## Weathering the Weather as Agriculturists: Dr. Darren Clabo

## Season 1, Episode 34

[Intro music]

**Kiernan Brandt:**

Welcome to Cattle HQ, a podcast from industry experts and progressive producers discussing cutting edge info about the cow calf sector to keep cattlemen and women in the know and positively affect their bottom line.

**Madison Kovarna:**

Welcome to Cattle HQ, brought to you by the South Dakota State University Extension. I’m Madison Kovarna, a Beef Nutrition Field Specialist based out of our Watertown Regional Center. Joining me as our guest in today’s episode is Dr. Darren Clabo and he is the South Dakota State Fire Meteorologist and an Associate Professor of Practice at the South Dakota Mines in Rapid City. He is fascinated by all things related to weather and climate, and especially if those relationships involve wildfire. First, I want to thank you for joining us today. Climate and weather within the state is something I definitely wish I knew more about. I personally wasn’t familiar that in South Dakota, we had a state fire specialist. Can you tell me a little bit more about what your position entails?

**Darren Clabo:**

Absolutely. Thanks for having me on, Madison. Boy, I wear a lot of different hats. I’ll take you back into a brief history lesson if you will. Back in the year 2000, August of 2000, we had a large fire in the Black Hills, 86,000 acres. The Jasper Fire grew. It grew 60,000 acres in one day and it really fundamentally changed the way the state of South Dakota deals with wildland fire suppression. Governor Janklow at the time figured out that one of the problems. Our state didn’t have very good fire behavior and fire weather intelligence. We didn’t have a real good idea of what kind of factors are out there that are contributing to large fire growth across the state. In collaboration with South Dakota Wildland Fire and South Dakota Mines, they created this position of the state fire meteorologist and my predecessor, Randall Benson, started it, I believe it was 2002 when they finally got him on board and then he left, and I came in here in 2010. So I’ve been doing this now for 14 ½ years. It’s almost like a career. My job is fun. I get to do operational meteorology, which means that I get a forecast for wildfires. I get to go on scene for wildfires or other large incidents and help out the management teams that are there better do their jobs. Kind of in the background as well, I’m always looking at the weather and climatic conditions. For example, yesterday, I put together our June Fire Potential Outlook for the entire state, so I looked at each climate division in the state, there’s nine of them. I’ve done research over the past 30 to 40 years of fire history in South Dakota trying to figure out when, where, and why wildfires get big. For instance, in the month of June, what drives big fires across the state. I also issue weekly outlooks that look at more kind of operationally focused issues in terms of, “Hey, is Harding County going to see higher fire danger on Thursday,” or what-have-you? Then I’ve just kind of been available as a consultant for not only South Dakota wildland fire, but also for all of the other interagency wildfire partners we have like the Forest Service or the Bureau of Indian Affairs or Bureau of Land Management or local volunteer BFDs or municipalities. It’s kind of a broad brush. I’m looking at all different time and spatial scales but really trying to bring it home to South Dakota and try to keep the, I guess, safety and efficiency of our firefighters at the forefront.

**Madison Kovarna:**

All of that sounds awesome. I have always been super interested in how weather patterns affect what we experience not only in the fire realm, but also, potentially on this eastern side of the state, we’ve had some powerful storms coming through this spring. One of the things that I thought was interesting is that you were talking a lot about the history of fires in South Dakota and in our preparation for our talk today, you had mentioned that we have a year-round fire season here in South Dakota. Can you give us some insight into maybe what those different seasons look like based on different sides of the state or how we can be better prepared for those seasons based on where we’re located?

**Darren Clabo:**

Absolutely, and this is exactly why I issued these monthly outlooks, because it changes throughout the year. I’ll give you an example. March and April, we think, typically, March and April or at least in western South Dakota, it’s the snowiest couple of months of the year. Not a lot of fire activity. However, on the east side of the state, the eastern third of the state, March and April are the two most active wildfire months in terms of acreage burned and number of fire starts. If we think about it, it makes sense, we’re coming out of the winter season. So if there’s no snow on the ground and we’re starting to warm up, the days are getting a little bit longer, but the key part of it is all of the vegetation on the landscape is basically dead. We’re coming out of the winter dormant season. The grasses are brown, they’re available to burn, and they will burn if they find that ignition source. Unfortunately, the ignition source in March and April, by and large, is humans so we need to pay attention to that. If we move closer to central South Dakota and western South Dakota, the peak fire season in terms of acreage burn and number of fires really starts tilting towards the months of July, August, and September. A lot of the fires, especially in the Black Hills, are caused by lightning during that time frame but in the months of July, August, and September, if we’ve had a wet spring, the grasses are still going to be green. So unlike eastern South Dakota where drought isn’t needed for fires in March and April because the grasses are already dead, drought is needed in western South Dakota during their peak fire season in order to get fires to even start because that’s the time of the year when things are normally relatively green. All of these relationships play a big role in when, where, and why we see wildfires out there. So it changes. I do want to point out, especially in the Black Hills over the past five to eight years, our largest wildfires have been during the cold season. When I say cold season, I really mean fall, winter, and spring. We can look back to the Legion Lake wildfire that we had that burned 54,000 acres in Custer State Park and surrounding areas that started on, I think it was December 11th. These are extreme events that we’re seeing kind of in the cold season. So we’re definitely a year-on fire state. Unfortunately, a lot of those ignitions are caused by humans, and I think we should all try to do a better job of not being that ignition source.

**Madison Kovarna:**

Speaking on the fact that most of the time, maybe inadvertently, we might be the cause of some of these fires starting, but what are some things that we can kind of do on our day-to-day lives to limit our impact on starting these fires? Are there some management things that we can do as producers? Are there just some household management things we can do at home, maybe on the acreage or even if we live somewhere in a more populated area, are there some things that we could do there to prevent those fires from even getting a chance to start?

**Darren Clabo:**

I don’t want to sound condescending but just pay attention. Recognize the conditions around you, recognize when it’s dry. Do you really need to mow that field on a day where it’s 98 degrees and the wind is blowing 40 miles an hour? We can put ourselves in a much better position to not start fires if we just do the simple things. If you’re out in the pasture doing the work that you’re doing, have a water source nearby especially if it’s a dry day, if it’s a windy day, if you notice that the grass feels crunchy and crispy. Have those kind of tactile feelings out there so you can understand that maybe today’s not a good day to do whatever activity it is you’d like to do and you could put it off to a day where conditions are less favorable for starting big fires. That, and then having a water source or fire extinguisher nearby, that’s super helpful.

**Madison Kovarna:**

Kind of moving off of the - I suppose it still relates to fire here within the state but the last couple of years have been really dry for us kind of all over. People have definitely been feeling the heat and just not having a lot of moisture, but this spring has really had some early promising moisture especially on the eastern side of the state where I’m at, we’ve been pretty damp. So what does that kind of look like on your end for a fire outlook for this summer? Is this moisture going to carry us quite a while or is it going to be something we still need to be a little more concerned about even if we have been a little more damp this spring?

**Darren Clabo:**

I’ll complain about everything. If it’s too wet, we grow too much grass that can burn later. If it’s too dry, the grass that we have can burn. So it’s kind of a double-edged sword. You’re right, 2020, 2021, 2022 were all three dry years, 2023 was wet, central and western South Dakota, but kind of southeastern South Dakota, Sioux Falls over to Mitchell and over to Brookings, kind of that pocket was pretty dry last year. Then this year, it’s been interesting. Most of the states have been receiving really good moisture up through the end of April but then May hit, and in central and western South Dakota, most areas saw anywhere between 40% and 75% of their average precipitation in May. That’s huge considering May is either the wettest or the second wettest month of the season, but you’re right, the eastern third of the state, the counties adjacent to and along the Minnesota border has been wet past 30 days, anywhere from 130% to even 200% of average precipitation so we’re talking three to seven inches of rain in places. It’s going to be good for producers, good for agriculture as long as you can get out in the field and do work, but again, we’re going to be growing grass, and I’ll go back to my statement earlier, especially in eastern South Dakota, prime fire seasons, March and April. So all the grass we’re going to be growing this summer will dry out over the winter. It’ll die off and it will be a receptive fuel for next spring. So we’re always kind of taking the good with the bad when we think about these things.

**Madison Kovarna:**

This is kind of looking rather than just we’re pretty wet right now, keeping in mind that, as we move forward through the year, that the stuff that’s left over is definitely going to be something we need to keep our eyes on next spring, which I think is super insightful. I have cattle back home and I’ve been talking to a lot of producers across the state, we’re excited to see a lot of grass, but I think we also forget that sometimes that stuff that we leave naturally to keep that grassland healthy also just needs a little bit of extra care when we come back in the spring to make sure that there is at least limited fire risk. We can’t get rid of everything, but we can sure try. Additionally, too, I mentioned earlier over here at least, we’ve had some pretty powerful storms rocking through the area. Lots of winds, some tornadoes, those type of things. I’m curious if there’s anything that you think that we should be prepared for with this increase of moisture coming off of these drier years? Are there more concerns for flooding or are there just some other things maybe we kind of forget about when the precipitation increases?

**Darren Clabo:**

Of course, flooding is always a risk especially now that kind of the soil profile has been filling up with moisture. When we get these periods of one or two wet months, the capacity for the soil to retain that water just isn’t there and you tend to have a lot more runoff. I think runoff is one thing we have to think about moving forward. The other is just general severe weather safety and preparedness. Frankly, the past three years, and I know there have been some areas that have gotten some really damaging storms, we have the derechos come through a couple of years ago, but by and large, the severe weather threat has been somewhat minimal, but this year, and this goes nationwide, we’ve seen a dramatic uptick in the amount of very large hail, damaging wind gusts, and, I can’t remember the number off the top of my head, but way more tornadoes than we’ve seen in previous years. So again, going back to the situational awareness thing, understanding that just because the past three years you might have not had that tornado or large hail threat, that’s something we have to think about on years like this when we do have more active weather. So I don’t think there’s anything specific, but again, it just goes down to paying attention to the environment around you, understanding on days when if it’s not hot, dry, and windy, you don’t have to worry about fires, but I got strong southeasterly winds. The dew points are cresting over 70, I might have some big thunderstorms this afternoon.

**Madison Kovarna:**

I think that’s something, too, I could definitely get guilty of, especially the morning can be super nice and then that afternoon is typically sometimes when I see those storms kind of shock us and catch us off guard. So definitely some good points there of just making sure that we’re being prepared and keeping that safety in mind. I know a lot of us in the Midwest, we like to sit out on our porch and watch that big storm rolls through but maybe we shouldn’t do that. Definitely guilty of that on my end. I’m sure there’s a lot of people as well. Is there any insight on some future weather patterns that maybe have come up in the last couple weeks up until this talk here that there’s been maybe some potential trends that are being predicted by people in your space or maybe some things that are just looking like they may happen?

**Darren Clabo:**

Yes. As a general trend across South Dakota, if we look at the past, about 115 years of data, our temperatures overall on average haven’t been increasing that much. However, our overnight minimum temperatures and our temperatures in the winter have been increasing, which is interesting. If we think about what we say the diurnal temperature change, the day to night temperature change, the big driver of that is radiation, whether that’s coming from the sun or being emitted from the earth. The other thing is our night times can stay a lot warmer if there’s more moisture in the air because water vapor is a significant greenhouse gas. What we have been seeing across central and eastern South Dakota, primarily eastern South Dakota, is an increase in the overall water vapor content in the air so the dew points are actually staying higher which is keeping our overnight minimum temperatures higher and frankly, more humid. This is concerning because, obviously, hot and humid conditions especially if we extend them into multiple days or multiple weeks can have a huge impact on cattle and other livestock. Heat stress, heat-related illness, is a very real thing for all animals that walk across the landscape. So I think that’s the one big trend we’ve been seeing in terms of the climate over the past 30 or 60 years since eastern South Dakota is just an increase in moisture. Precipitation is increasing but the dew point has been going up as well.

**Madison Kovarna:**

It’s funny that you bring it up because that I was actually going to talk about this after you talked about how the overnight minimum temperatures have increased to what we’re holding when we cool down, when the sun goes down. We’ve been seeing a lot with our feed bots cattle across the state, those animals during the heat of the summer, they don’t have those nighttime windows to anticipate that heat and fully cool down, which can really impact their performance there. So keeping that in mind of a lot of our producers, what they can do is what we would typically tell them to do, is feed those cattle closer to nighttime so that they can use that time to cool down when they’re digesting all of that feed that we’re feeding them to grow, they put off a lot of heat themselves. So allowing them to dissipate that during the night is amazing. It’s one of the opportunities that we were given just given our location, but with that temperature increasing, it might change some management things there and the same with the humidity that you mentioned. With that increased humidity, the same thing, those cattle can’t dissipate that heat as easy like you mentioned that heat stress becomes really important especially as we kind of move towards some of those smaller things that may be bigger picture end up impacting a lot more than we think. One of the big topics that I was hearing all the time, late summer last year and into the fall, was whether we were going to fall into one of those El Niño or La Niña weather patterns. In your experience and knowledge, what are your thoughts on what pattern we can expect or maybe even what that means for producers or even what those patterns mean, those different namings there?

**Darren Clabo:**

That’s a great question. I’m smiling, half chuckling, because we call these things teleconnections. The phenomenon that goes on halfway around the world that impact our weather here in South Dakota. Just a quick primer on El Niño and La Niña, so when we’re talking about these two things, we’re really talking about the oceanic water temperatures in the central and the eastern equatorial Pacific Ocean. So off the west coast of northwestern South America, kind of that area. Over the past close to two years, I’d have to look at specifically the data, but we’ve been in El Niño situation with warmer than average sea surface temperatures across that equatorial Pacific Ocean. There are some changes that have been going on. We’re now quickly transitioning to a La Niña pattern. So there are some different things that this impacts. Basically, how the surface ocean waters impact our area in South Dakota is the alter the heat cycle, if you will, over the equatorial Pacific Ocean. So it depends on where the thunderstorms grow. Thunderstorms release a lot of heat as we convert water vapor into liquid water that releases heat, that heats the atmosphere in different areas, whether it’s the eastern Pacific or the western Pacific, which then, ultimately, alters the jet stream and of course, the jet stream is the primary driver of all of our weather here in South Dakota. So we call these teleconnections. There are other things going on too. There’s another oceanic pattern in the North Pacific Ocean called the Pacific Decadal Oscillation. We’re in a negative phase of that right now. So we’re trying to see what is a negative phase of the PDO, Pacific Decadal Oscillation? How does that go along with us transitioning from an El Niño to a La Niña, and how is that going to impact our weather? Long story short, there are some tenuous science that goes along with it but most of the impacts are really in the wintertime. So La Niñas tend to bring us colder than average winters and so it would not surprise me as we move forward into the fall and winter months if we do see some of those colder than average temperatures across the northern Great Plains. When we’re under El Niño conditions, things tend to be a little bit warmer in the wintertime. During either, we tend not to see too much impact in the overall weather across the Northern Great Plains in the summertime. It’s mostly a wintertime impact. Does that kind of answer your question? There’s a lot going on there.

**Madison Kovarna:**

Yes, I think it does. I think the biggest thing to remember with these patterns is, like you said, it’s something that’s happening thousands of miles away from us that are impacting us here. So while different states have different weather situations that are happening, we’re all kind of in the same boat that we’re relying on these different conditions that are happening in the oceans thousands of miles away. We’re landlocked in South Dakota so we don’t get to see a beach very often, but keeping in mind that what’s happening there is impacting us and just allowing that to help with these decisions too, is that we hear about them talking about these big picture weather patterns but they do impact us here on a smaller level based on the paths that those storms follow on that jet stream. When that jet stream drops, it brings down some of this northern air. If it raises, it brings up some of that southern air too bringing back that middle school climate lessons that you learn in Biology and those type of things, but just remembering big picture that those things do impact us here in our small hometown state of South Dakota. With that, we’ve been talking for about 20 minutes now, but what are some big take-home points for our state’s cattle producers specifically in regards to something that I call within, not only my job but also within kind of our groups here at Extension of weathering the weather? Are there some practices they can implement or ways they can remain in the loop with the changing weather predictions that we’ve been talking about? Just some of those kind of tidbits for them to take home.

**Darren Clabo:**

Again, going back to this idea of situational awareness, I think the best way to weather the weather is to pay attention to it, but also recognize that our ability to accurately forecast is dramatically better now than it was even a decade ago. We can look at 20 years ago on a three-day forecast, 20 years ago, we had about the same accuracy as a five-day forecast has today. I’m the butt of a lot of jokes. I’m a meteorologist. I still get paid and may be wrong half the time. The atmosphere is fickle. It’s a chaotic environment but it still has predictability, and so just understanding that if you’re looking at a three-to-five-day forecast, the specific details might not be there but the overall general picture is going to be pretty close to the result that you’re going to see. So have trust in those forecasts, have trust in the meteorologists that are out there. We’re trying to help everybody navigate, in our case, when it comes to weather, all the problems are dangerous or life threatening, whether that be hail or tornadoes or derechos or floods or fires, but just understand that the National Weather Service, our partners in the media, myself, we’re all working together to get the best information out there. The other thing I want folks to understand is that we love talking about the weather and we’re more than happy to chat with everybody. I’m going to speak out of the line a little bit, but I’ll speak for our partners over at the National Weather Service. They’re fantastic meteorologists and you can reach out to their local office and talk to them directly, talk to their forecasters directly if you have specific needs or problems, or if you want to go through a storm spotter class or anything like that. I think the big things is understanding forecast accuracy. It’s greatly improved with some of the new modeling systems that we have and just pay attention to it. It affects all of us. We, in meteorology, like to say you can’t go outside without dealing with us, so just pay attention and try to keep you and your family safe.

**Madison Kovarna:**

I always hear lots of guff from people around saying that the storms that the meteorologists talk up a lot seem to always be the ones that are pretty lackluster, but I always live my life being more prepared, better than not being prepared enough. So the work that you guys do on preparing the general public and the states, people and the producers and that type of thing, it doesn’t go unappreciated. I think a lot of us really like to know when that weather’s coming especially us in the ag sector. We like to have those projections there of what’s happening so that if we do want to, we can kind of see whether it’s going to rain or not and those type of things and temperature changes and things like that. I agree with you that making sure that we can tease you a little bit, but you guys are doing a lot more stuff than we kind of maybe give you credit for out in the world. You had mentioned some people that we can contact with any questions but are there any easy-to-access resources for people or producers to look at for weather outlooks and such, maybe some ones that are more reliable or ones that they can access and know that that information is safe and honest?

**Darren Clabo:**

Yes. If you’re just downloading an app and making decisions off of a weather app, I would say it’s probably not quite the right way to go. The best resource for weather information in the United States is the National Weather Service. They’re kind of the big ship in the sea and they’re doing a lot of really amazing things. You can go to their website, that’s weather.gov, and you can see their suite of products. They’re forecasting for what we call hydrometeorological or flash flood events, how much water is going to be coming down. They’re going to be forecasting for severe weather through their Storm Prediction Center. The Climate Prediction Center looks at 6-to-14-day outlooks and then months ahead outlooks or seasonal outlooks. They even have outlooks for temperature and precipitation for next winter. So I think the National Weather Services is kind of the big player on the block. You can trust their forecast. The nice thing about the National Weather Service is there’s a human behind every single one of their forecasts. It’s not just some generic AI-produced something that you got off your phone. In South Dakota, we have three Weather Service offices. One in Rapid City, one in Sioux Falls, and one in Aberdeen. They’re members of your community and they’re going to care a lot more than some machine in Denver does.

**Madison Kovarna:**

Yes, I agree. There’s something to be said about the fact that there is that human behind those things that are coming out and ultimately, what they’re looking at affects them and their family just as much as it affects the people that they’re providing this weather information to. Another little selfless plug is I know sometimes if I’m curious about maybe if there was some potential, how much rain came down in the general area or some different trends like that, I’ll access the South Dakota Mesonet system, that’s pretty easy. They have stations all over the state and they are looking for producers, too, to agree to put some of those stations on their land and those, too, give us a lot of information. They don’t necessarily do the forecasting piece but if you’re looking just on how things have been going, that’s definitely a good resource as well. I agree with you that National Weather Service, they’re the big dogs in the group, and they know what they’re doing, and they have the resources to do that. Before we wrap up, I just wanted to ask you, is there anything that maybe we missed in our conversation or just some things in this last little bit that, maybe, came to mind that you’d like to discuss?

**Darren Clabo:**

I’ll circle back to the South Dakota Mesonet, our state climatologist, Laura Edwards, her team has been doing fantastic work in growing our Mesonet and I am very appreciative of all the landowners and producers out there that have volunteered to put one of these Mesonet stations up on their property. We can’t do our jobs without data and that is incredibly important. The data that the Mesonet provides is incredible. It’s soil moisture data, it’s atmospheric data. They’re putting webcams on these things now so we can start to see directly what are the impacts of a warm snow event or anything like that. It’s helping my job immensely. So I think to wrap this up, you all at SDSU Extension are doing wonderful things and I appreciate the collaboration that we’ve been able to build.

**Madison Kovarna:**

It’s definitely been interesting. My Master’s work dealt with some weather correlations with how much cattle drink based on some temperature and other environmental factors and all that data came from the Mesonet system, so I definitely think it’s a great system. I think there’s a lot of things we can get from it. Like you said, it really just helps us become better with what we’re forecasting and those type of things as well. With that, I wanted to thank you, Dr. Clabo, for joining me today on this episode. It’s been very insightful especially for someone I like to understand the weather, but I was more interested in cattle when I was going through school, so I appreciate this conversation. I think it was very insightful, not only for myself but to our listeners that will listen to this as well. With that, this has been Cattle HQ, brought to you by SDSU Extension, headquarters for all things beef cattle. You can visit us at extension.sdstate.edu for the latest beef information and until next episode. Stay curious and keep learning.

**Kiernan Brandt:**

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