

Body Condition Scoring

How research done on weight and body condition scoring at the Tevis Cup ride has led to changes in AERC rules for 2015

BY SUSAN GARLINGHOUSE, DVM

IN ANY ENDURANCE-RELATED conversation, eventually the subject of how rider weight affects the horse's ability to perform will come up. Also often discussed is the size of the horse itself—is a larger horse better suited to carry weight over long distances? Or a smaller, more compact "economy model"?

If the traditionally-held belief that carrying more weight is detrimental to performance holds true for endurance as well, then does it then also make sense that an extremely "lean and mean" endurance horse should perform better, given that they are carrying less body weight down the trail?

In the mid-1990s, the Western States (Tevis) Trail Foundation graciously allowed a research team access over several years in order to measure the effects of varying physical and performance parameters in over 600 Tevis horses.

The resulting research articles were subsequently published in the peer-reviewed Journal of the International Conference of Equine Exercise Physiologists and the Journal of the Equine Nutrition and Physiology Society. These studies can be forwarded in their entirety by contacting the author at docgarlinghouse@roadrunner.com.

One of the key take-home points from the data gathered was this: there is such a thing as *too* "lean and mean" for top-level endurance, and specifically over the grueling Tevis trail. Whether as horse body weight alone or in the form of tack and rider, carrying more weight inarguably requires more energy.

However, rider weight alone had surprisingly little effect on completion rate or even on placing. In 1994, during the first year of data collection, the Tevis Cup was won by Saxx, carrying close to 30% of his own body weight with Chris Knoch riding. Other heavyweight riders have also won first place over the years, including Garrett Ford, Boyd Zontelli, Pat Fitzgerald and Sam Arnold.

Amongst those riders included in the study, rider weight alone, or as a percent-



age of the horse's body weight, was not a significant factor in completion rates, or in predicting a placement amongst finishers.

A more subtle difference in weight-carrying ability appeared when looking at the total combined weight of horse, rider and tack, regardless of how that total weight was divided between horse or rider. As total weight increases, so does the likelihood of disqualification due to lameness.

This may be related to the fact that as the height of the horse (and presumably body weight) increases, average cannon bone circumference does not increase proportionally at the same rate. Mathematically, this means that more downward force is placed per square inch on the front limbs of larger horses, resulting in more biomechanical stress and lameness.

Surprisingly, it did not seem to make a difference how weight was divided between horse and rider—that is, an 1100-lb. horse carrying a 125-lb. rider (1225 lbs. total weight) was statistically at greater risk of being pulled for lameness than an 850-lb. horse carrying a 250-lb. rider (1100 lbs. total weight).

Given that more total weight means a higher likelihood of lameness, does this mean that trimming down a horse's weight by a hundred pounds or so to a greyhound-like silhouette is going to result in better performance?

The answer is a resounding *no*. Unexpectedly, but overwhelmingly, the data collected demonstrated that the body condition score of Tevis horses has more influence over successfully completing the course than did any other parameter measured. Traditionally, completion rates have hovered around 50%. Yet, when condition scores are analyzed independently of any other factor, comple-

tion rates are noticeably higher (see sidebar) in horses with a condition score of between 4 and 5—that is, with enough fat layer to cover the ribs and topline to create a smooth silhouette, without being significantly either overweight or underweight.



A thin horse with a body condition score of less than 3 lacks the needed onboard fuel for endurance competition. Photo courtesy of Patty Danley.

Conversely, as condition scores (and body fat stores) decrease, so does completion rate. Horses with a thin body condition score (i.e., those with a body condition score of 3 on the Henneke scale of 1 to 9) completed on average only 53 miles before being disqualified, with a completion rate of less than 10%.

Very thin horses (those with a score of 2) did even more poorly—completing only an average of 28 miles before being pulled, with a zero completion rate. Not only are thin horses more likely to run into metabolic trouble, paradoxically, they are also more likely to be pulled for lameness—presumably because a thin horse is a horse without sufficient

reserves for energy production, and thus a fatigued horse is also a horse more likely to stumble, interfere or develop muscle injuries.

So what exactly is a body condition score? Often referred to as the Henneke scale after the Texas A&M graduate student who developed it in 1983 as a tool in managing broodmares, this is a system of assessing the fat cover over six different skeletal landmarks on the body of the horse. Scores of 1 (ema-

Tevis Completion Rates by Body Condition Score

Body Condition Score	Completion Rate	Ave. Miles Completed
1.5 (extremely thin)*	0.0	22.35
2.0 (very thin)*	0.0	26.10
2.5 (very thin)*	0.0	33.08
3.0 (thin)	9.5	53.0
3.5	56.5	75.8
4.0 (moderately thin)	59.1	79.9
4.5	64.3	87.7
5.0 (moderate or "ideal")	90.7	98.2

*As part of the equine welfare program instituted this year, horses presenting at the pre-ride check with body condition scores of less than 3 or greater than 8 will not be allowed to start.

ciated) through 9 (obese) are assigned to each landmark and the results average to produce an overall score.

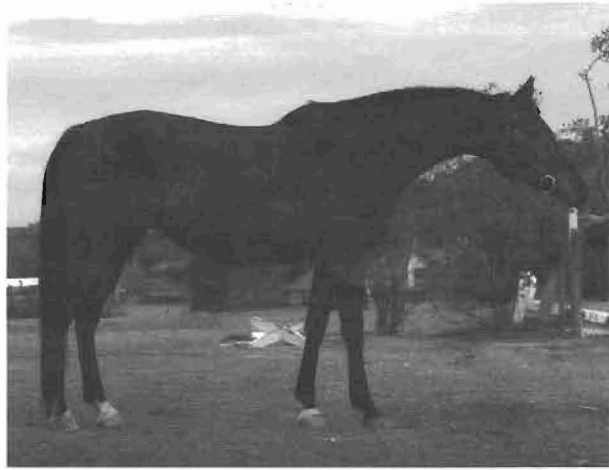
Specifically, the areas of the body evaluated are the neck, withers, behind the elbow and shoulder, ribs, tail head and along the topline. Keep in mind that when applied correctly, body condition score (BCS) is independent of factors such as breed, gender, age or conformation—don't get distracted by a stallion's cresty neck or the "hunter bump" along a thoroughbred's loin.

Even more specifically, BCS is independent of the degree of aerobic fitness of the horse—the system only evaluates the layer of fat, and therefore prominence of certain bones, not the amount or ability of musculature or cardiovascular fitness. As such, a thin horse is no more likely to be fit than a horse carrying a more moderate amount of body fat.

Many specific and detailed descriptions of the Henneke scale can be readily found online. More to the point at hand, what does a horse look like with an ideal condition score of between 4 and 5? What does a horse look like that is too thin to reasonably even start Tevis?

Looking at a horse with body condition score of between 4 and 5 should evoke the word "smooth." The neck and withers should not look obviously thin and should blend smoothly into the shoulder. Ribs should be easily felt with the flat of the hand, but no more than the faintest outline in good light should be visible. Standing behind the horse, the top line should be level or, at most, just the very slightest peaked appearance. The hip bones can be felt, but should look rounded and not easily visible. The prominence of the tail head may vary somewhat between individuals, but should have a small amount of fat on either side and blend smoothly into the hindquarter musculature. The individual bones of the vertebral column should not be distinguishable, nor should there be a "negative crease" or distinct bony ridge anywhere along the topline.

In contrast, look at the accompanying photo of a horse in excessively thin body condition. The neck, withers and shoulder are accentuated and the ribs easily discernible, even at a distance. The top line looks "peaky," and the individual spaces between vertebrae can be seen as a knobiness which increases towards the tail. There is often a discernible dip in the loin in front of the sacrum, the



A fit horse with an ideal body condition score of 5. Photo © Lynne Glazer, www.lynneglazer.com.

highest point of the croup. The bones at the point of the hip and tailhead are prominent.

The vast majority of energy for endurance exercise comes from oxidizing onboard body fat stores.

Physiologically, why is it that a horse carrying less weight in the form of body fat should be at significantly higher risk of metabolic disease over the course of a 100-mile ride such as Tevis? Wouldn't it seem counter-intuitive that less weight means fewer calories required? A good analogy is that of a car with a fuel tank carrying just a few gallons instead of a topped-up supply. While the car running on fumes is pushing less weight down the road, it also has very little range before running out of gas—literally.

Likewise, a thin horse lacks the adequate energy stores needed to supply sufficient calories over a 100-mile course. Regardless of the type of feed provided during the ride itself, the vast majority of energy for endurance exercise comes from oxidizing onboard body fat stores, and cannot be wholly substituted for anything else, including high-fat rations fed during the ride.

In a thin horse, the lack of adequate visible body fat is an indicator that the horse is in a negative energy balance and burning more calories on a day-to-day basis than is being supplied in the diet. As a result, the body burns not only what little body fat is available, but will additionally break down lean muscle mass to supply energy demands.

As a result, a thin, over-conditioned horse has less available muscle available for

work, regardless of the amount of training and conditioning that has gone into preparation. Such a horse is going to deplete available energy stores more rapidly and fatigue sooner than a horse that has been managed to maintain more moderate body fat stores.

If a BCS of 4 to 5 is ideal, would endurance horses do even better at an even higher condition score? As with all good things, there's a point at which "enough" becomes "too much." Even during rides which take place in much cooler weather than a typical Tevis (in which afternoon temperatures often exceed 100°F), endurance horses release a tremendous amount of heat as a by-product of muscle contraction.

A horse covering 100 miles of completely level trail under cool and dry conditions will still release enough heat to melt 300 pounds of ice and then bring that water to a full boil. As such, a horse ready to tackle a challenging endurance trail needs sufficient onboard fuel stores without carrying so much fat as to provide an extra insulating barrier to heat dissipation.

Just as a horse's top line should not look "peaky" with a negative crease, neither should it show an obvious positive crease or "dip" running down the center. If the ribs not only cannot be seen, but also cannot be felt with the flat of the hand, a plan to decrease body fat might be prudent before competing in hot weather.

As of the beginning of the 2015 season, which started on December 1, AERC rules provide that horses judged to be excessively thin (with a body condition score of less than 3) or excessively overweight (with a body condition score greater than

8) cannot compete in any AERC-sanctioned event, including limited distance. (Intro rides are not affected by this rule.)

Horses which have been ascertained and adjudged to fall within an acceptable condition score range at the pre-ride check-in cannot later be disqualified by the same or different control judge at the same ride for condition score alone. ■

Dr. Susan Garlinghouse will be speaking on the topic of body condition scoring on Friday, March 6, at the AERC convention in Reno. Don't miss it!

Veterinary CE at the 2015 AERC Convention

All AERC veterinarians are invited to participate in this year's Veterinary CE, held March 5 & 6, 2015, in Reno, Nevada.

Information and registration form available at www.aerc.org/VetCE2015.pdf or upon request from the AERC office. 866-271-2372.