by Amy C. Barton

Saddle Fit for the 21st Century

An Interview with Master Saddle Fitter Danny Kroetch

Adjustability. This is the primary theme that sums up Danny Kroetch's philosophy when it comes to saddle fit and design. Danny is a world renowned Master Saddle Fitter and designer based in Calgary, Alberta. Danny has proven his saddle theories time and again after fitting more than 60,000 saddles to horses in all disciplines around the world. That translates into designing, building and fitting over 2,000 saddles a year. This jet-setting saddle fitter clarifies a variety of myths and misconceptions that are often misunderstood when it comes to fitting arguably the most important piece of equipment used in equestrian sport.

Adjustability

According to Danny, the success of his saddle designs is based on an adjustable fit that is incorporated into every saddle that his company, DK Saddlery, builds. It begins with Danny's belief that a symmetric saddle cannot ever truly fit a horse's withers, which are asymmetrical. This is just one of many saddle fitting theories that Danny addresses for us.

Danny was invited to take part in a research study at the University of Utrecht Veterinary Clinic in Holland. The study was "How Ill-Fitted Saddles Affect Horses." It was the first ever research study done on saddle fit by a veterinary university. The results were published in *The Veterinary Journal* in August 2005 and proved that an asymmetrically-fitted saddle was far better for a horse's back than a symmetrically-fitted saddle.

Twenty years ago when Danny started with adjustable English saddles, there was only one other company in the world doing it. Now, there are close to twenty manufacturers incorporating some form of adjustability in their saddles. "I certainly don't agree with all their designs," says Danny, "but the point is that more companies recognize that the consumer is looking for adjustability." He stresses that it is a concept that has been proven to work, but only when done correctly.

He points out that a traditional English wooden tree is, essentially, nonadjustable. The point of contact is three inches from the top of the wither muscle. A wooden tree can only withstand up to 1,000 pounds of pressure before it separates and breaks. Wood is a very brittle material. "How far do you think you can bend a wooden tree with 16 rivets in it before you break it?" he asks. Danny explains that these types of trees have only about one centimeter of adjustability.

On a properly fitted tree, the pressure is approximately nine inches from the top of the wither placed on a true carrying muscle. Research shows that there is approximately 1,800 to 2,800 pounds of pressure exerted at the head of the tree when the saddle is girthed down, the rider mounted, and the horse is moving.

Many saddle brands that are currently marketed with an adjustable tree are not truly able to be adjusted. Those saddles that boast an inter-changeable gullet plate cannot withstand the pressure exerted on it when you girth down the saddle, then add a rider and a horse in motion underneath it. The gullet plate of a saddle needs to withstand from 1,800 to 2,800 pounds of pressure during ridden exercise. The interchangeable gullet plates are only about 1/8 inch thick and can only tolerate 25 pounds of pressure before they start to spread out. Danny asserts, "If you took the widest gullet plate and stacked

the narrowest one on top of it, then grabbed it in your hand and squeezed them together, applying approximately 25 pounds of pressure, you could make the top plate spread out and widen."

Next he poses a question about what would happen when you girth your horse up at 100 pounds of pressure, and then add the weight of the rider and the motion of the horse. "That plate is going to spread out over a very short period of time; and what's worse is that it is moving back and forth while you ride, creating instability and pressure." As the gullet plate fatigues it defaults to the widest position, so you'd have to change the plate frequently. He also points out that interchangeable gullet plates still do not address the issue of asymmetry. "Don't forget that they are exactly the same, symmetrical, from one side to the other."

"Only five percent of horses are equal and symmetrical," says Danny. Out of the 60,000 horses that Danny has fit, he's only seen maybe ten horses that were truly symmetrical!"

Air, Foam or Wool?

A subject of much debate revolves around the materials used to fill, or flock, the panels of a saddle. There are three kinds of substances used: foam, wool and Flair air. A foam filled saddle can never be adjusted to fit the conformation and asymmetries of a horse. It simply doesn't work.

There has been much discussion about the differences between air and wool. Many people claim that air becomes hard when you're sitting in the saddle. However, when you walk up to an air filled saddle [while the rider is mounted] and press your thumb into the back panel, the air moves away. If you were to do the same thing on a wool filled panel it would not give to the pressure. So truly wool is more rigid than air. "In fact", says Danny, "try thinking of it this way. Take a wool flocked saddle, girth it down and add the rider. The transfer of pressure is 100% straight down into the muscle of the horse. This compresses the muscle, disallowing blood flow. The restriction of blood flow into the muscle decreases oxygen. Oxygen is very important to the development of the muscle. Less oxygen means the muscle will fatigue much more quickly during work."

Air, on the other hand, always gives to pressure. Danny uses the example of a round balloon. "If you put one hand on the top and the other on the bottom and squeeze together, you'll get 40% compression and 60% expansion. Therefore, when you sit in a saddle filled with Flair air you only get 40% compression down into the muscle. The 60% expansion distributes the rider's weight over a greater surface area. Because there is significantly less compression, the horse receives greater blood flow into the muscle. More blood flow means more oxygen. More oxygen promotes faster healing and faster muscle building and far, far less fatiguing of the muscle."

Danny cautions, "If you try putting a Flair air system in a saddle with a traditional wooden tree, you'll get a saddle that rolls, and bounces." This is because a wooden tree is not stable over a horse's withers. It can't be fitted to any horse because it can't be adjusted to the horse's asymmetries. So, if you have an unstable substance such as air, and try using it with an unstable wooden tree, it simply won't work, he remarks. It does, however, work beautifully when you have an adjustable tree, like the one Danny designed and utilizes in his DK saddles. It is able to be properly fitted and stabilized over a horse's withers. Using this system results in much more swing in the horse's back; the horse will be able to move underneath it and really come from behind because there is no rigid substance blocking his movement.

"To alter wool flocking, fitters will either put more wool in or take wool out, which is incorrect. You have to balance the saddle through a correctly fitted tree. You can't balance it with a substance," he states and elaborates with an example. If the front of the saddle is too wide and sits down on the withers of a horse, and the back of the saddle lifts up and is not making contact with the horse (in doing so, not distributing the rider's weight over the whole tree), the typical solution would be taking a rigid substance, such as wool, and stuff more wool in the front to make it tighter. However, in a short period of time the wool will settle and harden. This makes it tighter over the shoulder and blocks the rotation of the scapula. "Always

Photo by Sarah Miller/MacMillan Photography

▲ **Above: Crystal Kroetch, 2011 Pan Am Silver medalist riding in a DK saddle.**

stabilize your saddle through the tree, never through a substance," he states emphatically.

Addressing Asymmetry

Many people believe that saddles should be designed and fit symmetrically on the horse. In fact, there is no medical proof that symmetrical saddles are better. However, the research that Danny was involved with in Holland actually proves that the assymetrical fit of the saddle is far more symmetrical in terms of weight distribution across the horse's back and ribcage.

The adjustable fit technology that Danny uses, and has proven for the past twenty years, can truly be fitted to any horse because it addresses the issue of fitting a horse's asymmetries. If we think about the anatomy of a horse logically, he says, fitting a saddle asymmetrically makes perfect sense since all horses, just like humans, are built asymmetrically. A traditional wooden tree can never truly fit a horse because it can't be adjusted to fit the asymmetry of the withers.

Because the shoulders of a horse are not symmetrical, Danny explains that the horse will carry one shoulder more forward than the other, resulting in less muscling on one shoulder and less muscle mass over the ribcage on one side. Eighty percent of horses are right shoulder forward, meaning it is steeper, and their left side is relaxed back more and rounder, broader. Fifteen percent of horses are left shoulder forward, making that side steeper and more "hollow," with their right shoulder broader.

"Only five percent of horses are equal and symmetrical," says Danny. Out of the 60,000 horses that Danny has fit, he's only seen maybe ten horses that were truly symmetrical! Therefore you need to have the ability to adjust the gullet plate to the asymmetry of the horse. Also it is good to change the length of the tree points so that they are correctly positioned on the muscles of the horse that are meant for carrying weight.

▲ **Above: Research has proven adding pads does not improve saddle fit.** ▶ **Right: A perfect example of a symmetrical saddle incorrectly fitting an asymmetrical horse. The two photos show that the right side is dry and lower than the left side, which signifies that the saddle is falling to the right and the panel on the left is closer to the top of the withers than the right. So the pattern is not equal and the dry spot is not equal or the same.**

Common Misconceptions

In 2009, the University of New Mexico conducted research on saddle fit. They took 180 wooden tree saddles of all different makes and models. They tested them using a thin saddle pad and also tested them gradually increasing the thickness of the saddle pad. The fit was analyzed over a computerized compression pad. The research found 180 saddles that still did not fit. They also discovered that the thicker the pad, the worse the saddle fit. Danny responds, "If your shoes are too tight and pinching your foot and I give you a thicker sock or an insole, is that going to make the shoe fit better? Saddle pads don't fix problems. They never have; they never will. If you have a properly fitted saddle, you should be able to ride your horse with no saddle pad and never hurt your horse."

Something that Danny hears all the time in the industry is, "I have this one saddle and I put it on every horse I own and it fits beautifully." Danny's response to this statement is: "Go stand in a group of people and look around. How many of those people can fit into your pants or your shoes?" This brings us back to the concept of adjustability.

Most of us have heard that if your saddle fits properly there should be equal sweat under the saddle pad from front to back. This is also incorrect. Danny explains, "All your girthing power, and your stirrups, everything that holds the saddle to the horse is in the front half. When you have air and heat, it creates sweat. If you're getting sweat under the front half of your saddle, it means the saddle is moving. The instability is allowing your saddle to shift from side to side over your horse allowing air in to create the sweat." Therefore, on a saddle that fits correctly, the front half should be dry and under the back half of the saddle it should be wet. The sweat marks over the back half [under your saddle] should be very large and symmetrical. The front third of the saddle should have large, symmetrical dry areas, indicating the saddle is fitting straight and stable over the horse's withers. If you are seeing small, uneven dry spots under the front of your saddle this is very bad. It's a sure sign your saddle is bearing too much pressure over a small area. White spots and white hairs (further explained in the next section) are typically found three inches below the withers. This is where the traditional English wooden tree creates too much pressure at the top of the tree point.

"We're getting by on the willingness of the horse to do what we ask of him. It's time we stopped taking advantage of their willingness."

Frequently Danny hears people remark that we've been using the same kind of tree in English saddles for hundreds of years and it's been working. Danny responds, "When I walk up to a horse and put as little as 10 pounds of pressure over the withers or down the top line of a horse, and the horse drops four or five inches [under my touch] from the pain, clearly this is not working!" He continues, "We're getting by on the willingness of the horse to do what we ask of him. It's time we stopped taking advantage of their willingness."

Perfecting the Fit

The most important thing about having an adjustably fitted saddle is the fact that all horses (just like people) change. Four things cause change in horses: work, feed, age and metabolism. In winter, metabolism slows down causing weight gain. In spring and summer metabolism speeds up causing weight loss and gains in muscle and body mass. "If a person were to gain, or lose, 15 pounds would their pants still fit?" he asks. "When you buy a traditional English wooden tree saddle, which is symmetrical and can't be adjusted, and then your horse changes (as they all do), or you change your horse, your saddle will no longer fit."

A big buzz word in the English saddle world is "tradition." The industry says that on a traditional English saddle we want the top part of the tree point to make contact with the horse, and we want the bottom part of the tree point to flare off the wither muscle, making no contact with the horse's wither muscle. Danny strongly disagrees with this traditional philosophy, based on scientific research of biomechanics of the horse in motion. "The traditional design of an English tree puts too much pressure at the top of the withers and also fills in the shoulder hole of the horse. This is a huge problem," he explains.

He further clarifies that if you take a bare horse and look at his shoulder hole while standing still, he might have anywhere from a shallow to a very deep shoulder hole. However, when the front leg is lifted and brought forward to create motion, the rotation of the scapula fills the shoulder. The traditional English tree, which is rigid and has the tree point flared off at the bottom, puts too much pressure at the top of the withers and fills the shoulder hole in. That's where the scapula needs to go. This creates an enormous amount of resistance as the shoulder is forced to work under the rigid tree. In this tree configuration, the tree points are not stable enough over a horse's withers. Consequently when the saddle is girthed down, the front

◀ Left: Wooden tree with the points contacting the horse 4 - 4.5 inches down. Note that the bottom of the tree point is not touching the horse and how it is pushing in on the wither muscle behind the shoulder. ▼ Below: Danny's proprietary tree with a wither point about 9 inches long. Notice how the bottom of the tree point makes contact with the horse and the top does not interfere with the shoulder rotation underneath it.

of the saddle becomes too low, again putting way too much pressure over the withers.

The very purpose of any saddle tree is to distribute the rider's weight over a greater surface area. In the above scenario, when the saddle is girthed down, the front of the saddle comes down and the back of the saddle lifts. So now, he explains, the entire weight of the rider is only distributed over the front half of the saddle, not fully over the whole tree. This puts way too much pressure over the withers. Therefore, the top of the tree point needs to come off the horse's withers and the bottom of the tree point needs to have contact with the horse's shoulder approximately 9 inches down from the withers of the horse.

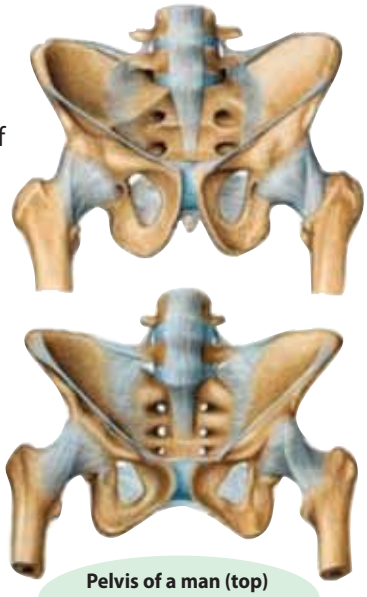
Danny has addressed these issues by redesigning the tree. His own tree creates the correct length and angle of the tree point, he says, allowing the shoulder hole of the horse to remain open, enabling the scapula to fully rotate under the tree point. The gullet plate on a DK English saddle has 46 centimeters (18 inches) of adjustability and can be adjusted to fit any horse's asymmetrical shape, from an OTTB with a "shark fin" wither to an extremely round, broad draft cross.

Additionally, Danny would like to explain what happens when there is too much pressure on the withers. Research has shown that the muscle of a horse can withstand 2.5 pounds of pressure [per square inch] over the withers before it becomes damaged. From 2.5 pounds to 4 pounds of pressure we are damaging the muscle. From 4 pounds to 6 pounds of pressure we have restricted blood flow into the muscle, killing the hair follicles. This creates those telltale white hairs we are all too familiar with. Danny relates, "People will often tell me, 'well, I don't have any white hairs on my horse, so I've never made him sore with my saddle.' This statement is incorrect. This simply means you haven't reached the threshold of 4 to 6 pounds—it doesn't mean you're not damaging the muscle."

Fitting the Rider

Besides fitting the horse, fitting a saddle to a rider's anatomy is also very important. The anatomy of a woman and of a man is completely different. In simple terms, the seat bones of a woman are much wider than a man's because they are designed for child bearing. The woman's pubic symphysis (the joint uniting the left and right pubic bones) is lower and rotated forward; a man's is much higher and straight. The tail bone of a woman is straight up and down; a man's slopes inward. This gives a man much more freedom and rotation of his pelvis, whereas a woman is more restricted. Consequently a woman needs to be supported in the front of the saddle so that she doesn't come down and make uncomfortable contact.

Then we have the human femur, the largest bone in the body. On a man, the femur comes out of the pelvis and falls straight down toward the ankle. A woman's femur comes out of the pelvis and then slopes forward and inward toward the knee. Additionally the hamstring muscle of a man attaches to the buttock and then to the back of the knee. A woman's hamstring muscle attaches to the inside, medial aspect of the knee. The thigh of a woman is round; the thigh of a man is oval. Thus a man's thigh sits more easily and flatter against the ribcage of a horse. A woman's thigh, when sitting in a saddle with a wider twist (which is typical of a saddle with a wooden tree) is actually rolled outward, forcing her to ride with little knee contact, something she will struggle to correct as she rides. Theoretically speaking, all saddles should be made for a woman because a man can ride in anything.



Pelvis of a man (top) and woman (bottom).

Finally, a word about forward cut flaps. The length of the femur has nothing to do with a forward cut flap. The length of the femur should only determine the length of the flap and the length of the thigh block. When the seat of the saddle is properly designed and supports the rider's pelvis correctly, it supports the lumbar vertebrae correctly and allows the femur to fall straight down. This places the rider in the correct position of alignment; shoulder, hip, heel. The rider will feel balanced and secure resulting in more effective use of the aids.

In Conclusion

Since Danny's fully adjustable English saddles have been in use for many years, much of his enthusiasm is based on positive reports he hears from his clients, as well as the veterinarians and chiropractors that work with the horses. They are impressed, he says, with how quickly the horses' sore backs have recovered when worked in a properly fitted saddle. "The best part," says Danny, "is that horses build muscle in my adjustable saddles. They develop more muscle over the withers and topline because of unrestricted blood flow. Better blood flow means more oxygen and nutrients reach the muscle. And, the tree points should be adjusted as the horse builds muscle in these areas assuring a proper fit at all times." So, the next time you're thinking about how your saddle fits, this Master Saddle Fitter encourages you to consider a simple formula: *adjustability = fit*. Your horse, he says, will thank you for it.

Editor's note: We welcome any feedback or questions regarding saddle fit which Danny is happy to address. Please send emails to ***editor@warmbloodstoday.com****.*