## Bovine Congestive Heart Failure

## Season 1, Episode 10

**[Music]**

**Olivia Amundson:** Welcome back to episode two, or the conclusion episode of congestive heart failure in feedlot cattle with Dr. Brian VanDerLey. Here we’ll pick up the conversation where we left off. Enjoy the episode.

**So, and maybe** I'm getting way in the weeds again, but you said, some of these risk factors are associated with like beta agonist and things like that so. Could these calves that have a greater risk because they may be, carry both of these risk factors, could it be feed induced that's causing some of this health related issue.

**Dr. Brian VanDerLey:** The best answer is, we don't know yet. So we call a speculation, once we find a gene, and we have the ability to start making up a story about how it works without any real proof that's bio poetry. It's a fun sport we like doing it a lot we like writing bio poetry, but it's not very useful, from the perspective of knowing what's actually happening so bio poetry is good for us when we're thinking about you know, what's the next research project going to test, how are we going to look at this thing, so we can figure out better ways for farmers and ranchers to control this problem and the cattle, they have. And we are simply are just not to the level where we can say things like that yet. Though the level we’re at right now, it is that we're pretty good at saying who's not going to get sick with these two tests, these two risk factors. If a rancher wanted to do something and I would offer a couple of criteria or a couple of suggestions for people who might be interested in doing something about this particular disease. One is you probably need to have some sort of retained ownership or some situation in which those cattle are still in control or influenced by the person who bred them, right, the cow calf producer. And the reason I say that is because we're at an early enough stage in this yet where it's really difficult for me to recommend that a cow calf producer makes this a central part of their selection criteria, because we just don't know how important it is, especially given the great diversity of places where these calves could go to feed. So we tend to see this problem in Nebraska, the epicenter is in the panhandle or in the western part of the state, we have a lot of cases show up there, we have a few cases that show up in the far Eastern part of the state and then it's kind of a gradient as we go up. So that suggests that elevation and oxygen concentration may still have a role to play. It doesn't seem like a good idea for me to tell someone who's calves might go to Iowa to get fed, as opposed to go into the Nebraska panhandle get fed to say you know what, you should completely revamp your breeding program to account for these two genetic risk factors. But if someone is feeding cattle and there's a they've had a problem this test, these two risk factors offers them an opportunity to start moving the needle toward fewer cases. We validated these risk factors we're pretty confident there's some updates coming those are forthcoming here pretty quick too, but we validate them are pretty confident that breeding toward less risk for these two factors will influence or reduce the number of cases, we see it, the feed lot but that's only really going to be valuable if the producer has cases now. Until we get more information about genetic and environmental art, excuse me, environmental and weather type management factors. It's really hard for me to say, as a general rule, all cow calf producers should start selecting against risk for these two things. I don't think that's, that’s not a good idea and that's why I say if someone already retains ownership in their calves are feeds in themselves and they have problems with heart failure absolutely, these are two risk factors that are probably important. I'm going to offer one small caveat to that is not in function is not enforced until we have more information, but, I suspect that we will probably find other problems that are associated with these things too so that's a story that we’ll have to wait to unfold. But if let's say that I am correct, if I'm not correct don't worry about anything I just said, but if I am correct, then it might be more important for someone at lower elevation who feeds out their own calves to select against those two risk factors, but for now it's people who feed their cattle or retain ownership in them and have some problems.

**Olivia Amundson:** So in talking about you know finding some of these cattle that might be potential risk factors to develop this congestive heart failure is there a commercial test available or how does a guy even test to see if these two genes are there?

**Dr. Brian VanDerLey:** The commercial tests that I know is available there's a company in Lincoln Nebraska called MatMaCorp that offers a two snip test. It costs about somewhere in the neighborhood of 25 or $30 per animal so it's reasonable, but it's not inexpensive. In my opinion, everyone has a different threshold for cost. They offer a two snip test for the data belongs to the producer so they're not sharing the data but retaining it or owning the data themselves. The breed associations and the large genetic, like genotyping tech companies Neogen, Zoetis, so on. I'm not sure about Zoetis but Neogen has the markers on their chips on a number of their chips. They have like a ggp 100. I'm not a Neogen expert so if I get these wrong, I hope your listeners pardon me, but they do have products that have these markers on. I think you have to specifically request to get an outcome I don't think it's a standard part of their reporting process. The most direct way is using the MatMaCorp system. Depending on producers preferences, the MatMaCorp offers some advantages, but if they're going to do genotyping anyway, it might be good, just to bundle this with their normal genotyping and it doesn't cost a whole lot more to get a 7500 K snip chip run on cattle so.

**Kiernan Brandt:** Yeah and I think that's just really, really good advice for people that are considering entering that realm you know there's a huge segment of the cow calf industry that has very little data once they once they're weaned once those calves are weaned and leave the place just because there's really no way for those guys to keep track of that, and so I think, if anything, just a good word of caution for guys considering getting into that field, considering hanging on to calves. Especially in an age where we're seeing more economic options for even on the commercial side of things just for some of those genotyping things in the end, the benefits that they can provide. I mean not to go too far into the weeds but, like some of those custom indexes and things like that just can be a pretty low cost option, I think we're going to continue to see a lot of progression on that front. One thing that, and I'm assuming it was some of that bio poetry, you were talking about one of the first things that put me on to this issue, which I was reading in a public or a popular publication, I'm not sure specifically which one it was, but it was talking about how this is predominantly an issue during the late feeding period and the suggestions that were being made were kind of what Olivia touched on a little bit earlier, but was that this may be a result of increased growth, right, and this is something that has popped up in other industries. And I had a chance to ask you a little bit about it at range beef cow symposium but it popped into my brain probably just because I had to do a graduate school presentation on it, ascites syndrome in broilers which kind of ended up being a result of too rapid rate of growth that then leads to all kinds of physiological issues and ultimately death. I think the important part to point out of that issue was that, from my understanding, at least, and perhaps you can provide a little more insight, but that they were able to resolve that relatively quick kind of through a similar selection process and kind of get a get a handle on that in a relatively rapid pace. I mean, obviously we have some other intricacies that will have to counter like generation interval and things like that, but this is something that's kind of relatively been seen before, or some version of it, right?

**Dr. Brian VanDerLey:** Yeah, so we've asked that question, too, is this the same thing that we saw on the broiler chickens are we basically growing them so fast that they out run their cardiopulmonary capacity things like that. At this point, I would say the evidence is leaning toward that's not what's going on here at least I'm really hopeful that that's the case. I want to make sure that my hope is not bias our research we try to run in a way that that's not going on but we've done three things up to this point. This is actually part of my current PhD students dissertation work but she's looking at, what we've done the first thing we did is we had these hundred two case control pairs and we did part of the process was we ran the 700 K chips on those animals or 770 K chips the HD chip and using that data we actually we stripped all those records all that chip data of any kind of case information, ID information we sent them to the American Angus association and had them do their genomic predictions using that data and we saw no differences in predicted performance outcomes, whether it was any kind of weight or carcass merit anything in any one of those categories so cases were not different the controls tremendous variation. Adding to that just anecdotally we see large numbers of cattle that seemed to finish just fine that are as big and grew as fast as the cases did. We also don't necessarily see this just in the late feeding period, we see it, at the beginning of the feeding period, and we see a lot of it in kind of the middle part of the feeding period as well. The second thing we did, because just to make sure that you know the genomic prediction data is it's a little less concrete maybe then what actual measurements might be we actually looked at carcass ultrasound so these would be predictions based on carcass ultrasound and again, so I know differences between risk categories. Both risk factors one or the other, or neither risk factor, they all had relatively same similar predicted outcomes based on some marketing times and things like that. And then the last one, which is the best option possible is we're following a pretty large cohort of these animals actually they've been slaughtered, we have individual carcass data. And we're generating genotypes, right now, so we feel like that's hopefully going to put the last set of nails in the coffin on this, you know, we want to put to rest this idea that there's a link between this disease and performance, because if that link exists, we have a major problem. We're going to force producers to choose between health and performance and in our production environment that's very challenging it's really challenging we want to have healthy cattle. But they're in a financial position frequently where performance is what pays and they might have to choose an option we don't like. One way or the other, it will be difficult, but I don't think they're going to have to make that choice.

**Kiernan Brandt:** Which is yeah that's really good, because I think, regardless of what cattlemen group you're a part of or anything like that, those increasing production efficiencies and kind of streamlining of our industry is what allows us to keep the price of beef relatively low and allows us to do all these great things as an industry and if we're limited by the fact that our animals are hitting a threshold that could yeah that could cause some major problems. When we were, I think it came was in your bullpen session at Range Beef Cow was there anything that you guys are noticing in differences between calf fed and backgrounded steers is, or, am I remembering that right.

**Dr. Brian VanDerLey:** Yeah so there's two things that are published, well one of them is published, one of them is our own data we've collected is not published yet, but it will be soon, and then the third one, is an observation. There was a published report, Dr. Joe Neary did his PhD at Colorado State and as part of that, he did a study looking at congestive heart failure and feedlot cattle using a large feedlot consulting group's database and they showed a number of things, but one of the things they showed was that yearlings where we're at higher risk of having congestive heart failure than calf feds. In our data, what we see is that it's almost entirely calf feds that are at risk for heart failure, to the point of we don't even really have observations in yearling type cattle. There are some notable differences between the sources of data that could contribute to that. The data that Dr. Neary us contained a lot more high risk kind of commingled sale barn origin type animals and those might have more conversion of heart failure that we see this it's brought on by chronic respiratory disease and that could happen in those, there's a lot of verbal uncertainty that I'm putting in this because I don't know a lot of things about this, but it could be related to the fact that they just had more respiratory disease challenge. In the calves that we're looking at they almost have very few of them have any evidence of respiratory disease, when we open them up and look, that doesn't mean it was never there, but we don't see it when we do the necropsy. And in fact one of the stories that we get, it's a management intervention that some feedlots and cow calf owners uses they feel that background in these animals or turning many yearlings is actually protective. So some places that really struggle with heart failure will actually grow them slower for longer or they'll actually putting put them through some sort of a yearling development program in order to alleviate heart failure in these groups of animals and they report quite good results from that.

**Olivia Amundson:** Yeah, Brian, I think, as we start wrapping up this conversation, which has been an awesome dialogue, I think both Kiernan and I have we've learned a lot we known some of it, but we just continue to learn more and more and it's just a very interesting topic and how it can relate back to the cow calf sector. But in terms of congestive heart failure in some of these feedlot cattle, I mean what are the future directions that you know your research group is maybe planning on going. And is there any research out there, or future research that will be will be done.

**Dr. Brian VanDerLey:** Yeah so we're in the process right now, of a couple of things we have whole genome sequence data on these 102k control pairs so I can't remember the exact statistics, but I can throw numbers out there, roughly. There's 700,000 or 770,000 SNPs on the chip that we use to generate the data that we're talking about today. In Angus cattle about 500,000 of those are useful so half million, whole genome sequence there’s 20 million SNPs in the bovine genome and we can use if I remember correctly, **we can use about 11 million of** those. So we have 22 times the data if I'm doing my math right which I don't do well. But if you think of it like a map, what we had before was like the back of the napkin sketched out with a pencil and you know it's like a map for the problem and its rough it's missing a lot of details. The whole genome is like Google earth Street View you know you can get down and look at a picture of the place you're going to and see exactly what's there that's our best chance for finding causative mutations. Right now we're we assume that in most cases we're kind of marking the area where a mutation might be with a chip. Whole genomes is very, it's our best chance to actually figure out where the mutation itself is so that, that work is forthcoming it's in progress it's a lot of data, it's a lot of work to make our way through it. This is the royal way my collaborators at US MARC and actually one of my grad students is helping with this, but there's supercomputers involved in all kinds of fun things so they're working hard on that, but we'll have more information on that coming. In the meantime, we do have we expect to have a publication out soon on this data, it will be published in a peer reviewed literature soon. We also are working on a prospective cohort study where we're actually using, we're selecting away from these, so we're actually looking at a relatively large cow herd that has a significant problem and we've applied selection pressure, based on these two risk factors for the last think we have our fourth calf crop in utero that we've genotyped two of those calf crops, the one that was born last spring, and the one that will be born actually add pretty significant selection against these two risk factors and those animals will be fed through retain ownership situation. So we're actually doing a prospective cohort to find out if we can reduce the incidence of heart failure by breeding away from these in a very practical straightforward way. Kiernan mentioned generation time, it's awful to do research on genetics and cattle, because it takes forever to get results we've been working on this for four years, and we got several more years to go, but that work is being done, and the other thing that's happening as we develop better genetic tests. For this is that we're more able to put animals in the in the risk groups, and when we can do that, we are more able to look at those genetic and our excuse me, environmental management factors that we think are playing a role. So, as we move forward we expect to do more work relative to things that we might be able to do feeding wise or housing wise or pre feedlot entry management on you know those are on the table, once we can actually do a really good job of figuring out who's going to get the disease.

**Olivia Amundson:** Well Brian, I have no further questions for you, Kiernan?

**Kiernan Brandt:** I guess just in closing, besides a comment on how busy your grad students are going to be combing through 11 million SNPs a data holy cow that does I'm not envious.

**Dr. Brian VanDerLey:** Supercomputers man that's what makes it happen.

**Kiernan Brandt:** Yeah what a time to be alive in the in the world of research, we have some pretty incredible tools available for our use, but you know just a lot of a lot of good information shared today. Hopefully, this is, if this is something that you folks at home aren't aware of that it's now kind of on your radar because this is something that can, like you mentioned this this herd that's got some chronic issues, it can it can start to add up, really, really quickly. The figure you guys have in the fact sheet over a quarter million dollars at a single operation almost 10% incidence of affection, you know that's a pretty big deal, but I guess, I just wanted to toss out that we will, we will go ahead and put the fact sheet in the link. With this episode so it'll be it'll be up there for anyone that's interested and any other resources that we have we'll just go ahead and plug them in on there so.

**Dr. Brian VanDerLey:** That sounds great. I think there's some contact information that fact sheet for me and possibly for Dr. Heaton but any of your listeners are welcome to reach out to me if they have more questions we're happy to talk about those things, and like I said at the beginning, I have an extension appointment to so as for my job as well.

**Olivia Amundson:** We'll keep you around then. Well, with that being said, this will just wrap up this episode, thank you to our listeners for tuning in and we'll catch you on the next Cattle HQ.

**[Music]**