

What your mother never told you about the 21-day cortisol surge in cattle

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AT A GLANCE

The 21-day cortisol surge in cattle, triggered by stressors such as weaning and transport, impairs immunity, weight gain and vaccine response. Understanding and managing this ancient biological response can improve cattle health and industry efficiency.

The 21-day cortisol surge in stressed cattle is a common problem that costs the combined beef and dairy sectors millions of dollars annually in mortality, morbidity, drug and labor costs, and impaired efficiencies in animals. And, yet, this inescapable reality is poorly understood and seldom planned for in producer protocols.

Ancient royalty

They say you need to know where you have been to plan on where you are going. About 2.6 million years ago, the aurochs, or wild ox, evolved in what is now India and parts of Asia. The male aurochs was 6 feet at the shoulder and weighed up to 3,000 pounds. Think of an American bison, only 1.5 times bigger. The aurochs had a personality to match its impressive physical presence. Ancient people depicted them in cave paintings 20,000 years ago throughout Europe. Julius Caesar discussed them in writings. Ancient Romans also used aurochs skulls and horns in battle preparation rituals, hoping to draw on the aggressive bravery and athletic abilities of the aurochs.

No wonder humans selected this animal to start to domesticate between 10,000 and 15,000 years ago. All cattle today originate from this ancient DNA base. But along with the good traits came a few that we still are forced to deal with today.

Skeletons in the closet

As I mentioned, the wild aurochs was rather belligerent. This extended to herdmates. If you got sick, you would be shown to the back of the pack, and the saber-toothed cat or ancient wolf would “cure” you. Over time, the flight-or-flight hormone, cortisol, was extended to a 21-day event. This bought time to either get better or die by allowing the sick individual to fake it, much as a cortisol injection into our knee or shoulder can help us to get by for a while. Today, our industry struggles to find sick inbound cattle before the 21-day shot show begins. Sure, trained cattle people are a valued commodity, but we are fighting a million-years-in-the-making strategy that still hides the infirm individual today.

Cortisol supports blood glucose levels, which makes sense if you need to run away or fight. At the same time, these periods of stress switch the immune system from fat metabolism products (ketone bodies) to the use of blood glucose. In the wild, this made sense when they did not have to worry about making milk or gaining weight. But all this is at crossed purposes to what we intend for cattle today.

Hair trigger

So what causes the trigger of this metabolic event? Weaning, trucking, chute work, crowding, social change, diet change, early snow, late snow, calving events, in vitro fertilization – in short, most of what we routinely do in our industry triggers the cortisol surge. Cortisol at these levels also triggers behavior changes so consistently that we mistake the typical cortisol-induced behavior for

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what is the normal, things such as unending vocalization, endless pen perimeter walking, flighty or skittish behavior. For the cow, it seems that it might be a good idea to get an extra step or two lead on the wolf or lion. Increased social flight distance is what we interpret as wild or flighty. Funny how next month when this behavior subsides, we also consider that as normal.

Lack of weight gain in the first two to three weeks with inbound cattle is also considered the norm. But if we control this event, cattle will gain weight from day one at whatever level they were doing before the stress. We need to work at putting the immune system back on its regular diet plan. Some research will call this inflammation. While not the purpose of this discussion, we can agree that blood glucose resources are more profitably used for other allocations than fueling a hungry immune system.

Vaccinating inbound cattle as they come off the truck is labor-efficient but does not promote an optimal response to vaccination, known as protective immunity. I'm pretty sure that when we read the insert that comes with every bottle, it does not advise using their product when the cortisol surge is most likely at its highest.

Wasp nests and Wiffle ball bats

Cortisol is a huge wet blanket on the adaptive immune system that

All cattle today originate from the ancient DNA of aurochs. The male aurochs was 6 feet at the shoulder and weighed up to 3,000 pounds, 1.5 times as big as an American bison.



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we want to respond to a vaccine (B lymphocyte pool). In fact, it does not do much for any aspect of immune function. If each stress is like hitting the wasp nest with a Wiffle ball bat, how many bats would we like to use today? Remember, the hornets are already on high alert before we ever get a chance to make a decision.

There are many studies in the peer-reviewed literature that observe behavior and make direct correlations to the cortisol levels of the stressed animal. Chute scores measure the speed that animals exit from the head catch when released.


Pen scores measure social flight distance and expressions of aggressive behavior toward us and other cattle. Vocalization is self-explanatory.

It turns out that we can make a back-of-the napkin assessment of the cortisol level by observing these behaviors over the rail. It costs very little except for some time, and it might be valuable in deciding how and when to work stressed inbound cattle.

Temple Grandin is an innovator in behavioral research who has left a lasting impact on our industry. Perhaps we need to take some of her concepts just a step or two further with the

current understanding of what the cortisol surge in all cattle represents.

If we understand the rules of cattle, we can succeed at their game. Not all the rules are ones we might like in a perfect world. But the first rule is that they never change the rules. Consistent frustration or consistent success – the choice is mainly ours to make. I'm pretty sure that frequent bouts with cortisol surges do not do our health much good either.

And finally, the next time you see your mother, do not be too hard on her. She probably did not even know that cows had rules. 

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