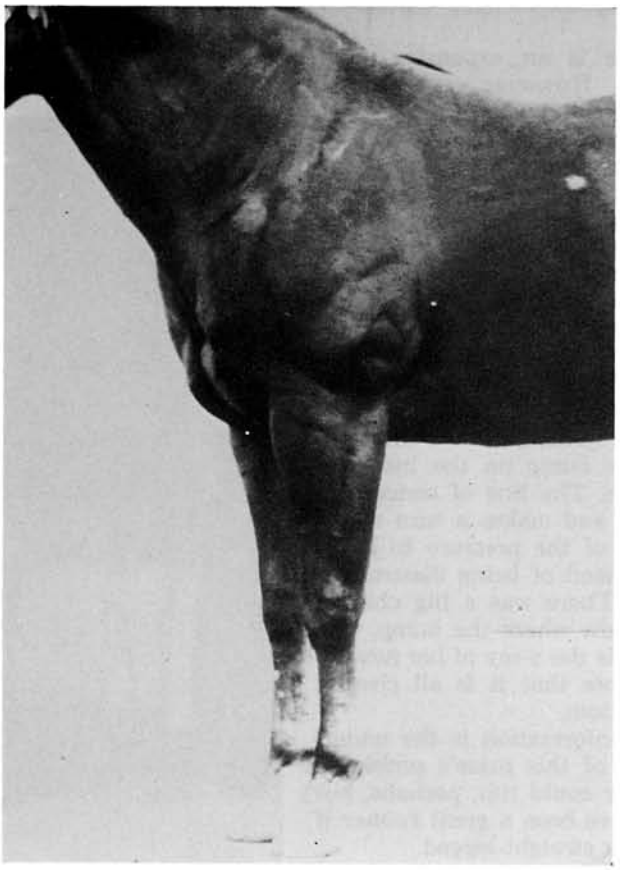
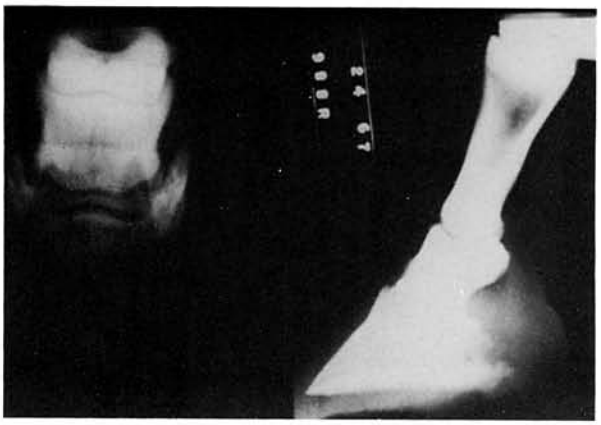


Figure 10.

Figure 11.

Figure 12.



Conformation

This mare is an expensive AAA race horse. However, she had a chipped knee and navicular disease. Note the shoulder with the lack of slope. She's a little bit higher behind than she is in the withers. She has a long but straight pastern and a little bitty foot. Think of the pounds per square inch that goes out the foot. If you could increase the circumference just one inch, it would greatly reduce the PSI.

Figure 14 shows the same mare from the front. Note how she is in at the knees and toes out. You can even see the little bump on the inside of her left knee. The line of concussion comes down and makes a turn which causes most of the pressure to be in one spot instead of being disseminated equally. There was a big chip in her knee, right where the bump was.

Figure 15 is the x-ray of her navicular bone. Note that it is all chewed up at the bottom.

To me, conformation is the underlying factor of this mare's problems. She certainly could run, perhaps, but she could have been a great runner if she had been straight-legged.

Figure 13.

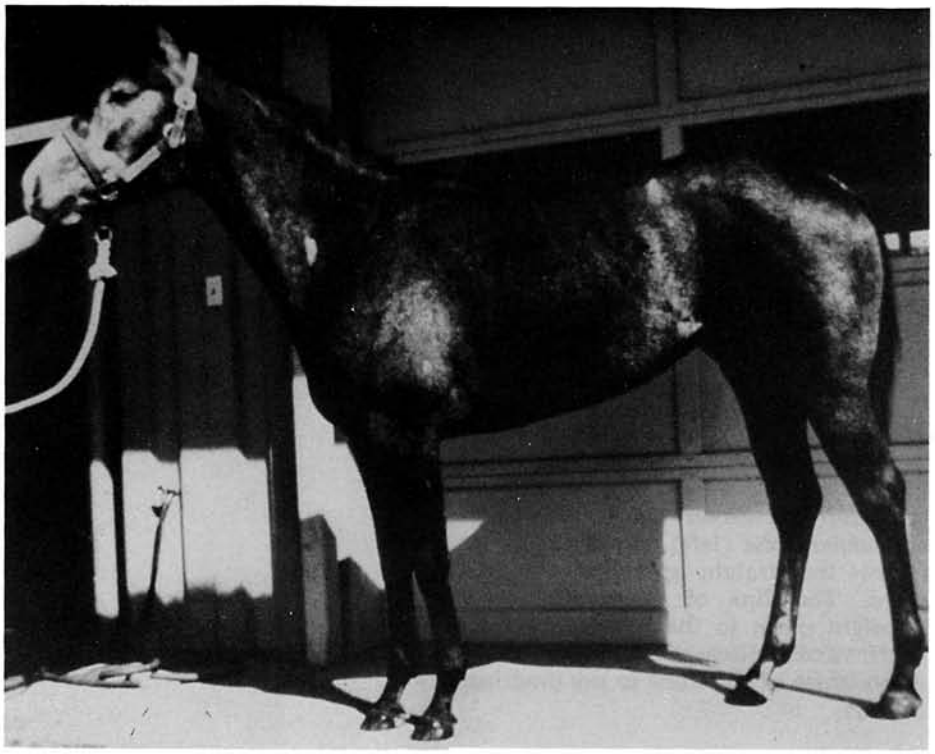


Figure 14.

Figure 15.

Conformation

Figures 16-18 show another example of good breeding but poor conformation. This filly is not necessarily higher behind but she has a short neck. She has a straight shoulder and is calf-kneed. Figure 17 really points out the calf-knees, both legs. This particular filly was paid up to run in the All-American Futurity but she never had the chance. Not only is the filly back in both knees, she's tied in below the knees. You can see in Figure 18 that she is in at the knees and there are knots on both knees as they curve in. These pictures were taken at 28 months of age. Conformation was the problem. The filly had the will and the bloodlines to run, but she is ruined. In addition, we can't operate on a knee like that and help it.

Figure 17.

Figure 18.

Figure 16.

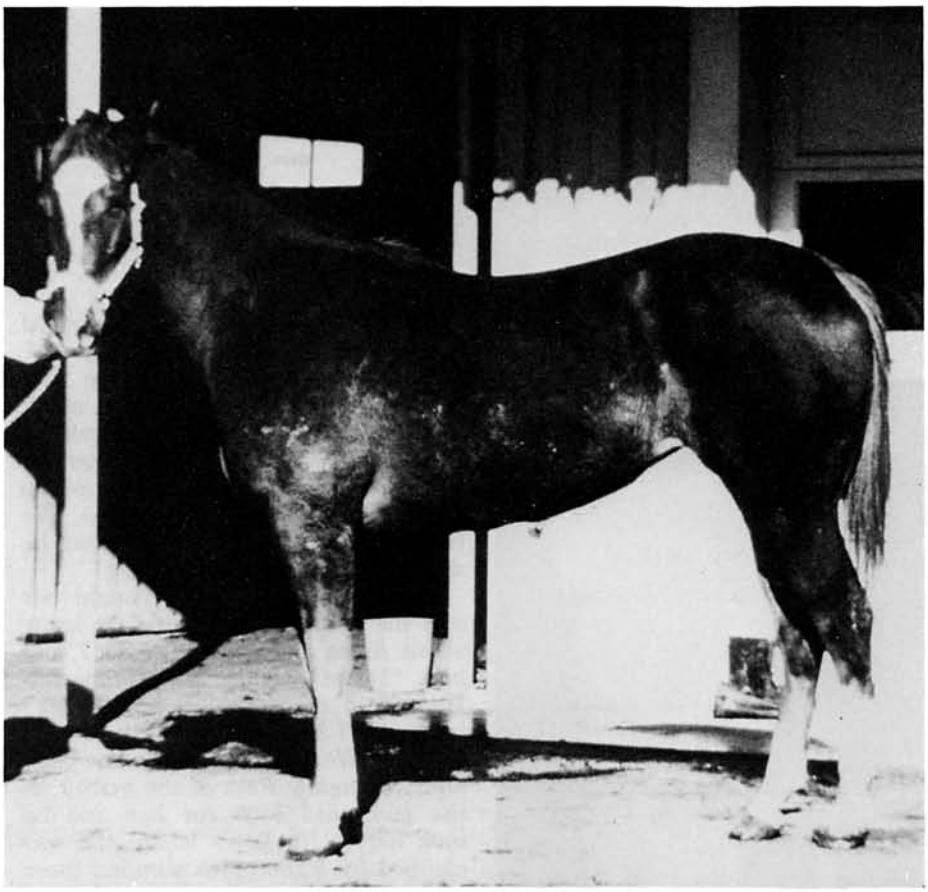


Figure 19.

Figure 19 shows a mare with offset knees. Her full sister is a polo pony. The two mares had the same training and nutrition, same terrain to travel on. The only difference is conformation. You can see that offset knee there and it took only six polo games to do her in. This is why I say that conformation really has a lot to do with the future of the horse. This mare will never hold up as long as her sister.

Conformation

Figure 20 shows a really bad calf knee. See how it bends back? When a horse stresses that knee, I mean really stresses, something has to give.

Note how the knee is bent back in this x-ray (Figure 21). She is bound to knock a chip off the front of the knee when she begins to tire at high speed and the muscles allow the knee to bend even further back.

Figure 20.

Figure 21.

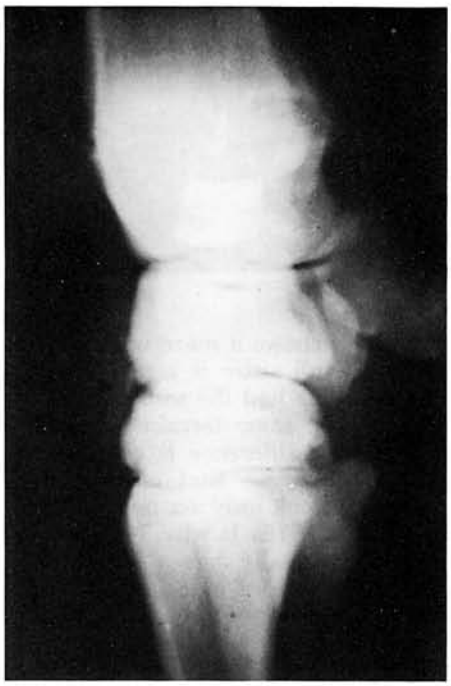


Figure 22.

Figure 22 shows a horse over in the knee. That horse was 14 or 15 when the picture was taken and had never had any trouble with his knees. He had just finished jumping 6′ 6″ when the picture was taken.

Figure 23.

Figure 23 shows a horse over in the knees that bowed a tendon. Now I'm not going to say that horses over in the knees are going to necessarily bow a tendon, but physiologically you can tell from the excessive change of direction why they might be more apt to bow.

← Figure 24.

Figure 25.

Figure 24 shows a broken-legged knee. This mare was not very old. She broke the right knee the first time she worked ⅜ of a mile at 22 months old. She came back six months later, raced successfully and won her first three outs. They called me to x-ray her left knee (Figure 25). We tried to convince the owner that he ought to sell her and he did.

Another client of mine bought her and the next day he wanted to know about fixing the left knee. So I told him, "I just finished talking one fellow out of fixing that knee." "Well," he said, "I bought her cheap so let's fix her." We fixed her. She came back and won again. Fact of the matter is, the guy paid $300 for her and he took her to St. Louis where she was claimed for $2,500 plus winning three races. I was just tickled to death, and this guy was about to cry. He claimed her back and then she had a broken ankle.

Conformation

This broodmare doesn't have broken knees because she never did anything. They had to shoe her to run her in the broodmare band. But look at those knees. The only reason she is sound is because she was never subjected to stress, strain and concussion. But they bred her and this is what they got (Figure 27). "Mares which are too lame to work and are suffering from the effects of poor conformation seldom are wasted. Instead, their faults are perpetuated by breeding them. There probably is no surer way of achieving bankruptcy." That's a quote from R. H. Smyth, MRCVS.

Figure 26.

Figure 27.

Figure 28.

Look at the leg on that horse. At the time this picture was taken, the colt was about 27 months old. His owner talked about his being a world beater. He broke his knee, his splint bone and sesamoid.

With a plumb line at the point of the shoulder transecting the foot, you can see the curvature at the knee. You can easily see where the line of concussion occurs.

Splints are not a true unsoundness on the majority of horses. But be careful in judging or buying a horse which has splints. If he has a conformation defect, it may very well be the reason for splints.

Figure 29.

Figure 29 shows the x-ray of an outside splint. I want you to note that it only supports a very little weight within the knee. There are usually mores splints on the inside because the inside splint bone supports more weight. This splint will go away if the horse is rested. You can make him be rested by blistering him — you don't have to blister him to rest him, but you have to blister him to convince the owner he needs to be rested.

← Figure 30.

The two splints pictured in Figure 30 are associated with conformation defects. This AAA race mare is in at the knees and toes out. Notice the hair is worn down on that coronet band. She definitely interferes when she runs and hits herself where the splints are. Both splint bones were literally pulverized. The significant thing is that conformation is the predisposing factor. It limited this mare's useful lifetime.

Conformation

This close up picture shows the line of concussion. As it swells up larger, she hits it all the more. Then she tries to compensate and ends up putting more weight on one side. Thus she can't help but have a bad knee.

Figure 31.

Figure 32.

Figure 32 shows a high splint. The significance of the high splint is that the irritation gets up into the joint. Thus, it is more important than a low splint. The reason this horse has the splint results from his being in at the knees. Notice where the line of concussion is.

Figure 33.

This x-ray shows what we mean by the high splint going up into the joint. Much more of the inside surface of the inside splint bone is involved in supporting the knee than on the outside. That's why inside splints are more prevalent than outside splints.

Figure 34.

Picture 34 shows a pigeon-toed horse, the opposite of what we've been seeing. This kind of horse paddles. However, this particular horse is in at the knees too, so he puts a lot of undue stress on his lower leg when he lands. If you look closely you will notice a little filling in the pastern and above the coronet band.

Figure 35.

Figure 35 shows the x-ray of the pigeon-toed horse. He is only five years old. Note the deviation which has developed. See how the second pastern bone is trying to compensate by uneven wear and lipping of the joint surface. You can see the angle of the foot is uneven from having landed crooked so often.

Figure 36.

Figure 36 shows a contracted foot, man-made. The owners were trying to change this horse's gait by letting his heels and toes grow long to get the pressure off the frog. He developed navicular disease because of a man-made situation.

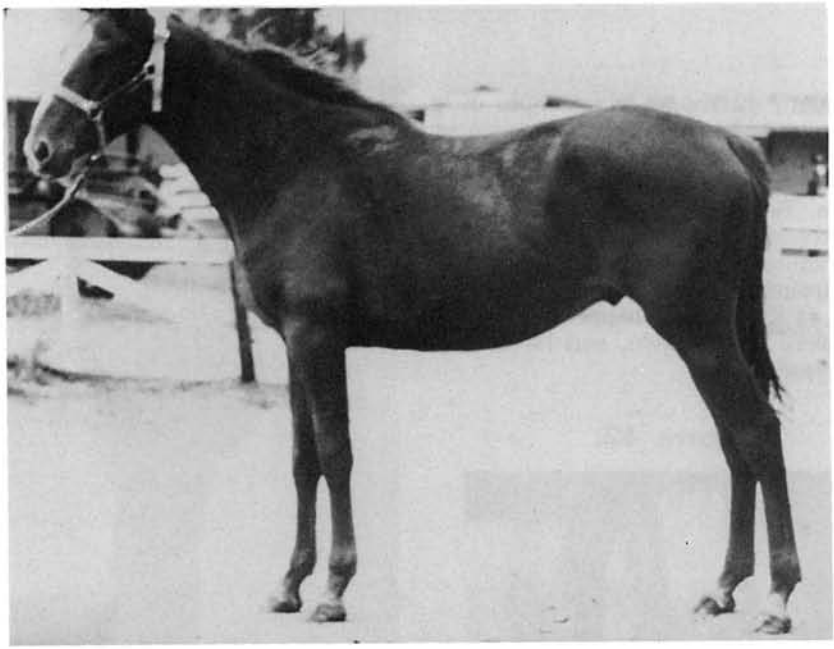
Conformation

Figures 37 and 38 are examples of good feet. Note the big healthy frog and concave sole. Figure 38 illustrates how the feet are in correct angulation with the pasterns.

Figure 37.

Figure 38.

Figure 39.



Picture 39 is a good example of a horse weak in the loin. His back is not necessarily too long but notice how he is too straight in the shoulder, weak in the loin and camped out behind. This is a jumping horse, so it's really an effort for him to pick up his body to propel himself forward. With his legs stuck out behind him, he jabs them into the ground. Interestingly enough, he had quarter cracks on each hind foot, inside and out (Figure 40). Again, this points out to me that conformation is factual in relationship of form to function. In his function, this horse couldn't stand it because of his form.

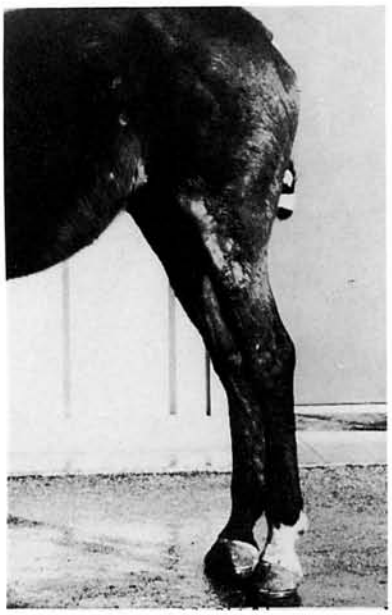
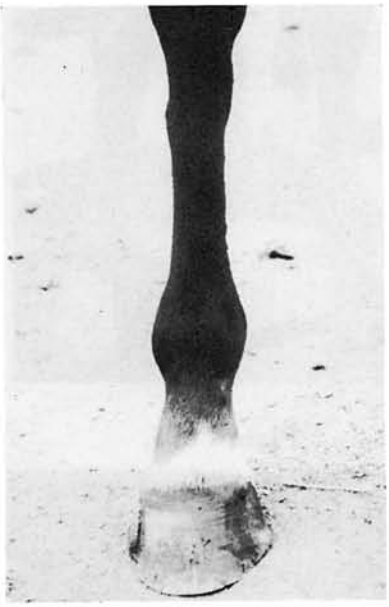


Figure 40.



← Figure 41.

Picture 41 is an example of a horse that is straight in the stifle. There is no angulation. Note how straight he is from the stifle to the hock. He had to have surgery, as you see, in order to correct the upper fixation. The ligament was cut so his stifle wouldn't lock. He was only five years old.

Conformation

Figure 42 shows an example of a severe cow-hocked horse. Remember the arc that I mentioned? It starts clear up in the stifle and goes on down. Besides being cow-hocked, he is excessively sickle-hocked as shown in Picture 43. These defects cause him to strain the hock on the inside. Picture 44 shows what happened. That is a severe bone spavin, and he is only five years old.

Figure 42.

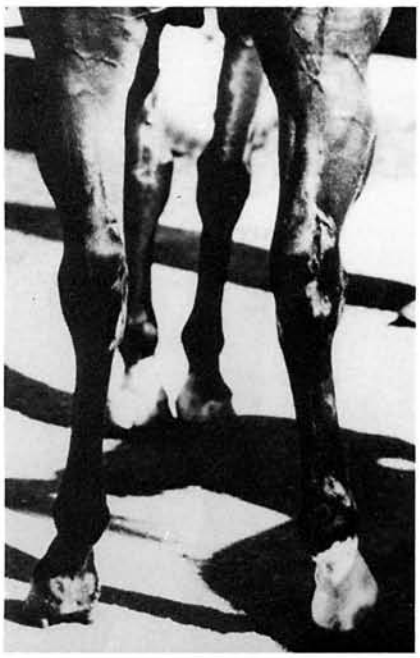
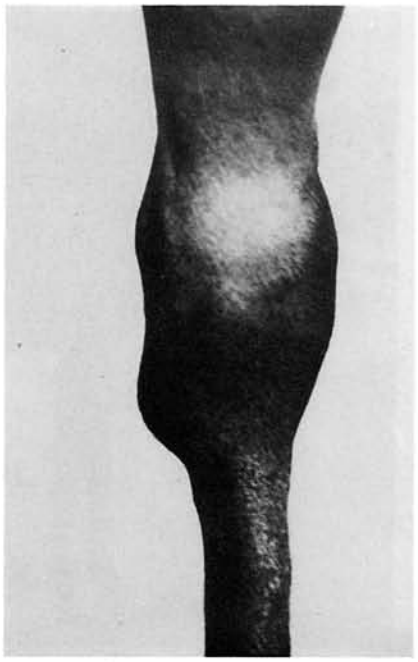


Figure 43.

Figure 44.



Picture 45 shows a good example of bone spavins on both hind legs. You can see that this horse is sickle-hocked.

Figure 45.

Figure 46. ←

Picture 46 shows a true bog spavin. Now this is not a crooked-legged horse — you can see he has good angulation. That spavin was caused by nutrition — feeding him too much when he was young and longeing him round and round in a circle.

Conformation

Picture 47 shows a thoroughpin. Note that a thoroughpin is higher up on the hock than a bog spavin. Picture 48 shows the hind view of the same horse.

Figure 47.

Figure 48.

Figure 49.

This is a post-legged mare. She has very little angulation in her stifle and absolutely none in her hock. She is coon-footed. The point of her hock is banging up against her gaskin area. This mare will pinch herself and is prone to having thoroughpins. Figure 49 shows the thoroughpins. This mare could not do a thing, and the people couldn't understand why.

Figure 50.

Figure 51.

Figure 52.

Figure 50 shows a real bad sickle-hocked filly. She has a true curb. Note the angulation and how that curb bulges out. You can see where the strain goes. This mare was lame when she popped that curb. She went ahead and grew up and did fairly well, but is now crippled. She did all right until she was five years old. We had to drill that hock and fuse the two lower joints.

Now let's look at this from the inside out as shown in Figure 51. There's the chestnut and the bulge right behind is the curb. Note how that sickle-hocked angulation is in there.

Now let's look at it from the outside as shown in Figure 52. You can still see the same bulge. The ligament ruptured underneath the tendon, causing the swelling.

Conformation

Picture 53 shows a crooked-legged horse from the ankle down behind. He did fine at halter. He'd win a little and get along pretty well. They correctively shod him, put him to work and the x-ray in Figure 54 shows what happened. Look how deformed the ankle is — big on one side, shallow on the other, and the joint looks like a question mark. There is no way we could treat that horse. He is a hopeless cripple.

Figure 53.

Figure 54.

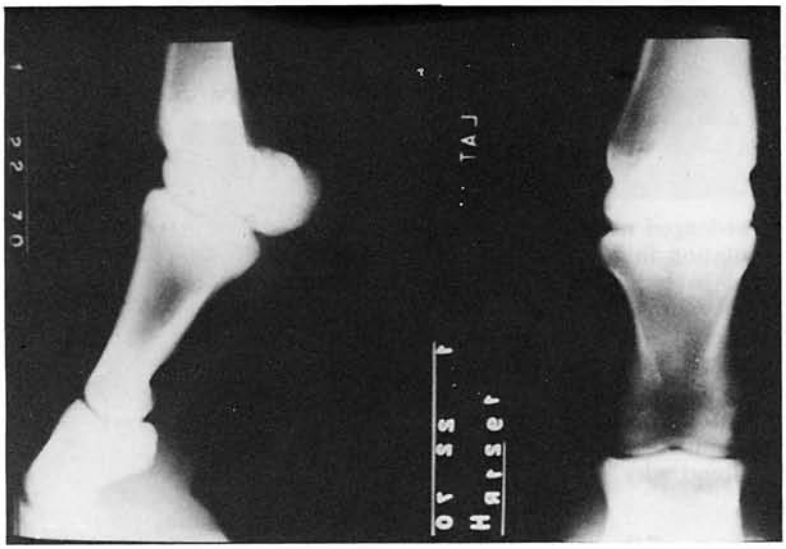
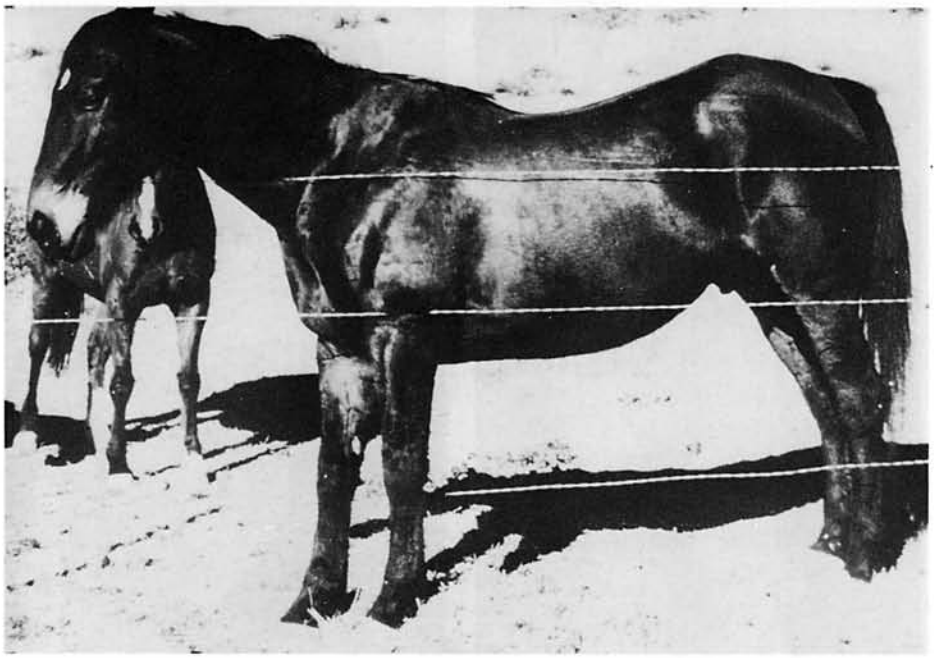


Figure 55. ➡



I use this picture to demonstrate disposition. That old horse had stood in the wire for two hours and never moved. He isn't a pretty horse and he's got conformation defects. But, let's take everything in the proper perspective. We need to have good conformation, we need to have conformation as it relates form to function and we need disposition. If we're going to have kids' horses or adults' horses, then we need to have disposition. Racing is a different thing. But we must relate form to function where it fits into the picture.

The unknown quality is the heart. If you don't have a heart with all the conformation, nothing is any good. We get these things from the bloodlines and the history. But let's correlate them all — conformation, disposition and heart, or the will to win.