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Resilient ranching workshop: soil testing

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00:00:00:02 - 00:00:25:04
Unknown
We've got some stragglers, but I'm Annie Overlin with CSU extension. I also own and operate a business in Nevada. Where we do kind of ecosystem services with ranches and mining companies. Can you. Thank you. Patrick. I when I was in school, I basically learned about soil. You know, I learned at sand, silt and clay.

00:00:25:07 - 00:00:47:25
Unknown
And in the last, I don't know, ten years or so, Nicole might debate that. We've had this incredible, body of knowledge that has come to us and I'm so grateful that Nicole has taken so much of that body of knowledge and put it into a book. I cannot think of a better person to be here with us today to.

00:00:47:26 - 00:01:07:00
Unknown
You know, for me, it's this is the first program I've put on in a year and a half. And so it's just phenomenal that we have Nicole here to help us all collectively, you know, learn together. So that's all the introduction I'm going to give. But I'm just so thrilled to have her here. And here's Nicole. Thank you.

00:01:07:01 - 00:01:39:07
Unknown
Yeah appreciate that. Good morning everybody. How we feeling. Yeah good good good good. All right. So yeah, my name is Nicole Masters. I'm an agro ecologist. I've been working in this space for 22 years now. My background was in soil science. And I actually finished my degree. Promptly got pregnant. Is an immaculate conception and not really the thing I recommend to young people to do when they leave school.

00:01:39:07 - 00:02:13:02
Unknown
Right? And my father was actually a pilot at the time, and he said, let's buy a farm together. So we looked at all of these maps. We looked at, rainfall maps. We looked at what would be some of the best areas to grow

avocados and where the land wasn't already zoned for avocados. So we chose an area that was right up on the edge, was higher than where most people were growing avocados, and we brought that land together and that began the journey of thank you say green on green mix, black and blue when you're breaking in horses.

00:02:13:02 - 00:02:38:13
Unknown
It was a little bit like that. So neither of us had any experience in farming or certainly in horticulture. We planted 700 avocado trees. We planted 3500 wetland species and restored a wetland, of which a native bird came along and pulled out 2500 of those plants. So we actually planted about 6000 wetland species because we had to replant them.

00:02:38:16 - 00:03:03:08
Unknown
And when we planted these areas, it was amazing because what came in was, brambles. We have a plant called gorse in New Zealand, and it over grew everything that we'd planted. And was this covered in blackberries. We're like now that was a total disaster. And we left it. If you go to my dad's property now, which is 20 years later, it's a standing forest and we can see some of the trees that we planted, but also the native seed bank that responded.

00:03:03:08 - 00:03:31:16
Unknown
It was absolutely extraordinary. So I learned a lot in those early days. My father was very helpful. He set me up with a wind farm business because it's quite hard to find employment when you're a single parent living in rural communities. And so I started making a very high fungal vermaak. So when extract and what's really interesting is 20 odd years later, I'm still sitting ranches up with wind farms, which isn't what I thought I was kind of set out to do that.

00:03:31:16 - 00:04:01:26
Unknown
As far as I'm concerned, the elixir of life comes out of a wind, but literally like it has all the microbiology it has. Plant growth, enzymes, hormones, all sorts of things that are exactly what a plant needs to be healthy. Some of my biggest clients at the time had, dreadlocks and $50 bills, and they would tune up sort of later in the evening and buy them a cast, because to grow their specific crop, which is illegal in New Zealand, not illegal here.

00:04:01:28 - 00:04:19:26
Unknown
You have to be able to plant your crop and then walk away and not come back and check on it for like six months. So for the marijuana guys, it's really, really important. So they taught me a lot about thinking about biological diversity a lot. Often those marijuana guys, if they're not doing hydroponics, really knew a lot about soil health.

00:04:19:26 - 00:04:51:14
Unknown

So I learned some interesting stuff from them. And now with my company, Integrity Soils, we work, predominantly through Australia and New Zealand, North America, so up into Canada, and we work with nearly every sector. So if you have soil, we've got something to talk about. So it doesn't matter if we're talking about golf courses or racetracks or, cropping, horticulture, market, garden, sheep, beef, bison, whatever you got.

00:04:51:17 - 00:05:14:01
Unknown
I don't have any llama clients. I don't have any interest in having any llama clients, particularly, but pretty much every other industry. I think I've worked. And so I want you to feel like you can ask me questions as we go through today. All right. I won't go into this. So I just want to share a quick case study.

00:05:14:01 - 00:05:36:00
Unknown
So. England. Angus. Betsy and Roger England, they're up in Big Timber, Montana. They're. They're one of my original clients. When I first came to the US, I got invited to speak at ranching for profit in 2013. And these guys approached me. And what he said was, this isn't possible in our part of the world. And I was like, cool, why not?

00:05:36:00 - 00:05:58:29
Unknown
And he's like. Don't know. Come and have a look at my place and let's see what we can do. And so began a great friendship. So I've been working with them since 2013, when we started working together, what we found is, they plants had very low brix for alfalfa. So what's brix is? Anyone heard that term before?

00:05:59:02 - 00:06:21:00
Unknown
So, yes, sugar is very good. So brix is a measurement of, dissolved solids and sugars in the plant. It's a measurement of how well is that plant photosynthesizing. Right. So for alfalfa the brix should be 16 minimum. And then in rise through the day okay. So when do you think plant photosynthesis is going to be highest. Yeah.

00:06:21:00 - 00:06:45:05
Unknown
So mid-afternoon. So that's the time we're going to cut hay for cattle, whereas for horses you might cut that hay first thing in the morning and have less sugars. Right. And what was interesting is that Brix stayed the same throughout the day. Right. So it didn't change. It didn't fluctuate. There was a reason for that. I don't know if now's a good time to get into it, but I will,

00:06:45:07 - 00:07:15:26
Unknown
If you look, this is the time of day, and the plant is photosynthesizing. It is going to do a shape like that. And hopefully you're above 12 and you might go up to 16. Okay, so this might be 12 and 2:00. Right. What

happened at their place. And we measured this. Is that their brix. Stayed the same was 13 but it stayed 13 through the day.

00:07:15:29 - 00:07:41:10
Unknown
There's a mineral that's involved in moving, sugars through the plant. So it moves sugar through the plant and down the roots. Do you know what that mineral might be? I'm going to guess what it's a trace element. Oh, right. It's boron. The other way that we're going to know that boron is low, you'll see hollow stems in your alfalfa.

00:07:41:12 - 00:08:02:01
Unknown
So we have a reduction in the weight of the alfalfa when we harvest. So you'll see this in broccoli like in the store the other way you'll see it. Well here it is. Cows joints will click. So if you see if you listen for your cattle in here, is there a click. You guys might click too. Right. And it's a boron deficiency.

00:08:02:03 - 00:08:27:28
Unknown
So, as an interesting aside, I was working on a ranch that had huge abortions through the year due to, eating pine needles. And their cows are aborting any time of the year. Right? Every cow in that herd was clicking. You guys welcome. Come in and sit down. These seats right up front. Yeah, okay. Come here. They're empty.

00:08:28:00 - 00:08:46:16
Unknown
And I could hear it. And I hopped out of the out of the truck, and I said to the to the elderly rancher, can you hear those joints clicking? And he's like, no, it's it's their toes tapping. So for 60, 70 years, he's been on the ranch. He's heard this clicking sound all right. So we tested, we did a hair analysis.

00:08:46:16 - 00:09:05:06
Unknown
We tested forage. There was hardly any boron in that forage or in this animals. They were deficient in their hair. And then we tested the pine needles. And the pine needles had twice the boron that they foraged it. So the cattle were actually looking for boron, and they were eating the pine needles to do that. And as a consequence we were aborting.

00:09:05:09 - 00:09:22:29
Unknown
So to eat enough pine needles to cause an abortion, you have to eat about two and a half pounds, like it's a lot of pine needle. It's not just like I'm just having a nibble, right? So listen for that sound. The first time I heard it was really on dairy farms, because it's quite common in Dublin and milk production, they lose a lot of them.

00:09:23:02 - 00:09:44:27
Unknown

Anyway, I will go down rabbit holes. I apologize, I did that already. We haven't even started. Okay, so boron might be something that might be missing on your place, right? They also had very low nitrogen, phosphorus and low trace elements which are boron and manganese. And they had an excess of molybdenum. Do you guys have that problem here in Colorado?

00:09:44:29 - 00:10:10:25
Unknown
Yeah. Yeah. And what's the consequence of excess molybdenum. They don't serve anything. Yes. That's right. So it's a huge problem in Montana because cattle it causes an antagonism and cattle can absorb copper, they can absorb selenium. So we see trace element issues and in animal health issues because of this excess of molybdenum. Right. So these guys had very high Molly.

00:10:10:28 - 00:10:39:27
Unknown
They have very high pressure and very poor water infiltration in a lot of areas. Right. So what we did was I built a little program, it cost, it cost in total about $36 an acre. All right. So they've got, fish hydrology. Right. So fish is a concentrated this fish is a fish oil. It's concentrated in oils.

00:10:40:00 - 00:11:02:05
Unknown
It's a big biological feeder, but it's also very concentrated in plant available phosphorus. Okay. So when we're looking for a little bit of phosphorus, one unit of phosphorus in fish creates the equivalent of 180 units in a soluble phosphate chemical phosphate fertilizer, because it doesn't lock up. All right. So we see some amazing stuff with just very small amounts of fish.

00:11:02:07 - 00:11:24:08
Unknown
We base our trace element mix on the soil and forage tests. And then we added some humic acid. Some of these might be new words or terms to use. So humic acid is, chemically made off you mates, which are soft brown coal. What is a soft brown coal. It comes from. Layer. Right. Yeah. So linear diet.

00:11:24:08 - 00:11:47:27
Unknown
Yeah. So we have linear and lignite seems here in the US. Where did that material come from. What's it made of. Carbon plants. Kilometers of plants that were laid down in that Carboniferous era and then compressed and concentrated. And so what we get with this soft brown coal is a very concentrated carbon form. Biology go nuts when we put it out.

00:11:47:29 - 00:12:22:20
Unknown
All right. So we put a small amount of that humic acid in. And what we set up was a conventional trial that was just using nitrogen, phosphorus and potassium inputs. And so we made a sprayer. I say we very liberally.

He made a sprayer. This sprayer, cost just play. This sprayer cost him a $5,000 to build the entire thing.

00:12:22:22 - 00:12:49:26
Unknown
It has a single nozzle that so one fifth of an inch in size, and it can spray as wide as. I have to put everything into American 16m, which is 50ft, 50ft. All right. So a 50ft wide spray on there. But what's cool is we can put Vermeer cast. So we actually put castings like anything up to half up to a fifth of an inch in size.

00:12:49:26 - 00:13:20:01
Unknown
We could put in this. We're putting seed into this. Everything's agitated inside of it. So he just got a recycled, dairy tank, dairy milk tank. But the benefit of it is, is you're basically coating seeds with microbiology and setting that up for success. While we were doing this because we're doing a workshop, he said, so I throw some oats in there, and I said, well, probably not, because oats are like that big, you know, the whole thing.

00:13:20:01 - 00:13:38:27
Unknown
So he said, I'll just try a cap. And I'm like, cool. And I turned around and you know what he was doing, right? So the whole bag went in. So this first pass is he came past us, he blocked, and he spent the next half an hour, blocking all of his nozzles. Right. So we try not to put really, really big stuff in.

00:13:38:29 - 00:13:59:23
Unknown
Okay. So we did a forage test to look at what was the difference. So sometimes you will do a trial and the grass doesn't look any different. You've got to be asking the question of what's the impact on livestock. What is their experience of this forage. So the first graph line here is what a supreme alfalfa would be if you're selling that to race horses.

00:13:59:28 - 00:14:27:15
Unknown
Right. So you want your crude protein above 22%. The alfalfa was 30. Now remember this is a grass and alfalfa. It's not pure alfalfa. So we're not making cows explode because you could maybe that control was at 22. So just under point one under acid detergent fiber. You want that under 27? Under 27%. That's the stuff that's going to, you know, help you you need fiber, right?

00:14:27:15 - 00:14:47:08
Unknown
The rumen needs fiber to digest. You don't want too much because that ends up being, it's going to slow digestion down. It's going to slow metabolism down. It's going to slow production down. Right. It's been more time trying to digest this stuff so it's less digestible. Neutral detergent fiber, same thing. So fiber. We want it below 34.

00:14:47:15 - 00:15:10:26
Unknown
This is below 34. That's at 37 total digestible nutrients. We want that above 62%. So what's the nutrition in this for? For cattle. And we're at 72 compared to 62 now. This is the best bit the relative feed quality. So that takes into account all of these different aspects of your forage should be over 180. It's a 222.

00:15:10:29 - 00:15:33:12
Unknown
So they've taken it from 155 to 222. What does that look like in the field? Animals are going to spend more time lying down. They're going to spend more time ruminating. You're going to get better weight gains and you can carry he started to lift on the same field. He lifted his carrying capacity by 25%. Even though the fields look the same, right?

00:15:33:12 - 00:16:05:07
Unknown
Doesn't visibly look like he was growing any more forage. But for the animals he is. Any questions about that? So okay, we looked also at what was happening with nutrition. There should be another line in there. Anyway, just to take my word for it. Oh, notice that's the control, right? That's the NPK. So significantly lifted phosphorus. This line here was actually getting phosphate fertilizer.

00:16:05:10 - 00:16:28:23
Unknown
Right. So phosphate was being applied to here. But the phosphorus went from point three basically to point four with only one unit of phosphorus applied. Okay. What we're doing is we're stimulating the biology that make phosphorus available. All right. And then we, lifted the potassium. We actually dropped the calcium, which in this case was ideal, right. That calcium was an excess.

00:16:28:25 - 00:16:47:06
Unknown
Yes. So to the last slide, when you had all those numbers for those, tests, you can get on the simple board. That's right. Yeah. This would be a hay analysis. So this is our wet chemistry, what you would do for a hay analysis. But I'm I'm doing it I'm doing these are two tests. Basically this is what you would do for a hay test.

00:16:47:06 - 00:17:07:23
Unknown
But we're doing it on a plant that's growing. And this is your just your mineral leaf test. So there's two tests and I put them together. If you send it toward, laboratories. It's called the Integrity Soils leaf test. So ask for my leaf test. So it gives us both parts of that story so we can have a look at what is happening nutritionally for the animals.

00:17:07:25 - 00:17:33:22
Unknown
And what kind of effect is that going to have? So with that, just one application, single application application. So after we did this

application, his tonnage went up by the equivalent of one ton per acre, which paid for ten acres of treatment out on the rangeland. So we're paying it forward. So what I find is most people when I start with them, I say, where should we start?

00:17:33:22 - 00:17:51:19
Unknown
They always give me their worst land. Thank you. Great. Really appreciate that. But I find if we can start with your best land, we can start to generate more yield. We can start to generate more quality and then pay that forward to pay for improvements we might want to do on the rangeland. Right. Not saying that we would.

00:17:51:21 - 00:18:21:11
Unknown
These guys have been doing holistic grazing since 2012. That very good grass managers. But they'd only just started changing the grazing when when I arrived. Right. So these days, a one ton of, Hey, what's it worth right now? It's 200. Yeah. So to do that in this season, then that would pay for 20 acres. Because what we're spending on the rangeland is about ten, $10 an acre, right.

00:18:21:11 - 00:18:40:05
Unknown
We're not putting the same program on. Yeah. So what time do you have a specific time a day or so. Some year that I wouldn't worry about the time of day because you get your underpants in a twist trying to manage that. But, in the growing season so early in the growing season, if you can, if you can do this.

00:18:40:07 - 00:19:00:01
Unknown
Well, I've noticed as I've got older and you might notice the same thing as you get, I've got lazier, right? So, we're putting things in the irrigation ditches now, so we actually have six of them, a cast that sit in an irrigation ditch or sit at the dam so that we can flood biology out with that water.

00:19:00:01 - 00:19:19:10
Unknown
Or if you have a pivot, you can plug this straight into the pivot and actually get the pivot to spread a lot of things. And we're using cows. So using cattle to actually spread nutrition or using probiotics and prebiotics. So finding other ways to get biology out without necessarily having to invest in the spray okay. And you can ask me about that.

00:19:19:10 - 00:19:42:14
Unknown
So we did a different program out on the farm grounds. Now for the entire time I've been working with these guys, the farm ground is their worst ground. It should never have been cultivated. And it's been in poor shape for probably 30 years. And all it grew was this is a yellow alyssum, and fan weed and I think a little bit of smooth brome, but that was about it, right.

00:19:42:14 - 00:20:01:05
Unknown
And just, it just never produced anything. He barely grazed it. It was just horrible. And cattle were not happy in these fields. They just roam the fence line looking to get out. So I've been pushing them for a long time to do something about the farm ground, but it just never was a priority. So what we did was 2 pounds of a cast again.

00:20:01:05 - 00:20:22:10
Unknown
We put in a little bit of fish, we put in some molasses, right. And then down the drill, drilled in other if you can see that there's actually lines here into that. Into this stuff. And we planted winter raw and vetch as a full seeding. All right. But the important bit in here is this Vermeer cast.

00:20:22:10 - 00:20:46:00
Unknown
Right. So he started to make his own worm castings. This is what's crazy is worm castings you can make from anything that you've got that comes out of like your feed, like, so you've got yards or you've got a feedlot or you've got areas where animals come in and you've got all that manure, all of that, straw and hay and any of that kind of waste product is what worms feed on.

00:20:46:02 - 00:21:16:11
Unknown
All right. And you've got these piles of manure sitting around that aren't breaking down. Now, a cubic yard right now of them. A cast is selling for $1,700, $1,700 out of what was your waste product that came out of your yards, right? I've seen it anywhere between 300 to $1700. It's black gold. Roger. That can be a little bit slack about feeding his worms, but we calculated that every hour he spent with his worms was generating $500.

00:21:16:13 - 00:21:41:14
Unknown
It's a $500 an hour job for something that he's he doesn't want to sell because he's using on his own farm ground. But 30 kgs. We dried that, put it down the fertilizer box. Really easy to to use. We didn't have any problems with blocking up and then put down this one to crop. Now, the following season we did get rain and rain, as we know is the magic or elixir for life.

00:21:41:17 - 00:22:03:26
Unknown
But these farm grounds for 30 years have not grown anything, right? And if they do grow, it might be sweet. Clover you probably get sweet clover blowing up, but that's about it. So this is a video of us driving across that same field, which which hopefully just flies. And so you can see the, you can see the winds Orion there.

00:22:03:26 - 00:22:26:29

Unknown
But what happened is the alfalfa just exploded. I need to turn these lights off. And you see that? Okay. So there's a sweet clover in there. There's alfalfa in there. But what came away with a whole lot of native grasses, and a native, flowering species. And admittedly, it was a good year, but it's maintained since this is 2018.

00:22:27:01 - 00:22:47:24
Unknown
We're still seeing the diversity like this in these fields. We didn't plant any of this. But what's happening is it's responding to the signal from the past. All right, so signal, the cast is full of biological signals that tell a plant to germinate. And I'm going to show you a few examples of this. But think about it.

00:22:47:24 - 00:23:10:29
Unknown
When you look across your land. What? I see your fingerprints. All right. What I see is, well, this might have been a result of, you know, some climactic variation, but you've been overgrazing here or waterlogging here, or, we've got clay soils or whatever it is, but you can see these patterns by what grows, because what grows is, is growing there because of a signal that it's receiving.

00:23:11:01 - 00:23:37:20
Unknown
Okay. So the signal that that we shifted shifted a whole lot of stuff on, on, on this ground. So there was a dramatic increase in plant quality, the diversity in density. What was fascinating, though, is we dropped that excess molybdenum by 90%, that molybdenum went from 8.5 to 1.4 parts per million. So we've got two transects, monitoring transects on this farm ground where we did treatment and without treatment.

00:23:37:26 - 00:24:02:19
Unknown
And I could show you, I could show you pictures. The area that didn't have any treatment was just covered in sweet clover, and that's all that grew. Yeah. And in the wet year that had some, western wheat. But that was about it. All right. Big decreases in phosphorus and nitrogen. But this stuff we have, I work with him on an advisory board, and there's a veterinarian who's on that board, and she said, that's a game changer for Montana.

00:24:02:21 - 00:24:24:29
Unknown
If we can drop molybdenum like that, it's a game changer. Right. And there's something that we're doing with the plant that enables that plant, that then dictate how much molybdenum is coming in. Right? So the plant can choose to not take up an excess. We we saw, soil building processes kick start. We measured fungi and bacterial activities lifted.

00:24:25:01 - 00:24:48:16
Unknown

And this germination of that latency thing. So we're going to talk a lot today about microbiology. Yes. This molybdenum get found by something else. Or is it just because the other nutrient ratios are coming up. It's because, there's there's quite a few different things going on. But one thing is that these plants develop what we call a rhizome sheath, so the plant can actually defend and protect and choose.

00:24:48:19 - 00:25:15:06
Unknown
So what we have in most agricultural systems and most ranches is we have naked roots. If you dig a hole, you'll see, these naked little roots and. So root systems will look like these spindly little things. And we see this 99% of the time of plants that we go and dig up on rangeland is you guys have naked roots.

00:25:15:08 - 00:25:43:11
Unknown
What we want to see is what we call the riser sheath. Right? So this is soil that sticks to the to the plant. I'm going to put the good plant because it'd be healthier. And I'll show you some pictures of that. And we will see that today. And so you're going to start to look for that rhizome sheath, because that's what moves the plant from basically a hydroponic condition where it can't control what comes into the plant to something that can defend itself.

00:25:43:13 - 00:26:14:06
Unknown
Okay. And I'll show you some pictures. That's cool. So I want you to consider that microbiology is everywhere, right? There's no system that doesn't have microbes on it right now. If you guys all disappeared and just left behind your biology, we could see an outline of, like, nematodes, bacteria, some of these fungus, perhaps. All right. And you're going to leave that pattern because you're totally covered in microbiology and you have about two and a half pounds in just in your gut system of microbiology.

00:26:14:06 - 00:26:49:07
Unknown
And this is where we're seeing the big breakthroughs in research right now is understanding that human gut microbiome and how important it is. So they say 100% of immunological disorders relate to gut health. So immunological means anything that's causing inflammation, allergies, asthma, arthritis, memory to think memory. Acne. Anyway, there's a very, very long list. Basically, everything we seem to deal with, is to do with gut health.

00:26:49:09 - 00:27:18:06
Unknown
So the breakthroughs that we're seeing in medicine are reflecting the breakthroughs that we're seeing in terms of, soil health, because this microbiology is absolutely essential for crop health. So I want you to consider so there's microbes everywhere, but, we'll get we still get microbiology in a disturbed soil. So what's going to disturb us? Soil is what I mean by disturbed.

00:27:18:08 - 00:27:48:29
Unknown
Yes. So cultivation would be a big disturbance. So grazing could be either a a positive or a negative disturbance. But yes. Totally. Yeah. What else is a disturbance? Can't say your mother in law can't block blood or. Blood or just, poor water management.

00:27:49:01 - 00:27:54:10
Unknown
What else are.

00:27:54:12 - 00:27:58:10
Unknown
Fire and drought. Yeah.

00:27:58:12 - 00:28:03:12
Unknown
Yes.

00:28:03:15 - 00:28:34:02
Unknown
So, equipment in what way? Tractors or so. Compaction, let's call it. Yeah. So in those herbicides, I'd add any asides. So that'll be pesticides or fungicides. What else? When killing wind. So, Yeah. Tillage will put with cultivation.

00:28:34:04 - 00:28:47:00
Unknown
Synthetic fertilizers. All right. So synthetic fertilizers are a really big, soil disturbance.

00:28:47:03 - 00:29:13:22
Unknown
What do you notice about most of those things on the list we pay for? Oh, you pay for them? Yeah. Not quite. Not quite. So common use of all of them. Most of these are what we call modern agriculture. All right, so it's modern agriculture that's led to what we think of it is disturbance. So every year we might be applying a herbicide or they might be cultivation, they might be overgrazing.

00:29:13:25 - 00:29:40:02
Unknown
You're thinking of overgrazing. What does overgrazing mean? What's the literal definition of overgrazing. But you take I'm sorry, the plant ceasing, biting the plant too soon so that too much of the plant often diminishes the ability for the site to regrow itself, and it takes away the reduction. So if we take too much of the plant off, is that overgrazing?

00:29:40:05 - 00:29:59:15
Unknown
No no no no it's not, it's not it's the it's the time to recover. Right. So so is it before fully recovered fighting a plant before it fully

recovers. So if you have a very, very large field and, and the plants are in the active growing stage, you might see that plants are growing, recovering while the animals are still in there.

00:29:59:17 - 00:30:23:18
Unknown
That's the definition of overgrazing because they're going to come back and bite that plant again. Oh delicious. It's very tasty. At that little reemergence stage. Okay, so it's that it's not say how much we take if you're going to take off more than you're going to leave it for longer, right? So just thinking about that as a disturbance, it's probably the biggest disturbance in grazing, obviously.

00:30:23:21 - 00:30:51:23
Unknown
You know, things like fire can be very impactful, but we could even see fire as being a modern, phenomenon as well, because we're getting these hot fires, unmanaged fires, unmanaged forests or other. Yeah. So there could be still 5000 species. In a teaspoon of soil and that biomass. So kilograms per hectare is the equivalent of one jersey steer.

00:30:51:26 - 00:31:15:26
Unknown
So you need to divide that by 2.5 to get that in acres. So so it's a what is it. It's a third. Basically this is say it's a third of a Jersey steer per acre. Just to make the math easy. Right. So then if we have a soil that's healthy, could you plug that in for me. Foreign.

00:31:15:26 - 00:31:40:23
Unknown
So thank you. Then we could have as many as 25,000 species. Now, we're not talking about individual organisms, but species. And they could be as different as llama to bison to human to monkey to plant species. Why is it so much diversity just in a teaspoon of soil? Why is most of the diversity on the planet and soil, where all the food is there?

00:31:40:25 - 00:32:08:12
Unknown
Yeah, where the food is, where it all starts, where it all starts. Keep things in check. You know, it's it. Soil is the most important ecosystem on the planet. It's what regulates climate. It's what keeps water clean. It's what drives healthy food and all the rest of it. Microbiology and here are going to respond to fluctuations in temperature or nutrients or water, or respond to a different type of plant that's signaling to it.

00:32:08:12 - 00:32:32:20
Unknown
Right. So huge amount of diversity in there. And it's the equivalent of five Angus bulls a hectare. Oh that math is really hard. I should times it I think. So if I times it now I'm not going to just go into diesel. Right. Just catch up with the rest of the world. Is it is it? You and Bulgaria are the only ones that use pounds.

00:32:32:22 - 00:33:00:00

Unknown
Anyway. Yes. Fine. That, that ratio, you know, species in certain versus healthy soil. Does it change much if you're in dry soils? You know, just like the, Earth, geography versus, moisture. Yeah. Yeah, yeah. So drought is going to play a role, but there's ways that we can rehydrate dry landscapes. So unless you're just in a desert, there's things that we can do out here.

00:33:00:02 - 00:33:15:04
Unknown
So even in semi-arid landscapes, we can still rehydrate in terms of building carbon by building organic matter. So there's things that we can do here. With any issue here.

00:33:15:06 - 00:33:42:22
Unknown
History printers. All right. Carrying A01. Oh, no, that sounds like panic stations. We won't bother here. Okay, so this is, one example of the these riser sheets. Right. So seeing where, soil really clings to roots, this particular example, is a dairy farmer work with a New Zealand. They lifted their bricks from 7 to 21. You can taste it right.

00:33:42:22 - 00:34:10:19
Unknown
It's so sweet that that pasta. We. You almost wanted to make a fruit salad. Like a salad out of it. Take it home and eat it. All right. Super sweet. And what's interesting is he has some very degraded soils where they're running at seven to those that are running at 21, when he brings the cattle into these fields of the cows, he makes an additional $3,000 a week in income on milk, solid production.

00:34:10:21 - 00:34:43:03
Unknown
Then when he drops it down to the low brix. Okay, so there's a direct relationship to bricks to milk production and to meat production. So the meat production has been calculated, as being every one degree that we lift in bricks equals 0.1 of a pound of weight gain the animal per day. All right, so if you take your bricks, using, Roger England's example, he went from 13 bricks to 20.

00:34:43:05 - 00:35:06:23
Unknown
Then that's the equivalent of 0.7 per pound per day. He's not finishing. But as a finisher or you wanting to fatten calves, get bigger calves earlier. This is the secret right way to lift nutrition and lift quality. How we do that and part is through these signaling metabolites. Okay, so the plant is actually sending out all sorts of things every day.

00:35:06:23 - 00:35:26:04
Unknown
It's communicating to microbiology, right? Just like your gut is communicating to your brain. And they're actually saying now that your gut is your primary brain, they see that response has actually happened in the gut before they happen in the brain. Just kind of freaky. But the

same thing in the plant, the plant outsources its stomach. It's not inside its body.

00:35:26:04 - 00:35:45:22
Unknown
It's outside of its it's so inside. It's outside. So it will send signals to say, I'm under attack or it's getting quite dry. Can you provide me with this? Can you give me more water? Can you give me zinc? Can you give me phosphorus? All right. And many of the defense molecules that the plant needs to defend itself.

00:35:45:22 - 00:36:10:06
Unknown
So salicylic or jeselnik acids are stimulated by microbiology. So it's a it's a pathway that goes both ways. Right. The plant signaling to microbiology. The microbiology signaling to the plant okay. So if we can figure out how we can trigger some of these signals then we start to see real health. So one of the processes of what they call quorum sensing.

00:36:10:09 - 00:36:36:08
Unknown
So signals that biology used to turn on or off. So they discovered this first in the 1950s looking at bioluminescence. You know if you guys ever been to the beach it's a lovely place. You can go in the evening sometimes and you splash in the water and everything lights up with this bioluminescence. And they were trying to figure out how do those microbes or those phytoplankton know to communicate and light up together.

00:36:36:10 - 00:36:56:28
Unknown
So they found that when you reach a certain population, microbes can signal to turn on or turn off or have different genes expressed. So imagine you have like a strip organism in your throat. And it's not virulent, right? You don't feel a sore throat. At a certain point you get enough and suddenly you feel sick. All right. It's the signal to turn on that.

00:36:56:28 - 00:37:25:01
Unknown
The biology now turned into violence. So they discovered, a signal, a chemical signal for cholera. You can drink this in its parts per trillion. And it tells the cholera in your gut that there's too many of the cholera, and it flushes out of the body. Right. And that was invented like five years ago. They're still not making it free to anybody, though I've noticed anyway, that chemical signal is the same chemical signal that we can apply to a plant to turn off botrytis and grapes.

00:37:25:04 - 00:37:46:22
Unknown
But it's the same chemical signature, which is kind of interesting. So ants and honeybees use this signaling to communicate to each other. And what we're seeing is this is how biology and microbes and the plants are communicating. So when we're putting out I talked about we were we put out onto the rangeland, we put 2 pounds an acre of them a cast.

00:37:46:25 - 00:38:15:07
Unknown
And you're like, that's just silly, right? We're talking about fairy dust and unicorn horns at this point, right. Horn that it once. Obviously it's all right. And so we are harnessing these chemical signals. They are parts per trillion. Putting them onto landscapes and seeing biology respond. And we're doing this in semi-arid environments. We're putting small amounts of these signals onto rangeland to create a germination response.

00:38:15:10 - 00:38:37:21
Unknown
Right. And I'd say I work with probably some of the best holistic graziers in the world that are already doing a brilliant job with grazing and have been for like 30 years, and now they've hit a plateau. And now we're finding there's another level we can get to from addressing what's the missing link? What is it that's not working so well and addressing that, and then suddenly things take off.

00:38:37:23 - 00:39:01:03
Unknown
So I'm talking about bacteria a lot today. So just so we're all on the same page, bacteria and archaea look very similar. They're totally different organisms. They're not even related. But, you know, they look like these tiny little dots that that video plays. So that all over you most simplest, most common organisms, they're across every environment.

00:39:01:05 - 00:39:31:08
Unknown
They're very important. And suppressing disease very important and breaking stuff down. That video didn't last, you know, very important in forming the small aggregates in the soil. And this is the bit that's important for you to get is so bacteria, they make the small aggregates. So if we see a soil that we would call structures this is a bacterial soil.

00:39:31:10 - 00:40:00:02
Unknown
Right. And what we'll find is it forms crusts. So we might see crusts on that surface. Or you've had a heavy rainfall and you get all that crusting or that slaking effect. They can move with water and form hard pans. So we get hot pans, we get compaction. You might see moss or lichens or those kind of things growing on that surface.

00:40:00:05 - 00:40:31:27
Unknown
Moss, whatever. These are all indicators that we have a very, very bacterial soil. Okay. You might also see cheatgrass in this space. Cheatgrass loves very bacterial soils. Cheatgrass. Madusa here Vince not Japanese brine or really love these highly bacterial soils. Okay. So they form the small aggregates. So when we think about building a soil, bacteria make the sand to form the bricks.

00:40:32:00 - 00:40:53:22
Unknown
Right. So they're just making the bricks. I want you to think of them in terms of they hold on to nutrients but they don't give it up. So we get nutrient and mobilization. So inside the body of a bacteria will be phosphorus, will be nitrogen. And it's locked up. Right. So that the bags of fertilizer in the shed unopened.

00:40:53:24 - 00:41:22:09
Unknown
Okay. So what we get is, soils that are very mobilized. So we have very low phosphorus or very low sulfur in these soils, very poor nitrogen, poor growth, poor carrying capacities. Right. So you might have in New Zealand we took animals per acre. You guys took two acres per animal. Right. So you might have like in Western Australia, you might have 5050 animal stock units per acre.

00:41:22:16 - 00:41:46:28
Unknown
No other way around 50 acres per stocking. That's right. All right. So as we start to as if you have these bacterial soils that nutrients locked up okay. So it's important factor to look at that very important in the nitrogen cycle. So a lot of our organisms and soil the free living ones are doing that nitrogen cycle. And they consume simple sugars.

00:41:47:00 - 00:42:14:24
Unknown
It's what they like to eat okay. So thinking of simple sugars they're going to eat more simple green materials okay. So that might be plant material in that very active growing phase. Or molasses or sugar or milk seaweed manure or urine. Folic acid is another component of that humic acid. And they love many of this. So when we do these things, we stimulate bacteria.

00:42:14:26 - 00:42:39:03
Unknown
Okay. So bacteria will eat fungicides and pesticides. All right. They'll eat the herbicides. They love it if you're applying urea. They love it. All right. Cultivation. Boom. We get a whole lot of bacteria in that system okay. So we create systems that have more and more nutrient being locked up. So you're the head like a big pile of grass clippings and you put your hand inside it.

00:42:39:09 - 00:42:54:04
Unknown
What does it feel like? Why is it all of, off of it's composting? The great bacteria breeding. And when you reproduce, right, you make a lot of heat.

00:42:54:07 - 00:43:18:11
Unknown
Not here. Right. And other places make a lot of heat when you reproduce. All right. So these bacteria reproducing, metabolizing, making a lot of heat okay. So very important and soil important for our composting type

side of things is Steve here. Yes right here. So Steve, I was thinking last night around your big pile, the around the woodchips is I would put molasses out there.

00:43:18:13 - 00:43:37:14
Unknown
I want to put some molasses over all that woodchips that you've got and just help break that down and convert that. And it would be there. Would love it. Some molasses. Okay. So that's going to speed up that breakdown process. So we've got a lot of woodchips. It's very carbon based, a very cellulose and lignin. It's hard for bacteria to eat it.

00:43:37:14 - 00:44:04:27
Unknown
So we put molasses in there just to, to to trip it off. Yeah. Yeah. And he's got a lot of woodchip that's really awesome. But it's not moving super fast okay. So then our fun guys. Just a note about cell phones. Sorry. No, it's fine if you just want to turn them to vibrate. Whatever you like.

00:44:05:00 - 00:44:28:09
Unknown
If your phone goes off, you're only a bottle of tequila. Just saying. And I said that in Australia once, and the Governor-General was in the room. And you know whose phone went off, and he brought me the nicest bottle of tequila. Like, I'm just kidding. Not really. I'm just kidding. But, yeah. Anyway, it's helpful. Okay, so thinking of our fun guys.

00:44:28:12 - 00:44:52:18
Unknown
They're also very important in suppressing disease. They also retain nutrients, but they make them available to the plant so they'll slow nutrient losses down. They break stuff down, they form the soil macro aggregates. So when we're thinking about what we want to see in our soils, we want to see the large crumbs.

00:44:52:20 - 00:45:19:23
Unknown
Okay. And so those crumb structures. So they form these structures. So when we want to see when you dig your hole is that soils look like I say chocolate cake I've heard Gabe Brown say brown cottage cheese which is visual and disgusting. So we come going with chocolate cake right. So they will actually bind the small aggregates together.

00:45:19:23 - 00:45:43:11
Unknown
So the small aggregates from the bacteria in here and they form those crumbs. So have you guys seen those dust storms that have been happening. Holy Toledo. They're going all the way through Alberta down to Montana. Colorado. Yeah. You can see them on satellite images this past winter. And last year was just a little fall was covered in dust.

00:45:43:13 - 00:46:18:21
Unknown

Right. The reason for that is this we get bacterial soils, they don't stick together and they blow. So they could blow away or wash away. Okay. So when we see that. So I think across the US you guys lose 6.7 billion tons of topsoil every year. The average ranch is losing four tons of topsoil an acre a year on some of the places in Iowa, they're losing between 50 to 100,000 pounds of soil an acre.

00:46:18:23 - 00:46:40:19
Unknown
So think that that ton of soil is the equivalent of a sheet of paper. So what's happening is you guys are dying by a thousand papercuts, basically, is that every year you're losing another sheet of paper and another sheet of paper, and it's happening unseen. Except we can see it. It's in the dust and it's in the color of the water behind the water.

00:46:40:19 - 00:47:13:25
Unknown
Tanks are that much taller than the soil, and the water tanks are taller and the fence lines are dropping. Yeah, right. So the reason for that is we're driving this okay. And we drive this through these these actions. Okay. And it. Can I get a bottle of water, please. Thank you. So when we get funky in the system and we've actually done erosion programs and these highway stabilization programs that just spray fungal foods and fungi on the highway side, whatever that is, side of the road to stop them slumping onto the roads.

00:47:13:29 - 00:47:38:19
Unknown
Right. It's not roots that hold the soil together. It's fungi, okay? And they make glues and waxes and they stick everything together. Work at it with David Johnson, who's been here in this area, has shown that yield has more to do with active fungi. And we're going to see that today than it does with NPK. So he did a study comparing, nitrogen on a cover crop.

00:47:38:19 - 00:48:05:02
Unknown
And he grew 32 tons of dry matter. I'd say it was per hectare. Not I guess, compared to high fungal compost. Where he grew. No, it wasn't 32, 22 because he did 32 ton with just high fungi and no NPK. Right. As we start to live fungal activity in soils, we see yield and we see water holding, right.

00:48:05:04 - 00:48:28:16
Unknown
These landscapes used to be very active, and part of that is they build this porosity. And if you can imagine water trying to move through that system, this one water is going to move across and it might sink down a little bit. And this one, the water weaves its way through the soil. Which makes it very hard to evaporate.

00:48:28:20 - 00:48:50:03
Unknown
In these systems. Water is lost very quickly. All right. So we have soil systems that just lose water to evaporation okay. That picture there.

Thank you is actually my Vermeer cast. So like I said I get lazier as I get older. We used to make them a cast. I say we my husband had nothing to do with it.

00:48:50:04 - 00:49:18:07
Unknown
All right. To say, ex-husband. Anyway, so so we. Yeah. I would put the, I would order 200yd³ of wood chips, all right? And they would arrive at the farm, and then I'd spray some fish and maybe put some manure in there, but not very much, and just leave it to mature. And I was using what we call white wood species.

00:49:18:07 - 00:49:41:25
Unknown
So things like your aspen, your old olders, your cottonwoods, poplars, willows those species breed fungi like no one's business. All right. And so they start to break down, and then I throw worms at it. Right. And just make sure it had some moisture. And so what you're seeing here, this is the Verna cast. This is the fungi. And these is the woodchips.

00:49:41:25 - 00:50:06:10
Unknown
This is a high fungal firmer cast. This is the stuff that's going for $1,700 a cubic yard. Right. You want to see stuff grow, right? You want to see stuff grow healthily? Okay. So. And then what would you do with it? It depends. In the early days, I was selling it, then I got lazy. So was this using it on the farm?

00:50:06:12 - 00:50:28:08
Unknown
So take it out and. Put it out on the windows and broadcast it. So I, I could leave it in windrows. I actually would put the pigs on it, too. So I bring pigs in. They'd stir it all up. They they eat so much of it. It's crazy how much of this woodchip the pigs will eat and fatten overnight.

00:50:28:11 - 00:50:52:29
Unknown
The little sumo pigs. And then this could be applied as a liquid. And the extracts. What did you guys use? I'll use any. What were you using, Steve? 16 gallons. But how much? How much compost was in that? What we're gonna go look at now?

00:50:53:02 - 00:51:26:16
Unknown
Okay, it's a couple pounds. Maybe. Anyway, I'll go off. I'll go with what we were using. So we were using anywhere between 2 to 20 pounds an acre of this material. I would sieve this or put it in a burlap sack into a sprayer. But I have a sprayer that had the nozzles, that's fully agitated. So we were putting seed, and this out through the sprayer.

00:51:26:18 - 00:51:50:29
Unknown
Sometimes it's our department uses to spread the hydro blasting. No different nozzles. Yeah. You can't buy these nozzles here, but a lot of

guys I know are buying them from this developer in New Zealand who's actually from Salt Lake City. And they moved to New Zealand 25 years ago. But he's got the most amazing nozzles that you can't get these nozzles here.

00:51:51:00 - 00:52:08:06
Unknown
Okay. You might tell us this. Yeah. What do you what would you like to see is the carbon to the bacteria as a form of ratio. Because yeah, we're going to get to that because we're going to look at the test results that we've got here. So that's really good question. Right. So fungi break down the more complex stuff okay.

00:52:08:07 - 00:52:38:12
Unknown
So the cellulose the lignin. So the things that's in woodchips the concentrated cabin that's inhumane. So biochar woodchips stubble straw fish oils whatever. This organism here is it's called an inter mode pathogenic fungi, but it's also known as cordyceps. You guys have these fungi, in America, they live some of them live inside plants, like an Indian.

00:52:38:14 - 00:53:07:04
Unknown
And when a plant comes to chew on it, it grows inside the insect that's chewing. So they really target, chewing insects. We've been applying this. So that example with Roger England, we use this product on his fields to control alfalfa flea and clover weevil and alfalfa weevil. They will not live in these environments. Okay, so they are naturally occurring fungus.

00:53:07:06 - 00:53:24:04
Unknown
This one's kind of neat because it gets inside, the brain of the ants, and it tells us to go up to the top of it, changes its brain chemistry. Says climb to the top of a leaf, gives it lockjaw on top of that leaf, and then sprouts at its head. So cool. There's another one that gets inside.

00:53:24:04 - 00:53:31:23
Unknown
The ant tells it to go home to the Queen, and when it gets there, it explodes like an ISIS bomb at work.

00:53:31:25 - 00:54:03:00
Unknown
Sorry, that's not very appropriate, but, All right. But these we have these microbes naturally, in Montanan soils, you have one that actually infests, caterpillars. They will infect grasshoppers. All right. So we are missing that when this happens. Okay. So if your soil is structures degraded, we lose the fungi that our natural predator controls. Okay. So they're going to break down the hard to break down stuff okay.

00:54:03:02 - 00:54:27:22

Unknown
So I want to dig into weeds for a minute. What's a weed. Why not a plant at a place according to who? You're right. It's just your problem, all right. How do you get rid of weeds overnight? You don't. Yeah. Stop calling them weeds. You're good. Okay, so. But I think of weeds as being, indicators, so I love them.

00:54:27:22 - 00:54:48:24
Unknown
All right. Any plants out of place is indicating something. Right? And they could be indicating, one of five things. So our job is to start to learn. What is this plant trying to tell me? Okay. Is it trying to cover bare soil? Right. What are the ones that, you know out here that, that they just cover their soil?

00:54:48:26 - 00:55:21:07
Unknown
Those that are kosher Russian thistle. Canadian Canadian thistle. This thing alyssum bindweed, cheatgrass, cheatgrass. All right, so all of those, there's a signal. When that soil becomes bare, it starts to drive to bacteria. It sends a signal to that seed bank to germinate. Okay. Your seed bank under there is massive tens of thousands of seeds under a yard of soil who grows is based on the signal that they're receiving.

00:55:21:10 - 00:55:43:23
Unknown
What's the signal? Is it because it was bare or disturbed? Is it because you have low organic matter? No one in this room, right. None of you have that condition. All right. So there are weeds specifically that are trying to build organic matter, right? Is it to balance minerals. So some weeds are there. We call them the dynamic accumulators.

00:55:43:26 - 00:56:07:16
Unknown
Leafy spurge is a dynamic accumulator net. Boyd is a dynamic accumulator. Thistles are what they do is they bring a mineral that's low in the soil, a low availability, bring it up, and they release it again, back and back through their roots and through their leaves. Okay, so if you're low in zinc, which is what leafy spurge is indicating, it starts adding zinc into that soil environment.

00:56:07:16 - 00:56:27:22
Unknown
And that's awesome. It's fixing it. So if you just wait 100 years, it'll have it repaired for you. I'm not that patient. Right. So the first time I came across this was in 2001. We had so much ragwort on our place, people would say, where do you live? And I'm like the Yellow Farm Uprights Road. And everybody knew where we live, right.

00:56:27:22 - 00:56:54:10
Unknown
Because the the rag. What was this tool. The cows which is like your ragweed, the cows that lie down and you couldn't find them. Someone told me it's an indicator of low phosphorus, low calcium, low organic matter

and low copper. So we did an application based on those four things. That ragwort was gone in 18 months. We have never seen it again, but you can see it in the gullies that we didn't treat, and you can see it on the neighbor's place.

00:56:54:12 - 00:57:22:19
Unknown
I love it when the neighbors are like, yeah, great comparison. Thank you. So it could be that they're trying to balance some imbalance in the minerals. It could be a microbial imbalance. So we get some weeds that really like bacterial soils and some that really like fungal soils. Melon. Melon loves a fungal soil. Leafy spurge. Some of the highest testing we've seen in pasture land has been fungal numbers under leafy spurge.

00:57:22:21 - 00:57:55:10
Unknown
Okay. Yeah, which is kind of weird. Net weed is a boron. Boron? We have done the testing. Boron and something else. Yeah, but it's a microbial indicator too. So it it pushes it here and it keeps it here. So those into my pathogenic organisms, it has a specific pathway in its roots to stop them growing. So it suppresses the growth of those fungi that suppress disease, suppress insects.

00:57:55:12 - 00:58:26:24
Unknown
So that makes sense. Knap weed releases a signal that stops those beneficial insects suppressing fungi from growing. It's the stuff you find in research sometimes. So not to geek out, but I get very excited sometimes, like got. Are you saying it's a pollinator? Providing pollen or going the other way? It suppresses it. It stops them growing.

00:58:26:24 - 00:58:50:06
Unknown
So net weed stops beneficial fungi from growing intentionally because it's almost. Well, I'm talking about spot in that spot in that weight. Yet when it goes flowering it affects a lot of oh yeah. But these aren't pollinators, right. These are, soil dwelling insects that this one. All right. It wasn't that one. It won't it suppresses that. Okay.

00:58:50:08 - 00:59:14:01
Unknown
So the the organisms that control, grasshoppers net weed won't let them grow. So it's like the Netflix encouraging grasshoppers. And if you have a look and see a good grasshopper attack who's not attacked the net weed, the kosher, the Russian thistle, they're just fine. All right, but your grass will be gone. Okay? Because they're healthier and we'll have a look.

00:59:14:01 - 00:59:44:21
Unknown
So it's a health signal that's attracting a disease. A disease that's attracting, the grasshoppers. Right. So it might be a microbial imbalance. So a lot of them are so thinking, these are cryptic games. So

your moths and lichens, that's a microbial. When it's really hot out. Or as a safety valve for toxins. Okay. So if you're near areas, is anyone near a oil oil cold areas.

00:59:44:24 - 01:00:12:17
Unknown
Some of you are right. So what comes what comes up out of the ground in those areas. To me too is yeah some H2 is. So we get the hydrocarbons are coming up. You can get right on gas coming up. You can get all sorts of weird stuff. And we've seen weeds that are really good at trends transforming those gases or transforming those toxins.

01:00:12:20 - 01:00:33:09
Unknown
Okay. So milk thistle, the variegated milk thistles are really good example of this. And sometimes you'll see it like if you always use a pour on and drench in the same area. And then you might have a field that the cattle go to. Next you'll see some really weird weeds. Right. And these, these weeds, taking that chemical out of the soil.

01:00:33:11 - 01:01:04:23
Unknown
Okay. And they're often quite nasty weeds. They'll be prickly. They'll be unpalatable for sure. Okay. And so there's quite a range of those safety valve ones. So we took a comment on, farmer amaranth or of course, the big weeds. What is environment that they love. Yes. So we're thinking a lot about herbicide resistant weeds.

01:01:04:25 - 01:01:35:09
Unknown
All bacterial to the to the situation. We we've I've worked with some ranch, some cropping guys that have doing five herbicides a year and they still can't control the weeds. They shifted to a nutritional program, and within a year they were only doing one single glyphosate at two thirds of the right. Right. And so the secret to this is what causes herbicide resistance is an overexpression of the gene that, the herbicide acts on.

01:01:35:12 - 01:02:02:10
Unknown
Right. So these so the Palmer amaranth, the kosher, they overexpress this gene which helps them to, to not be affected by the herbicide. Right. But what we're seeing is if you have aromatic, aromatic amino acids and you apply those with your program. So this could be fish oils. We're putting fish oil on with herbicides. And it breaks that gene expression.

01:02:02:10 - 01:02:29:12
Unknown
And we're we're controlling these herbicide resistant weeds at the same time with the fish oil we're moving it towards more fungal balanced soil. So a bacterial dominated soil or a more recent. Absolutely. And certainly more of the herbicide resistant weeds, and what's interesting is as we start to shift soil health, they won't even germinate. They won't even germinate.

01:02:29:12 - 01:02:51:13
Unknown
And I can show you an example in a minute on of that. Okay. So yeah, there's lots of ways we disturb soil. My great know, my grandfather used to talk dress in a DC3. How cool is that? All right. But what they used to apply, and I wish I'd seen it. What they used to apply in New Zealand at the time was super phosphate was DDT.

01:02:51:15 - 01:03:16:12
Unknown
Right. So we had mass of native insects that when the ryegrass arrived they would just like for me delicious. So they had huge and sick problems. In the early days. Right. So some of these disturbances you've said are natural or unnatural. I'm just aware of time. So normally I'd run through this really slowly, but we're not going to do that.

01:03:16:14 - 01:03:42:28
Unknown
We're going to look at how soils have a biological successional process. So they go from being very bacterial dominated. Okay. When you only have lichen and mosses and that will be I want you to think of this is as a disturbance pathway. So this end is highly, highly, highly disturbed with all of these things. And this end has no disturbance whatsoever.

01:03:43:00 - 01:04:07:18
Unknown
Right. Does it make sense? Okay. So as the disturbance slows, we see it. A change in the in the population. So what you might see and I see this in a lot of places is they have sagebrush and cheatgrass. Yeah. And the reason for that is cattle will walk around that sagebrush there in this area disturbing it.

01:04:07:18 - 01:04:31:04
Unknown
They'll be pooping and weeping or whatever, especially if your pasture size is a large. So you see that the edges start to encroach with sagebrush or briers or oak or something like that. Right. It's because they're not getting adequate disturbance. Right? And we end up with a mosaic. So the cow, they'll always go this way, they'll always camp here.

01:04:31:05 - 01:04:57:12
Unknown
There's going to be cheatgrass here. And they're going to ignore that area. And that starts to go work or sleepy. Right. So these become the sleepy soils. These are the very bacterial dominated ones. What we're aiming for is is the grassland ecosystem. Right. So that's either one bacteria to fungi or I want 1 to 4 fungi or one that's really fungal dominated still for grass okay.

01:04:57:14 - 01:05:21:08
Unknown
This is about 1 to 10. This is about 1 to 1000 okay. Bacteria to fungi I know some of this is new for you guys, so it might be a little overwhelming and I apologize. I actually took my dog to dog training

recently. And what I noticed, she's working with goats. She's an Aussie shepherd. She is the best dog on the planet.

01:05:21:08 - 01:05:44:17
Unknown
Don't argue with me. And, And no arguing anyway. What what what was interesting is to watch the other people with their dogs is you have to do a perpendicular line with, you know, the sheep, it behind you. And the dogs are allowed to come around in front of you, and you got to keep walking this way. And when the dog comes around that way, you got to change on a 90 degree angle and walk this way, right?

01:05:44:19 - 01:06:03:06
Unknown
Everybody who is learning how to do this lost their ability to walk in a straight line. It was it was funny, except I did it too. Is it you start looking at the dog and you're worried about getting a position, right? And you do this because your brain can't process multiple things all at once. You can't walk in a straight line and learn something new.

01:06:03:11 - 01:06:19:18
Unknown
All right, so I'm asking you today to walk in a straight line and learn something new. And it can feel overwhelming and confusing. If you're feeling that way right now, you're in the perfect place. It's fine. Okay. Just. You're fine. Yeah. So.

01:06:19:20 - 01:06:44:05
Unknown
We see our deep rooted species are starting to come in, right? They're bringing up nutrients and they're starting to build soil, and they're dying down. Right. The the soil building processes are beginning. Then we'll get our annual grasses. What have you got out there? Apart from what annual grasses? If you go up, go to cheatgrass. What's that go for?

01:06:44:07 - 01:07:10:14
Unknown
Oh, I don't know. That one jointed goat grass. Yeah, that is like six feet anything. Yeah. So it could be native or non-native. Six week fescue, annual barley. Yeah. And so many of our weedy species are actually in this, like your, your wheat and your barley and your corn and that annual. They like it slightly bacterial.

01:07:10:19 - 01:07:31:07
Unknown
Right. And then in here is our perennial grasses. And what I find is people are trying to seed perennials into this soil condition. Very bacteria. And they don't get very good results. Okay. We want to have when we get up at this ratio, we start to see these species germinate. And I'm aware that we're going to go outside.

01:07:31:07 - 01:07:41:16
Unknown

So I'm going to show you. She left the room I'm going to ignore her. Okay.

01:07:41:18 - 01:08:15:01
Unknown
Now I'll continue with this this this okay. So, these are good friends of mine. The Hagerty's in Western Australia. Diet and Ian, they practice what they call, natural intelligence farming. Their entire program is half a gallon of worm tea that goes down the drill. And then in the growing season, on their really degraded land, they do 12 gallons of a compost extract in the growing season.

01:08:15:04 - 01:08:37:07
Unknown
But this is the off growing season, right? This is summer in Western Australia. What you're seeing there is the oat crop has come off. And so in the first year when they do this program, so they, they, they take on really degraded land that's probably having like five herbicides a year, including stuff that's now banned, when people can't control the weeds.

01:08:37:07 - 01:08:57:28
Unknown
Right. In the first year of putting the worm extract down the drill, they have nothing else they might do a light right of glyphosate, no post emergent herbicide. And the first year they get things like button grass, kerosene, grass. Is that sound like a good idea? No. And windmill grasses, which Australians are. They're so eloquent with their language.

01:08:57:28 - 01:09:32:00
Unknown
So, a windmill grass is also known as cracked grass because it climbs up the back of your pants and comes out. You crack and it does. You'll be like, what is that? There's a grass creeping its way up your pants. Right? So very early successional grasses not ideal in the second year of their program. And I was very fortunate that I was there this day, up along the drill lines came, some Satara species, grasses that have been extinct in this area for 60 years, native grasses that came only with it put down the worm extract.

01:09:32:02 - 01:09:57:09
Unknown
Not only neighbors. Thousands and thousands of acres were covered in this grass was like it was madness, you know, it was crazy. It's like switching that signal switch to germinated. All right. And what came back is this native seed bank that you guys are all sitting on. And I'm seeing it again. And again, and it's probably one of the most common emails I get from people is we started to do this and we're seeing June drop seed.

01:09:57:09 - 01:10:10:13
Unknown
We're seeing needle and thread. We're seeing that Indian rice grasses are pretty like seeing grasses that they haven't really seen on the property for a long time. They might have had a couple, but not seeing a lot.

01:10:10:15 - 01:10:19:29
Unknown
Oh, you're back. Let me finish. Weeds.

01:10:20:01 - 01:10:22:29
Unknown
Okay, so.

01:10:23:02 - 01:10:41:08
Unknown
One thing that we do is we tissue test is if I'm going to get a copy of this. I've been trying to. Oh, okay. You're not going to get a copy of it because technology won't support you. So we've done tissue testing out here. What I want you to do is take your I want you to sample a desired species in your field.

01:10:41:08 - 01:11:01:26
Unknown
What is it that you want to see growing and something that you're interested in, that you're seeing encroaching that you don't really want? Okay. And then send it into the laboratory. The lab has actually emailed me a few times going, what the heck are you sending us? Like super earth? Like, I know, poisonous ivy, something I don't know, like, just don't worry about them.

01:11:01:26 - 01:11:22:14
Unknown
They'll be fine. Just send it in. And what I want you to do is test them and look at them side by side. Okay? So I did a project on the Tom minor basin. They were curious about the bears because the bears are coming in for caraway. So Caraway is, looks kind of like your yarrow. It's a Eurasian plant.

01:11:22:14 - 01:11:43:05
Unknown
There's no natural predators, insects for it here. And it's spreading. And what's happening? The bears come in and they they farm it like they cutting it up and the eating it. But every time they do that, it spreads again. It's spreading right down next to the houses. And it's becoming an issue because you're getting bear human conflict and nobody likes that.

01:11:43:08 - 01:12:06:20
Unknown
So we tested the soil and we tested the weeds. What we found was that caraway is a bore on accumulative. It's accumulating foreign in very low bore on soils where they had high bore on soils it was no caraway. Okay. So what they're doing is they're applying boron in these areas to stop that germination signal. Right. That weed is trying to deal with a problem and it's addressing it.

01:12:06:23 - 01:12:36:07
Unknown
You can say, I can see what you're trying to do, and I'm going to do you out of a job. Right? So we did this with a plant called Cape Weed, which

you guys don't have yet. Right. So it's on the coast. It's a big, big problem in Australia. It's a it's a South African daisy. I have seen it, at the top of the last coast in our, California and on the East Coast.

01:12:36:07 - 01:13:05:10
Unknown
All right, so what we did is. And you see, the top of it is you take that weed. Yeah. This. Okay. And you compare it to a grass that you want. So he wanted rye grass, and then he's measuring his cape weed. So the nitrogen is pretty close. The phosphorus was pretty close. Potassium. So, cabin cabinet, pretty good calcium.

01:13:05:10 - 01:13:09:19
Unknown
How much more times calcium is there in the Cape? Weed.

01:13:09:22 - 01:13:42:23
Unknown
About three. Yeah. The magnesium. It's probably a 50% increase in that. Or 150 sodium. It's ten times the amount of sodium in this cape weed. Then there was and the other species. And then it was twice the zinc, ten times the boron and twice the nitrates. All right. This plant is known to be a nitrate weed. So you want to do this testing and take a look and then look at what's happening in your soil.

01:13:42:23 - 01:14:08:25
Unknown
And what we found was the soil was incredibly low in calcium. It was low in sodium. I find this so often we use we use a lot of same mineral. I use Redmond salt on rangeland and you're like, that sounds like heresy. Then you. These are some of the oldest landscapes in the world. And that sodium is leached off and it's accumulated in the valleys or eastern Montana.

01:14:08:27 - 01:14:33:19
Unknown
Yeah. Or where is it in Colorado? You can point at some Coloradans, eastern Colorado, western that river, and they farm wherever they farm. Right. We've got that sodium coming in, but most landscapes are deficient in sodium. How do you know that your cows are eating sodium? All right. So we we use C minerals is a is a is a critical component for many of our programs.

01:14:33:19 - 01:14:53:20
Unknown
I absolutely love it. Bang for buck a little bit of C mineral. Delicious. So we are putting on C mineral. We're putting on calcium. We put on zinc and boron. And to deal with the nitrates we put in a little bit of humic acid. Right. So that humic acid helps to convert the nitrates to ammonia. Makes it safe to eat.

01:14:53:22 - 01:15:20:17
Unknown

Right. So nitrates why don't we like nitrates or give what's calves. Did cows nitrates in the water. We have blue baby syndrome from babies drinking formula milk. They've now found in a study in New Zealand that, I can't remember. The parts per million of nitrates are very low, but if you're pregnant and you're drinking water that has nitrates in it, those babies are being born smaller and have learning difficulties.

01:15:20:18 - 01:15:51:24
Unknown
Right? The amount of water now that has nitrates in it. Crazy. So we see a nitrate buildup. On bare soil. So last year when you guys had it was super dry and there was a lot of bare soil. What happens is you get bacteria building up in that zone. So you get bacteria. And what they do is they numbers build up and they're building up.

01:15:51:24 - 01:16:13:13
Unknown
They actually have nitrogen and nitrates in their bodies. And in part because they not that it really matters, but they have an enzyme which pulls the hydrogen off the ammonia and they replace that, create the nitrates. Okay. So what happens is you get this bust and boom cycle. The numbers are building on the bare soil. And then you get some.

01:16:13:16 - 01:16:26:24
Unknown
They build on the bare soil and then you get a rainfall event. Why numbers spike. They run out of food. They die down. They'll do it again. And what happens is at this point.

01:16:26:27 - 01:16:59:09
Unknown
They release nitrates. And then you see these. Have you guys got these? Pigweed. Fat hen. Kosher. Russian. Russian thistle. Right. They are all nitrate weeds. Where else are you going to see them? As might be around your yards. Areas that have got a concentration of manure. They're trying to heal that landscape. Foxtail barley is interesting because foxtail might be nitrates, but it could also be sodium.

01:16:59:12 - 01:17:20:11
Unknown
Okay. So if you're seeing it creeping down to the bottom of your pastures, go and do a test. You might find you've got sodium coming up. You need to change management, right? You need to change that before you sell an ISO alkaline your whole fields okay. So look for this one is a key indicator. And that'd be feeding livestock on this because it can be losing production okay.

01:17:20:14 - 01:17:57:09
Unknown
So this is a response to having big round and not and having a bust and boom cycle. How would we stop a bust and boom cycle. If you have something that's careening out of, like, the population's booming, what's going to stop that? Could be a disease. This is a. See what's change?

Biology in the soil. So we need to fungus, fungus and some of the other ones that we need, which we need the predators.

01:17:57:11 - 01:18:22:10
Unknown
Yeah. So the predators are going to be in the soil. They're going to be our nematodes. And protozoa. Okay. So nematodes look like these non segmented worms and protozoa come in a range of shapes and sizes. But it. All right. So we had those things will stop that bust and boom cycle. But if you have these really compacted bacterial soils you won't have them.

01:18:22:10 - 01:18:44:02
Unknown
And then you're going to get these plants responding okay. Right. Yes. So you know, you'll have a couple of years where something just goes out of control. Right. And then it goes away. Yes. So when do you decide to treat it or not? When you decide to treat or not like, you know, you can't you can't predict weather, how many years it's going to come and go or if you should just.

01:18:44:02 - 01:19:07:03
Unknown
Yeah or not. So when do you decide to make the decision to, if you were thinking you were going to herbicide it. No, no. But like that would be a decision making thing. Someone was going to herbicide to do this instead. If you have the budget, if you have to ride it out. So I call it the ugly hair stage.

01:19:07:05 - 01:19:33:03
Unknown
Just ladies understand what I mean, right? You just gotta roll with it. Or actually, Covid, guys, you understand what we mean now is just ride it out because it is a cycle. And a lot of these weeds are just here for a short time, and they are trying to heal landscapes. But some of the things, like you're more perennial weeds like California and thistles and things you might want to take some action because they're not necessarily going to shift really fast.

01:19:33:06 - 01:19:55:22
Unknown
But it's more about being able to observe it and then take your eye off it and start to look at what do I need for grass, because it's telling you you're off the mark for producing high quality forage, right? And effectively, if we can, all those areas that are in Kosha instead, we're in perennial grass. I've got guys that are selling land because they're like, we don't need all that excess land because we can do more on less.

01:19:55:24 - 01:20:13:05
Unknown
I rather just sell a few plots off around here. We don't do that, do we? Not? Because we can get more effective grazing. But you don't have to do anything. Yeah. And we're going to use some tools when we go out in the field now. So you can make some decisions around that. Like do I need to take action or not.

01:20:13:05 - 01:20:23:26
Unknown
And that's remind me if I don't answer that question because it's important and we'll see it out there. Great. Okay.

01:20:23:29 - 01:20:56:00
Unknown
So earlier I did not introduce the oswalds. Yeah. Shane. Well, Steve likes to hide, and he was just like, I'm going to go deal with this water leak instead. And I'm like, I kind of get that. But anyway, so I'm going to introduce Steve and Nancy and Nancy, can you please stand up? Steve and Nancy have been so generous and basically allowing us to be here and kind of expose their ranch.

01:20:56:00 - 01:21:19:15
Unknown
It's a it's an intimidating thing to do. I know I have a hard time when people come to my place. But basically the way this happened is, is we had the opportunity to explore, applying high fungal compost, which we will talk to you about later. We've got Dave West here. We got his we used his compost.

01:21:19:18 - 01:21:42:05
Unknown
So anyway, we wrote a Western Sare grant and we got money to do that. And part of that is to do a workshop. And, and so that's one reason why we're here. But in the process, I've really gotten to know the oswalds. And they their management is amazing. And it's incredibly inventive. And there's been so much ingenuity on this ranch.

01:21:42:05 - 01:22:07:10
Unknown
There are other folks in this room that have helped out with that interconnect. Yes. Berlinger. Josh to zero. If you guys don't know them, get to know them. But yes, people have been many people. I've been involved helping out. And you can really, really see it on the Saturday. I'm going to give it over to Steve, or Nancy, whoever wants to talk or John Dunn.

01:22:07:12 - 01:22:14:14
Unknown
Son. Yes. And and they're going to talk a little bit about the management here.

01:22:14:16 - 01:22:20:25
Unknown
You oversold it, Sandy. No, I didn't.

01:22:20:27 - 01:22:49:02
Unknown
Yes you did. No, I did it. Okay. Our ranch, we operate on about 12,000 acres. This is the county road you guys maybe drove up today. So our ranch is divided into two halves here. This is our winter country. Summer

country? Let's see, we took over the ranch in 91. It was basically these two, two pastures.

01:22:49:02 - 01:23:19:10
Unknown
And since that time, we've put in maybe, I don't know, 30 miles of fence to our electric. It's kind of my backbone, what I call my backbone. And then we split up those. Permanent pastures into multiple pastures. So we've got maybe 200 plus pastures. We move our cows every day during the growing season and the winter time.

01:23:19:12 - 01:23:54:04
Unknown
We don't we winter down here toward Apache, towards Cotopaxi. They're down there until they're down there from about, around Christmas time until the 15th of of, March. When we come out of there, that's when we wean. I took a move back in 94. If we moved back here. Know it in December. I remember sitting in my desk and going through my numbers and was like, Holy crap, we're going to go broke here.

01:23:54:05 - 01:24:23:08
Unknown
I've got to get a job in town. Let's do something different. So in 95, January of 95, I took this course called ranching for profit. Kind of an oxymoron, but that really fundamentally shifted everything we're doing here. I came home and crunched the numbers and and, I sold every last piece of equipment. I had that point. It was in April, and we shifted our cabin season from February, March.

01:24:23:11 - 01:24:57:29
Unknown
Now we have June. We start June 10th and calve until, right now, we had our last calf, I think yesterday. So anyway, we've run our our pairs together down in this winter country. For, for a couple of reasons. Number one, it's 100. I don't have to deal with multiple herds. And the other reason is, those mamas are teaching those calves what plants need, where to hang out during the storm.

01:24:58:06 - 01:25:23:27
Unknown
Affected to go to, like, snow down there because we don't have very good water. And, you know, just the social aspect of that, anyway, we wean then in March, bring the calves up here in the only time I feed hay is during that time. We feed a real short period of time. There. So, you know, that's the other thing.

01:25:23:27 - 01:26:02:28
Unknown
Any here I feed, we buy mainly from the San Luis Valley. They grow pretty good hay over there. What else? You're shrugging your shoulders there. We've done some. Really? Steve has done one of the things that I was really struck by when I, when I came to this ranch was really the genetics. Your genetic line has got to be very habituated to grazing on

really, really different habitats because you guys all know you guys probably all came up the Arkansas River and you know how rocky that is.

01:26:02:28 - 01:26:29:05
Unknown
All that rock coming. You know, the Rocky ground. Well, they graze in that area and then they come up to these meadows. So those cattle have to be very knowledgeable about how to graze. And down there, they're they're browsers, they're browsing a ton. They're eating a ton of forbs. So their diet and their grazing strategy is very, very different than it is here where they're doing more high.

01:26:29:07 - 01:26:50:08
Unknown
High, you know, density grazing on meadows. Right. Like that's so easy. But when you go into that bottom country, I mean, that's a whole different management strategy. And that that to me was like, how do you move cows in here? That's amazing. It's really, really cool. And then they come up here and they do this high density, very high density grazing and that's, you know, 100% different.

01:26:50:08 - 01:27:04:26
Unknown
So those mamas, it's really important for them to teach their, their babies. Like this is what you need to know when you go down there. And then when you come up here it's different. And then the ranchers are going to be smart enough to keep those heifer caps out of those towns, so they know how to do that then.

01:27:05:01 - 01:27:38:16
Unknown
Yeah, they're babies. Exactly. You send them all the super, super important Eagles. Yeah, yeah. And I mean, you don't really wean the cows when the calves themselves, you know, I mean you get those started there. No calcium. Yeah. They're winning you know no home and yeah. No. Yeah. Well when we turn them down in December I would say about well 100% of the calves are sucking still they're still nursing when we wean quote unquote in in March I would guess 90% of them are already weaned.

01:27:38:18 - 01:27:58:06
Unknown
You know, they're kind of hanging out with mom, but they're dried up. So it's a nonevent to same thing I don't we need it gardening. Yeah, that's for sure. Yeah. That's for people like to hang out and five. We can do it. We like working this late. We were sorry for it. Yeah. Harvest the good, the bad seed.

01:27:58:06 - 01:28:30:05
Unknown
Talking about the work. It's really healthy. Yeah, it's really important. We used to receive cattle and, you know, from other states. And, man, it was really so much harder to to to do that because they have to learn. Oh, but what's bluegrass? I'm all about? The other thing, the other really inventive thing that I think that that Steve has done is in that

lower country, and he's collaborating, collaborated with NRCs on this is they've done these pinyon juniper treatments.

01:28:30:08 - 01:28:57:20
Unknown
And you can see within those pinyon juniper treatments, they've had a lot more. And the in the let me back up a little bit and the pinyon juniper, we're getting a lot of pinyon juniper that really shouldn't be there. And the pinyon juniper is very unhealthy. There's a lot of what's called phase three pinyon juniper. When you get that, you get no, you get no, water infiltration and because of that, you don't get any shrubs or any grasses growing underneath the trees.

01:28:57:22 - 01:29:22:08
Unknown
And so the whole water cycle is really broken. And so what they've done and working with Josh and right there, they've done some, I really shouldn't be talking about this, but do you want to talk about it? Does a lot of hydro ax treatments, work in the brush management or off seasons and around your chief's focused, fixed areas that, you know, he finds is the best bang for buck in collaboration with HP.

01:29:22:10 - 01:29:32:03
Unknown
Have a diversion program with BLM. We're not discriminate on killing pinyon and juniper around here. So.

01:29:32:05 - 01:29:52:12
Unknown
Yeah, but the response has been really the response has been really good. You, if you go in the lower country, you see a lot of native grasses carve it up. A lot of different species, lot more, vigorous species of those good species to have. And you'll see the little strange, you know, have a little water in them here and there.

01:29:52:15 - 01:30:19:07
Unknown
Just the water holding capacity has, you know, increased in those areas instead of, evaporating off the trees. Now, now he's growing grass, right? Yeah. And the forest is much healthier and less fire prone, which is a big deal here. Yeah. So the diversity that these cows get is enormous because they're going from 5000ft ish to 90, what, 90, 87, 87.

01:30:19:07 - 01:30:45:03
Unknown
Yeah. So they're going through a few different egerton's. So they're they're smart cows, but they're happy cows. They also keep a grazing chart, the charts, everything here. And I keep some data here. Probably the most important is rainfall data. You really can't see it here. But you know, I record, rainfall every day, and I also keep, stock days per acre.

01:30:45:07 - 01:31:11:02
Unknown

Kind of is a, it helps me think about how many cow days I'm taken per month so that that changes over over the year. And, I boil all that down into this. You can't really see this very well, but I keep a chart called stock days per acre per inch of rain. It's kind of like my canary in the coal mine when the line goes up.

01:31:11:08 - 01:31:36:10
Unknown
That's bad news. When the line goes down, that's good news. So it kind of gives me a it's like a early warning signal. When the line goes up, I got to D stock and we've got, a drought plan in place here that says, you know, when the, rainfall is low, we're going to D stock by a certain percent.

01:31:36:13 - 01:31:59:12
Unknown
So this year, we've had all this rain. You can't really see the line from there, but it's going down, which is good. The other thing is we're we stocked in, 2018, half of our cows were up in Silverthorne during the summertime. They never came back. They went down to went out to Yuma, Colorado on not to Kansas.

01:31:59:14 - 01:32:24:03
Unknown
And they bought this really nice shop. Which is great. And that's why we're all here. Because we have a shop. Yeah, yeah. So, so some of the things that we've also been working on to kind of build in more flexibility is, to work on cover cropping some of the old farm ground. So that's where we're going to be going next.

01:32:24:03 - 01:32:47:25
Unknown
And that area is, you'll see just in relation. So to where it is with headquarters. If he could get that, that field a lot more productive, it would help in so many ways, just giving them more flexibility with production. And and how I mean with movement of cattle, wildlife. Wildlife is a huge part of this ranch.

01:32:47:25 - 01:33:12:18
Unknown
As you can imagine, of the location, huge deer population. We have a hunting business here too, which kind of helps offset, you know, I used to, complain to the Division of Wildlife for years about their deer and elk here until one of my neighbors said, you know, I'm in the grass business, and I don't care what form my grass goes out of here, I'm going to be paid for it.

01:33:12:18 - 01:33:36:28
Unknown
So it was like, Yeah. So we've had a quite a few trials up there on this piece of ground. It's slab right there. It's been a little bit tricky because we put in all these turnips and we went out there and you know, they're all the dirt eating them. Yeah. So there's been some challenges.

But, we're so excited to have Nicole here to kind of help us troubleshoot further on the soil, the soil and of things.

01:33:36:28 - 01:34:01:11
Unknown
So we're excited. I'm excited to share it with you. And and one thing that I like, I love that Dave West is here because you're a great farmer. You know, I mean, I love that we've got all this like collective knowledge that we can that we can we can all sort of troubleshoot together. So thank you, Steve and Nancy, for exposing the in my mind, the very tiny, the tiny.

01:34:01:14 - 01:34:25:12
Unknown
I don't want to say weakness, but like experiment that is so that we can all learn from because I know that, you know, I, I personally can't stand that I have Canada thistle all over and I'm the range specialist. Right. And people come in and they're like, oh, good job. And I'm just like, so thank you very much for having us all here.

01:34:25:15 - 01:34:50:29
Unknown
Our pleasure. Yeah. Yes. You are really, really for this issue. Yes. We do have a grass fed business. So we, you know, our goal is to sell everything through a grass fed business. We haven't been able to do that quite yet, but we're getting close. So how do the animals finish? Are they all. Oh, yep.

01:34:51:02 - 01:35:17:09
Unknown
Everything. Yep. Great. So we retain over heifers most years. I actually stopped earlier this spring. You know it's kind of worried about moisture. So I sold half my steers half of my heifers. But we normally keep all of our heifers and expose them all to a bull. And you know, those bulls know which ones are the best. Not me and any open heifer cow.

01:35:17:09 - 01:35:41:25
Unknown
She gets ground up into burger. We also Steve and I have done a few. Steve has been on a few of my webinars. I did a, webinar on drought last year. We were in a well in May. It was a pretty stressful time and everybody was stressed and I was like, okay, let's do a webinar just to let us all know, because we couldn't get together that we're not all all alone.

01:35:41:25 - 01:36:05:08
Unknown
So we have a webinar with, Kenny Burke, who was here yesterday, and Steve and some of the folks from us just talking drought strategy. And it's our Ncsu rains website. And we also did one on soil health with Grady Grissom and Steve. So you're welcome to check those out too, for kind of more localized strategies. Anyway, I want to say one other thing.

01:36:05:10 - 01:36:33:20

Unknown
The reason the call is here was that, you know, we've heard her speak 2 or 3 times. Three times. And, I we've got some so much land up. We've got about 200 acres up here which are fairly unproductive, in my opinion, from, you know, the, the type of management, grazing management we've been doing. I've well, when we took over the ranch, we saw Hugh and changed our management.

01:36:33:20 - 01:36:51:02
Unknown
We saw a huge increase in forage, but we've hit a plateau. And I want to get that bumped up to the next level. We'll hear Nicole talk. You know, the light bulb went on in my head. Hey, it's all about the biology. We got to figure that piece out. So that's what she's here. Hopefully that's why you guys are here.

01:36:51:02 - 01:36:57:24
Unknown
We're going to see some interesting stuff today on some,

01:36:57:27 - 01:37:11:27
Unknown
Beautiful ground. Yeah. Beautiful. The scenery is gorgeous. Yeah. I've been cover cropping for about five years. It's a total failure. No total failure. Well, this there are some some improvements.

END TRANSCRIPTION