Paleo Solution - 248

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Robb: Howdy folks. Robb Wolf here with another edition of The Paleo Solution podcast. Today's going to be a little bit different. Usually we talk protein, carbs, fat. We talk Paleo, we may diverge into a little bit of that stuff but today we're going to touch on a topic that is really just near and dear to my hear which is this idea of sustainability as it relates to Paleo. And in particular this concept of soil restoration, carbon sequestration. And I have two phenomenal guests on the show today Russ Conser and Peter Byck. Guys can you please give a little bit of each of your background. Peter maybe we'll start with you and then we'll jump right into the meat of the show.

Peter: Robb, thank you for having us on it's a real honor. My name is Peter Byck and I am a filmmaker. I made a movie called Carbonation which has been out for a few years. Our tag line is that climate change solutions movie that doesn't even care if you believe in climate change. And because I focused on climate, I've realized through a lot of amazing work by a lot of amazing people that the soil is a huge, huge store of carbon and that's where I'm focused on.

We just made a new movie called Soil Carbon Cowboys. And that is about ranchers doing regenerative grazing, adoptive grazing and having phenomenal results. And we're at the very, very beginning of trying to figure out scientifically what's going on.

Robb: Russ, give us some of your background.

Russ: Sure. I'm kind of probably odd in here. I'm a Mechanical Engineer by training. I just retired from a 30-year career at a large oil and gas company. Real early in my life, my day job was counting carbon in the soil when I happened to be at TED two years ago when this guy Allan Savory gave a talk on how changing, how we graze animals might put carbon in the soil. I said well if that's true I can go measure that.

And then the funny thing was here the following week after that the teleconference I was giving a talk on innovation of a place called Urban Land Institute, the guy came up to me and said you need to meet my friend Peter Byck because you guys think the same. And so Peter and I got on the horn and I thought we're just going to have a general conversation about sustainable energy, innovation and Peter says have you heard about Soil carbon? And so Peter and I have been working on this now for little over a year. And quite some energy. We're very excited about the subject.

Robb: For me, so you know clearly I came into all these stuff with kind of a medical research kind of orientation looking at this Paleo diet concept in the evolutionary Biology behind how theoretically maybe humans adapted as hunter gatherers over a long period of time and possibly emulating certain characteristics of that ancestral life way might have some benefit for ailments that afflict us today. You know changes in Circadian rhythm, changes in gut biome, changes in the way that we socialize with one another. And I feel like we've had quite a lot of success with that.

You know as far back, I want to say 2000-2001 I had in the back of my head there was probably a sustainability story that was similar to what I was envisioning on this kind of evolutionary medicine applied to human story. But I had absolutely no data to support it. It was a guess and I think maybe some of it was trying to you know pacify my kind of moral misgivings with getting back in and eating animal products because I've been vegan for a time and suffered a lot of health problems as a consequence.

But as things have motored along and we've seen work from Polyface farms and from Allan Savory, it really looks like this you know this applying kind of evolutionary medicine to soils and to sustainable ecosystems that we interface with, we might actually have something to this. But you know the main story that is portrayed in the media and just kind of, it's just this gestalt kind of thing for most folks is that planet of the vegans is the only way that we're going to feed everybody.

But that may in fact be the quickest route to scuttling our whole operation if you could imagine. Could you guys maybe comment on that a little bit? I mean we're really nutcases proposing that grazing animals

could be the solution to not just food production but reversing you know sequestering carbon, reversing soil erosion and things like that.

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Russ: Sure, why don't I start and throw it to Peter because Robb I kind of came in through a similar but slightly different door. I found my way into evolutionary health stuff when dealing with some health problems with my dad. And indeed it kind of changed the way I eating but then I was – gosh this is sustainable. Right? Can we feed the planet with organic produce and grass-fed beef.

And so really I had that as a door in my own mind as well. I think that's what actually perked up my years the most when I first heard Allen's TED Talk was hold on a minute, I mean there's a chance that this thing that's good for my health might actually be good for the planet if it's done differently.

And that certainly made me curious in that. Then for what it's worth, as I've gotten into it, you know it's not only kind of similar to. It's really coupled with the health system. So for example you know you mentioned Robb there the microbiome and guts stuff. I think the magic to this thing is going to come down to at the end of the day the health, the microbiome and the soil.

The soil is kind of the intestinal tract of the Earth. It's the interphase between natural environment and the solid environment. And so where all life happens. It's where photosynthetic energy is captured in plants and fed to microbes when they're healthy they grow and sequester carbon. When they don't, they respire and give it off. And so these things fit. And even some of the kind of the analogous principles are the same.

So things I certainly heard a lot on your podcast you know on lift heavy things, heavy exercise I mean really kind of holistic grazing or adaptive high density grazing is a short duration grazing as we call it, is one of these things. It's kind of like the equivalent to high intensity interval training for the land that is the cattle come in and do something quickly and then they get off and they have a long rest period. And so I think what we're learning is a lot of these principles that nature works by applies to the inside the human body but also to the broader

environment. Once we figure out how to couple with those things then environment and health can get better at the same time.

Robb: To be fractal in nature and maybe if we could learn something in one place we might not need to relearn it elsewhere.

Russ: Yeah. Absolutely true. Peter?

Peter: Yeah. The first question I asked Russ was has he ever heard of grass-finish beef. And you said yeah, I eat it for my health. And then I said have you heard of Allan Savory and his work? Yes. And I said you considered the carbon implications of this, he goes well started to but what do you got? And so not only do we think that the human gut is important in the soil biome is important but the cow gut is also another biome. I think it's these three things that are really suited to a really good dance together when we let them.

Really what happened was Russ was a very innovative guy and a very big company Shell Oil and I knew that Shell was basically putting a lot interest in carbon capturing sequestration. That's my entry point for this whole conversation. And so when I talked to Russ I said what if there were enough ranchers doing this new techniques because there's very few of them doing it right now and the anecdotal evidence is pretty amazing but we need a lot more science so we can talk about our whole science approach.

What if enough ranchers were getting enough carbon into the soil, wouldn't that be a positive for the world especially with the fossil fuel company? And that's really what started our conversations and Shell has given us a grant to look at what's that business look like, what do those businesses look like. And we found enormously, I'll just speak for myself, I've had an amazing time working with the people that we've collaborated with at that company.

And we've come up with some pretty cool stuff on the business front and we're early, early days in opening up the ideas that we're talking about to the whole company. But it's been an amazing experience. And the ideas, to get enough ranchers to do adaptive grazing and start sequestering enough carbon, you start really affecting the planet in a very, very positive way.

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Russ, I think you should talk about this. This is the thing where it's almost like borrowing the carbon rather than taking the carbon and putting it up in the atmosphere. Go ahead Russ.

Russ: Yeah, for what it's worth Robb, the thing that really hit me early on when I went out looking for data and it's very sketchy right now. One of the things Peter and I were working on very heavily with a team of leading scientists from other countries to go out and do better science here because what we have is very limited.

But from the data that we have, the level of organic carbon concentration in soils where ranchers were practicing these new methods versus ranchers that weren't was kind of a pretty much exactly the same difference between what we call lean and rich source rocks in the oil and gas industry.

Source rocks are the solid organic material that were laid down millions of years ago that got buried deep in the Earth and then they're cooked with time, temperature and pressure and that cooked oil and gas comes out, it floats at the top or someone comes along with the drilling rig, pokes a hole in it, sucks it up. Sends to refinery, goes to your car and then unfortunately goes into the air, the CO_2 coming out of that.

What we're basically proposing here with this is closing the loop on the fossil fuel industry that is that the levels of organic carbon that we're seeing in the soils being very countable to the levels of organic carbon that were in the old soils let's say from the time of the dinosaurs. It's almost like what we're doing is we've been borrowing carbon from yesterday's sunlight through millions of years ago and now we're putting it back.

So it's kind of a full circle sustainable business modeling. Again, those things that kind of just well, duh, I guess if you work with nature and nature does what nature does, and nature photosynthesizes energy, stores energy in the form of hydrocarbons, that's sort of what life is. And we're just closing the loop here that's all we're asking. We're not asking for any miracles. I think the miracles…

Robb: Other than miracle of life, yeah.

Peter: Nice Robb, nice.

Robb: So guys, clearly I'm bought on this stuff. It makes complete sense to me. Russ when you first reach out to me, my assistant forwarded the email and he's like I almost put this in the spam box because clearly it's a joke you know. And then we started talking and I just about lost my mind.

But let's look at the other side of this. Clearly grazing done improperly, raw crops done improperly etcetera etcetera are very damaging to the environment, very damaging to the top soil. What's going on in that process exactly and then let's kind of compare and contrast for folks. You guys explained it already but again, I think that people are so immersed in this one paradigm that grazing is bad.

There's some programs now if you have some kind of wetlands on some property that you own, you can get a really beefy tax break if you basically take that stuff off the grid forever, can never be used for agricultural, can never be used for grazing. Which the other side of this is that the land lays fallow and there isn't the interphase between grazing animals and the plants and the microbiome. That's almost as bad as overgrazing. So there's a whole other flipside to this.

But you know what, it's really woven into the psyche that grazing is bad. It's incredibly damaging but what we're proposing here is that actually it maybe the thing that keeps all of the system tied together and functioning.

Russ: But I'd say before we go down too much of the road of what people are doing that's wrong or harmful, my take on all of that is I think there's a lot of really good people who aren't trying to be wrong or harmful. I think they're just trying to do their job and be farmers. I wish more people were farmers because 1% of Americans are farmers right now. I want 10% of Americans to be farmers.

It's what these folks that these people on the cutting edge are doing right is this stuff that lets me sleep at night and wakes me up in the morning all in a good way. They're basically taking their cattle and they're emulating the way herds moves across the prairies. So you have this high dense population of animals with hooves and they're grazing and they poop and they pee and they eat. And they know when to stop. They actually know

when to stop eating the forage. And then the wolves come, chase them away and that land rests for a year or two years.

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We're emulating hat heavy hit and then that rest period. And a lot of our ranchers are finding out that they could have 800 head of cattle or the top guy in our world Neil Dennis who put 850 cattle in one acre. And he'll have them hit it for two hours. And then he'll move them on to the next acre. He's got a thousand cares and he'll let that first acre rest for 80 days. That's like his sweet spot up in Saskatchewan.

And he is sequestering an enormous amount of carbon in his soil. There's a lot of questions of what kind of carbon that is. But the results are pretty amazing. He's making more money per acre, he's putting on weight on the animals a lot better. His animals are a lot healthier. I have a lot of vegan friends and I respect anyone who doesn't want to eat an animal. How could I ever say don't eat an animal right? I just totally respect that.

But I say to my vegan friends you still want those animals walking around on the land that you're going to grow the food that you do want to eat because it's turning on this whole biome in the soil. Carbon is the currency and the cattle and their hooves, they're turning on the seeds, it's this phenomenal thing that's happening.

We have a rancher in Mississippi, Allen Williams. And those hooves of those cows on his ranch or his farm have stimulated seeds that have been laying dormant in his soil for a 150 years. The seeds have been there, they just basically said screw you I'm not growing on these conditions you know like a holiday starlet. And now they're growing like wild and it's blown away the scientist that had gone down there.

I want to talk about what's doing right because I want to inspire people to come over these way folks. If you say folks are doing it wrong, they're going the get defensive and they're not going to want change. We want people to be open minded to look at this because we want ranchers and farmers to make more money. We want them to make more money, making healthier food, being healthier for themselves, being healthier for their animals. It's a really strong point that we've discovered on this.

Robb: Okay I like that. I like that thank you. I guess again, man this is one that shows – everyone once in a while I get a show where the guests I really wish I wasn't the interviewer, I wish I was just the guy who's listening and actually have somebody smart asking the questions because I actually like to be engaged with what you guys are talking about. But you know what you just describe there it seemed reminiscent of some of these species of trees and plants that require intermittent wild fire to perpetuate their life cycle.

Peter: The sequoias.

Robb: The sequoias, yeah. So this is something again I think for folks to kind of anchor in here you know the evolutionarily or naturalistically created elements of these organisms. Certain organisms, their life cycle is dependent on not just the possible passing through the gastrointestinal tract of a ruminant. And then also potentially interacting with the hooves and the feces and the urine and all the rest of that stuff, that all may play critical elements in creating a really diverse environment.

And when I was watching the Soil Carbon Cowboys movie, these guys were mentioning that at one time they would get out and spray enormous amounts of herbicide on patch of lands to knock down the clover, knock down the things that they were considering weeds. And most of these things happen to be the silly items that were nitrogen fixers.

And so now, these guys don't purchase nitrogen fertilizer. They actually grow it. They may buy some seed to prop those numbers up but the things that they used to be trying to eradicate, they're now actively planting in these areas. And then the cows are benefitting and these guys are making more money and arguably the toxicant load going into our environment is dramatically reduced. It just seems like a win all the way around.

What do you guys feel the largest stumbling block to getting more acceptance with this? You just mentioned if someone suggesting that maybe you try something different then there's the implication that you're doing something wrong and there's maybe some defensiveness there. How do we – you know one, you educated this interview on how to ask that question better in the future. Don't make people defensive.

And I logged that one and I won't make that mistake again. But what else can we be doing to foster some discussion about this?

Peter: I think that the main thing is a lot of people don't know about this yet. It's just brand new although a lot of these techniques is as old as the hills. But putting it all together it's just really brand new especially in a bug industrial agricultural country like the United States.

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Get as few people growing as much food to feed as much people as possible. Why not get more people growing really healthy food for as many people as possible? I just think there's a lot of people who don't know about this yet. So us being on your show is one of the most powerful things we can do is because we can talk about this and make our films and do our science which we should probably really talk about what we're getting right to do. And just get to ranchers and farmers. With ranchers and farmers doing the talking. And that's why the film can be so powerful.

It's going to take time but we also want to make it, we want to figure out ways that we can take that financial risk away from changing. That's one of the business ideas that we're working on is that how do you take that financial risk of change away so that the rancher will be more attracted to the idea of changing.

Robb: Because a lot of these folks and you mentioned this at the beginning of the film, a lot of these folks are hanging on by their toe nails currently because of some of the challenges of the current models suggesting that they do something different could clearly be pretty nerve-wracking.

Peter: Pretty nerve-wracking and that's really important the three cutting edge folks in the movie all came to this through crisis. They didn't come to this you know just strolling down the path going I'm going to try this. They had to try something different because they're going out of business. And I think that's one of the things Gabe Brown says is you know don't wait till you're going out of business like me, let me help you make that adjustment.

And none of them are saying change a hundred percent tonight. They're saying just try this on 40 acre, just try this new techniques on 40 acres

and see what you think. And you know we hear ranchers sort of saying they don't want to be the one everyone else's laughing at or talking about on Saturday night. And we're seeing a lot of young ranchers come to this I think with more energy and they kind of have to talk to their dads or their uncles into it and then they discovered that there's really something powerful.

One of the best stories I got is there's a place called the Ranney Ranch in Corona, New Mexico. The family's have the ranch since 1970. And the older generation died off in the early 2000s and the next generation wanted to change the methods. But the ranch manager had been there the whole time and he didn't want to change. He really didn't want to change.

And they're in a heavy drought and the owners said we are changing and we'd love it if you stay because we love you. Within three years of the change the guy who didn't want to change, the ranch manager was blown away by already the differences he was seeing in his land that he knew so well. So it's really a question of just trying it, going places, exploring it and seeing the successes.

And really I think what the biggest missing link, Robb, this is the biggest missing link and Russ, you start – I'll just hand it over to you on this one is the science. There's just such a think amount of science but there's so many you know scientists, land scientists, ranch scientists who've been skeptical of this because they don't see the numbers that they can rest on.

Robb: And I just have to interject there, it just sounds so eerily similar to this whole Paleo diet scene particularly with regards to autoimmune disease like we had thousands and thousands of anecdotal you know stories. But again you know it's all still anecdote and it's taking us almost 15 years to get to a point where now we have a three or four really well done clinical trials with autoimmune disease related to a Paleo diet.

And the results are quite remarkable and very consistent with what we've seen on the anecdotal level but it's one of those frustrating things you know where folks will say where's science and like well, help us get it and then they're like where's the science? And it's just this chicken and egg

kind of thing. They're not willing to jump in at all until you get something and it's hard to just prime the pump and get that going.

Russ: Yeah and so we're working on that. And you know this is where I came in and looking for data, I found that it was really, really sketchy. And almost none of it has been presented in peer reviewed scientific literature yet. So there's great anecdotal stories, good raw data sets but you can always question was there some confounding variable. Just like you said Robb, it's common in health things.

Most important paper and now the lead principal investigator of our scientific team that we formed to continue this work is Dr. Richard Teague at Texas A&M University. And he wrote a paper in 2011 that looked at culpable ranches next to each other and these three separate counties in north Texas. Some that had been practicing these new methods but some that had been practicing various forms of old methods or traditional methods either with high density grazing or low density grazing.

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And he also captured some data from land that wasn't grazed at all. And in that paper he was able to document some pretty substantial differences using rigorous statistical methods over large landscapes. So the equivalent of a good controlled trial, the difference was it wasn't kind of a before and after. It was like ranchers who already been practicing this stuff for a while, he was able to document.

And what he saw was kind of the key magic number. And it's derived directly from numbers that are in his paper amounts to difference of 30 tons of carbon per hectare over about a 10 year period. So and we approximate that by simply saying okay over about a 10 year presets three tons of carbon per hectare per year which turns into a really substantial number because there's 3.5 billion acres of grasslands on planet Earth.

Peter: Hectares.

Russ: Hectares, sorry. I'm usually the guy that is very cautious with the units. So that would say and all kinds of caveats on how fast you can implement on a 3.5 billion hectares etcetera but at least in terms of total scope, you'd

say that hey that's 10 billion tons of carbon you could be taking up on the world's grasslands each year and we don't know how long that might go but at least 10 maybe 20, 30, maybe a little longer.

And these turned out to be really substantial numbers. So there's some key science that we don't know in terms of how the rest of the system balances itself. So if grasslands start taking up soil, the ocean's will re-emit some – so let's say only half of that comes out of the year and the other half comes out of the ocean goes back into the year. So you've only drawn things down my half.

In the process, we're talking about making some pretty significant dense in atmospheric carbon. Now what maybe more important in that science for some of the other benefits besides carbon so as you saw the Soil Carbon Cowboys movie, you hear these anecdotal reports people with better water retention. So they can weather droughts. So their fertility on their farms stays high while other people are drying up.

So we see some of those variables and other document in that paper almost twice the water in filtration, less soil erosion in that thing. And then the number that isn't usually paid attention to in that paper but these best practice ranchers in that paper actually carrying twice as many cattle per acre of land compared to the people that were practicing the traditional, most common methods over there.

And this leads from the science into the business now which is what we're seeing anecdotally and we haven't documented rigorously what it's scientific studies yet, is the evidence that suggests that farmers who and ranchers who apply these noble methods can raise their productivity, they can cut their input costs.

And the people that are clever entrepreneurs at this stage but hopefully we can forgot how to scale that, have a product that commands premium price in the market. So what's not to like from a business perspective. Those kinds of opportunities don't come around long or I can reduce my cost and increase my yield and sell my product for a higher margin in the first place.

So we think that the science coupled with business are some really great opportunities where we can help this thing scale and scale quickly if we

can kind of get through the education and experiential dimensions that Peter talk about.

Robb: Right. And you know it make some of my listeners do convulsions when I mention these stuff but it always seems the market driven elements ends up preceding the science and the science thing comes in after the market is kind of established what's really functioning and then it revalidates what we've seen kind of winning out in the market place. So I find that really interesting.

A lot of the work that I'm trying to do is create this systems where various like Savory Institute hubs or similar entities have a market place to sell these food to folks. And currently it's a little bit scattered but we've been talking with natural grocers, we've been talking with some other pretty big entities trying to get them in cahoots with the Savory Institute and the folks working the Savory Institute so that we have these kind of decentralized production systems.

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Russ, this is maybe a question for you but it definitely seems like consolidated distribution has a lot of advantages with regards to energy conservation and what not. My gut sense is that there's an advantage on decentralized productions, centralization and the distribution scheme. Do you agree with that or do we need decentralization on both sides of these?

Russ: Robb, you're very insightful because that's exactly you know Peter mentioned that we were off here looking at some of the business models that might be associated with helping unlock potential on this space. And the reason I giggled a little bit there because Peter knows that I think this particular issue of process and distribution of grass-fed meat is one of the most significant business opportunities in the space.

One of the things we've learned, Peter and I have been of around the country over the last six to nine months I guess we started last April huh, Peter. And we've been talking to thought leaders, politicians, entrepreneurs, scientists and one of the insights that came up here is that the small scale grass fed producers, they actually do okay. They're entrepreneurial but typically what they do is they'll have their meat

process in a local mom and pops slaughter house and they'll take it to a farmer's market or they sell it online.

But what we've learned was that the cost of processing and handling for those people were something like five to 10 times more per pound to finish product then goes through one of these large CAFO's. So in terms of overall profitability, potential profit, that supply chain is broken. And so the suggestion was we need this to find the sweet spot or we have more distributed meat processing that has shorter supply chains on it, shorter chains on the supply side and the demand side.

So imagine a slaughter houses that are placed between the ranchers and major markets. And one of the things that you said that tells me your intuition's really good Robb is that indeed the energy systems associated with such a thing because these are pretty heavy consumers of energy for their freezing for their delivery in cold to keep the animal products fresh.

It turned out to be a key part of a typical slaughter house and the midsize might spend just hundred million dollars a year in utility cost. But they've got all these waste product from the animals that could be used to generate some of the energy that could bring that cost down. And so we've – actually I'm part of a team that's made a pitch to a challenge called the climate quest at the University of Wisconsin in Madison.

Our team leader's a guy by the name of Bartly Duran who's a butcher in Wisconsin. And yeah, we're working to try to basically come up with the concept that would totally reengineer how grass-fed meat is you know brought to market so that more consumers could get healthy food and there's compelling businesses in this as well.

I guess in my view, if we're successful, you know we would be to coffee with Starbucks was or maybe the better analogy is an age where big agriculture is dominated by large institutions kind of like the automotive industry is we would be the Tesla motors to a German motors. That someone to come in and demonstrate a totally new concept for how we develop and deliver a product that makes this in a sense and delivers a compelling product to people who are eager to buy that product.

So that's one of several business models that we've developed and you know my hope would be that once people realize the potential in this phase and not only would it attract ranchers but entrepreneurs, I met a

clever team from Stanford this summer, two young ladies they're developing an iPad app to help ranchers apply these methods better on their land. I think there's all kinds of businesses that could come out of this space in once kind of the light bulb goes off here.

Robb: Right. I've had an idea for some sort of a hedge fund around this too where we can aggregate these now several million people playing around with this ancestral health approach and get a couple of shackles out of each one of those folks and then leverage that to be able to box some of these entrepreneurial endeavors and see them play out and then provide a great dividend for the people investing in that.

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Peter: As everyone knows that shackles are the most sustainable type of funny reference you can make.

Robb: Exactly I kind of use that on purpose.

Russ: I agree. Crowd funding has got potential. Even though I've talked to you about the science of soil carbon, my deepest expertise frankly is innovation management strategy that's what I've done for the last 15 years. And what I'm trying to do with my next 30 year career is figure out how to apply these entrepreneurial techniques to make things happen. And I think that there's a big meta shift underway where big game changing things that used to have to come from governments can now happen with startup companies.

And SpaceX seems really big now but you know I just think it's a huge, huge thing right now as a little startup company from California could do what only NASA could do just a short time ago.

Peter: And it started with Paypal.

Russ: And it started with Paypal right? So I think entrepreneurship is going to be the real key to unlocking a lot of these things and there's probably some things I know Robb you're big on ad policy. There's certainly probably some barriers in that. But I don't think there's any reason we have to stop and wait. I think if we unleash entrepreneurs and unleash or connect the demand of people seeking healthy, sustainable food to those entrepreneurs, I think that's the way to get these thing going.

Of course as you mentioned at the real cold phase, the practitioner side, Savory Institute is doing great work with the Savory hubs. It's just letting ranchers teach each other on what works on their land and that's really, really important.

Robb: Yeah, I'm on the board of directors of the northern Nevada, northern California savory hub. And it's some good friends of ours Abby and Spencer Smith and they're just 35, 40 minutes away and really doing some amazing work out in the northeast of Reno, Nevada. And this area interestingly you know it was once a vibrant grassland and it is a blasted desert now. It is kind of the almost pin ultimate end stage that Allen Savory talks about when you denuded the Earth of this perennial grasses like we have sage and gravel and that's about it.

And it's pretty interesting you need a thought along that line and this is maybe getting really out in the field but why not goats and camels and all these stuff that used to be part of this native flora and fauna before humans, the Clovis peoples made it through this area who are mastodon and bison and all kinds of things around here. I think there were a couple of different types of elephants, there were goats, there were camels that were indigenous to this particular area.

Should we be looking and trying to play to that side too? And I know that that's a whole other thing when we're talking about the economics of this like goat meat consumption is on the rise in the United States because largely of an increasing Hispanic populations. So there's a real opportunity there. But camels seems amazingly well suited to this area when you talk about limited water sources but how do we get folks fired up about camel meat? What do you guys think about that?

Russ: Who knows? It takes an entrepreneur that says I'm going to create a market for camel meat to do that. To answer your question functionally, is that A, biodiversity is absolutely key to this and it's not even just the large animals. One of the members of our science team is a bug guy. So he's studying the role of grasshoppers and insect in the system.

And one of the things that's absolutely true is to help the ecosystem require participation by plant animal species of all different sizes. And the plants like you said it's leguminous plants that are the nitrogen fixers that

have to coexist with the grasses for the system to work effectively and there got to be flowers for the pollinators to work.

And so all these stuff connects but in terms of the herbivores, the more of them and the more diversity of them, the better. Patagonia should get a really big pat on the back. They've been a pioneer in the commercial space here. They've signed contracts for supplier role production from people who apply these techniques, precisely these techniques to a sheep grazing for wool production. Richard Teague of our team has been active in consulting with the people that work as ranchers and that's been on Savory hub and instrumental in shaping those activities. So sheep, goats, who knows, camel…

We had a funny conversation about the role of the large animals like mastodon I guess about a year ago. Peter and I when we were at a little retreat because you know some of the comments from our people are more ecologically insightful than myself. That there really was an important interplay between grasslands and forest. And there's large animals actually had a role to play in terms of managing the interphase.

In other words when elephants will knock down trees. Right? They're kind of an alternative to fire in managing how trees and grasslands work together. I don't think we know a lot about you know exactly what the recipe is. We kind of know directionally where to go in this stuff but yeah, the more diversity, the better.

And I'm thinking of a lot of ways like what we're trying to do with cattle here is simply it's a very doable, very scalable way to replicate what the bison used to do in North America at least. And you know it will probably take us a while longer to kind of get the bison systems in the course that brings all kinds of other challenges in place as well.

I have a bison producer here five mile north of my house who started to graze bison. I'm telling you it's awesome. You know it's better than any bison I've gotten from other supply chain. So I hope the people bring back species diversity.

By the way, I just got to believe that that will have an impact on human health as well. I think eating the same – it's not just nose to tail, it's I think diversity of protein sources. It's probably going to have positive

human health impacts as well. So again this system is coupled when we think about it. Right?

Peter: We're talking about system. Robb, you mentioned systems. Russ, you're just talking about systems. And that's really – when I was making Soil Carbon cowboys, I had a lot of questions. Is carbon being sequestered? If so, is it the kind of carbon that stays on the soil for a long time like decades or centuries? Or is the kind that just cycles back up through the plant life and that's fine too? What about methane? Everyone talks about methane in cattles. So what's going on with the methane on these systems? The nitrous oxide.

And Russ mentioned bugs. What's happening with the bugs above and below ground? What's going on there? What's happening with the mycorrhizal fungi? What's happening with the bacteria to fungi ratio? And what's happening with the animal well-being and the animal health and the health of the meat of the animal? The rancher well-being and the ranchers health? And what's happening with the forage production? And what's happening with wildlife from insects to birds to large animals?

And as I was asking theses questions I've got to meet a lot of scientists around the country. A lot of them are just talking on the phone. And every single one of them was a specialist and one of the things that I just mentioned and they were really excited to measure these things on these ranches but they all were marginalized. All of them were hamstrung from doing the work they wanted to do.

And so at Arizona State where I teach, we just said come on out and let's see if this is team. 10 scientists came out and we realized that there was a team of like minded people who wanted to try and study these systems, this whole systems where carbon is the currency. And so now, that was a grant from the Walton Foundation. We just got our grant from the Thornburg Foundation to bring the science team back together again. And we're ready.

We have our game plan, we have our budget, we have our methods, we have our team. And we're going to measure anywhere between 36 and 81 ranches around the U.S. high stock continuous grazing, low stock continuous grazing. Continuous grazing being the way it's been done for about a 150 years. Just letting the animals roam from fence to fence and

maybe you have paddocks that are the third of the size of your ranch to this high stock density short rotational grazing, adaptive grazing technique that we've been talking about this conversation. Let's just see what's the difference. Let's measure it. And let's take a snap shot.

And that's really exciting because we're looking at the whole system at large scale. And it just, I can't believe it hasn't been done before but it hasn't. If there's a listener today who knows about this being done, let us know. But we've been look and look and look and we know the USDA's really interested in this. We know a lot of companies that want to create businesses out of these ranching operations are very interested in this.

We know a lot of environmental groups are very interested in this. We know a lot of companies are very interested in this. And so now, we're going to ask all of those people to put their money where their mouth is or put their money where their interest is and help us fund this large exciting science project. It's going to touch all the stuff we've been talking about.

Russ: And then looking at this stuff, one of the key things we're really be looking at is getting away from that anecdotal stuff for the data we have is simply because someone was there and measured it. We've kind of mapped out basic different ecosystems and environments around North America.

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If we go out and get these ranches and we can compare this people of different practices in the southeast, in the Midwest, in the far north and air it west, in California, in Texas and we can start understanding what are the controlling variables here? Certainly things like rainfall were going to be important. Seasonal average temperatures, sunlight, you know, we'll probably learn a whole bunch of stuff that we didn't know.

David asked a question before by doing this project so like he said, we just assembled this team, we're kind of dotting our I's and crossing our T's on the actual project plan now. And hopefully we think it's something we can do over about a three year period to get some real high quality research to go out and do this.

Maybe shorter if things go well but this is probably in the evolutionary health perspective you guys probably went through this phase 10 years ago. And we're just kind of entering it now with the soil health dimension.

Robb: Yeah, you know it's maybe about 8, 10 years ago that we got the very first kind of human clinical trials looking at Paleo diet versus a Mediterranean diet or a standard American diet and stuff like that. It's only been later that we've been looking at these interventions for specific disease process. So it's interesting. It's tracking very similarly.

Russ: Yeah I think it'll be coupled you know. I know you're also a fan of Martin Blaser and the Missing microbes.

Robb: Right.

Russ: Where the whole idea is that there's a co-evolution between the microspecies and the macrospecies and that's the same thing here. So I think that the things that you continue to learn in the evolutionary health perspective will help us formulate good questions for researchers as well. And that the least of which is nutrition for what it's worth.

I think something that I haven't found in a research on yet if it exists I'd love to hear about it, the best research that I think it's been aggregating so far is by Cindy Daley right there in Chico who I believe you might know Cindy.

Robb: Yeah.

Russ: Who did the best work in terms of documenting the nutritional differences between grain-fed beef and grass-fed beef. But no one till the best of my knowledge yet has looked at the nutritional differences between grass-fed beef that's been raised in this holistic practice versus other normal grass-fed beef or maybe the grass or the cattler just grazed normally on open pastures.

Because if we're right, there's an implicit thing in here where we should be cycling the nutrients from the soil better. That we're getting you know right micronutrients in the food to allow maximum growth and etcetera. And we don't know that but I think that's an interesting question. So

there maybe some coupling that occurs directly on that dimension of this project. We'll see.

Robb: Loren Cordain did an interesting analysis of whole body rendering of some wild deer and elk and looking at specifically just the fatty acid profiling those critters. And it was markedly different than just a monoculture grass-fed cow. So I think again, that's all speculative. We don't have any data to hang our hang our hats on but it was markedly different and in that, just looking at the fatty acids, just not looking at all these you know there's tens of thousands of carotenoids and other fat soluble phytonutrients that get associated with the fat in these animals and in our own bodies that seem to have influence on the way that our biome actually processes them.

You know, people talk a lot about polyphenolics and different plant products that are beneficial for health but it's typically our gut bacteria that process those and then it's the product of that processing that we end up benefitting from. So that's a huge, huge story and we have zero information on it.

Russ: And zero information but you know I think it was your friend Chris Masterjohn that turned me on the micronutrient benefits of grass and meat. You know those fat soluble vitamins or the things that may grass-fed beef fat a little bit yellow. And so the idea that yellow fat is good fat is kind of contrary in most current markets look at fats and saying hey, you want it to be white because it looks pretty.

Robb: So let's bleach it.

Russ: So let's bleach it right. And I think one of the marketing things here is can they help people appreciate now when you see all fat that means it's going to be rich in micronutrients. And I only just this summer finally got around to reading Weston Price's big magnum opus on that stuff and I think there's even interesting dimensions here.

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You might recall a document in how a dairy products vary seasonally by geography and he used to have samples of butter fat sent in from 16 different regions around North America and showed how the fat soluble vitamin content will vary according to the time of year based on what the

animal is grazing it at the time. And I think that it's really plausible we're going to see the same type of thing emerge in the meat products as well.

Peter: For us. Look at Gary's Zimmer cheese.

Russ: Yeah, we met a dairy farmer in Wisconsin here a couple of months ago. Gary Zimmer really brilliant soil scientist himself. He applies very similar principles let's say in soil nutrients and we had his cheese, it was just mind blowing.

Peter: Seasonal. He's got winter cheese, spring cheese, summer cheese, fall cheese and you can taste the difference. it's the same animals on the same land just different plants growing. One's really tangy, one's really smooth. It was amazing.

Russ: And note he hasn't gone in and actually measure kind of what's the fat and vitamin differences between them but I bet they're significant.

Robb: Yeah, yeah absolutely.

Russ: And that's probably what's driving the taste differences. So I think it there's just a zillion areas for research in this stuff. And I think one of the things back, the original realization here, we'll know we're on the right course when we start finding solutions to what's good for the planet is good for our health is also good for local economies.

I think this is what really got me hooked here when Peter first called me I'm like holy cow. Usually because my career for the last 15 years has been investing in people with very noble energy technology idea sets my wheelhouse. And here's an idea that's related to energy in the form of carbon sequestration and ultimately potentially as you said in terms of energy consumption distributed to production systems.

But it's this pathway here they're all connected to something where everybody wins. You just don't see that very often. And I think it's because we're going back into this evolutionary framework of where things have co-evolved and so once you figure out how they all fit together when the system is working right, all the components to the system get better as opposed to one has to suffer in order for something else to succeed.

Robb: This gets really far afield but there's this whole concept that the Nash equilibrium in game theory. And you know if you've got a complex system and the players in that system follow a pre-prescribed set of rules then all of the individuals end up maximally benefitting. But when one individual breaks that rule and I would argue that humans maybe through ingenious but perhaps we're going to find out maybe misguided application of technology we've broken a lot of the rules that underpin ecology that the Nash equilibrium has been broken.

And although we've had a short term benefit, we could argue with regards to the economy's upscale from intensification of food production and what not. In the long run, that system will eventually break and that's kind of the foundation of this whole Nash equilibrium which is going to be a chunk of my talk at Paleo effects talking about that stuff.

But when you talk about that, it just makes me very excited because it has a little bit of that feeling of that fractal element that it should be good for local economies, it should be good for the environment, should be good for humans and it should be again, mutually beneficial on all scales and then we're following within that Nash equilibrium.

Peter: And for the animal well-being too, again back to my vegan and vegetarian friends, part of the reason they're so against eating meat is the industrialization of the meat. And if they felt like the animals are being treated well then they back away from saying no one should eat meat. We're at a restaurant in Chicago where this woman said wherever we go on this research we've been doing, we find the grass-finished beef places. And this one woman said do you ever have a great life, just one bad day.

Robb: Which is pretty much everybody's story.

Peter: There you go. That fits everyone.

Russ: Robb, I really look forward to seeing what you do at Paleo f(x) because I think this insight about humans as the single agent broke nature's Nash equilibrium is bang on. I think that's a really, really good insight. And you know we used to because I've been in the innovation business for quite a while. And for a long time, the last 10 years there's been this big trend of biomimicry which is how we imitate nature, how we replicate features that we see in nature in order to invent new widgets and processes that are more efficient.

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But I think what this stuff does is what I call biomimicry 2.0 which is how do we actually tap into and work with nature instead of just sit on top of it and try to imitate it? And I think that once we realized that humans are a participant in nature not something that rides on top of it, I think it will open up all kinds of opportunities here where you can kind of eat your cake and have it too. But you got to think systemically.

Peter: Natural technology, right Russ?

Russ: What's that?

Peter; Natural technology.

Russ: Natural technology that's right. This is all about natural technology.

Peter: Hey Robb, can I ask you a question?

Robb: Absolutely yeah, yeah.

Peter: Because I'm the guys usually ask in the questions right? Have you read, I think it's David Montgomery's book called Dirt?

Robb: I have, yes.

Peter: Because I just think about that book and again it's not like we started making mistakes 150 years ago or 250 years ago. Soon as we start digging the soil with any kind of implement 10,000 years ago, we started cutting through the mycorrhizal fungi. And it's sort of been very few people getting it right and a lot of people knocking it up since then right?

Robb: Yeah. And Jared Diamond in his book Collapse talked about that. He ended up covering a lot of the same material not everybody has – typically the story is that people end up screwing it up in a pretty epic fashion but occasionally folks figure out some sort of a legitimately long term sustainable way to make both their economies and their food production work.

Russ: Yeah, exactly. Yeah and what I thought in that Dirt book that Peter mentioned in Collapse is basically civilizations are successful because they temporarily exploit the soil and then when it doesn't work anymore they pick up and move somewhere else or they just die away. I think the

opportunity here now is once we understand this system it's not even about compromise anymore. It's about synergy. It's like you know that humans and soil once they're back in phase in this Nash – if we reestablish Nash equilibrium, the bugs win and we win. In fact this is one of those I don't think you can read some of those books on microbiome stuff without coming up with questions about who's controlling the show here.

Are we providing – basically we're just a symbiotic host for the microbes to be able to exist. And I think he come to this similar thing here with the soil stuff in a lot of ways. The soil microorganisms here have evolved in ecosystem defeated energy. And if we figure out how to do that well, they'll treat us well at the same time. And if not, well as long as there's another place to move on to we're good. Robb, has you seen this new movie Interstellar yet?

Robb: I've not yet. People have been telling me to go see it but I have not yet.

Russ: Yeah, so the underlined plot right is that we've screwed up the soil on planet Earth and so now we need to go find a new planet. And I won't give anything away but I think what we're talking about here is what we have in front of us is an opportunity to figure out how planet Earth work.

Robb: Find a new planet.

Russ: Yes. We don't have to go far away galaxy to find a new home.

Peter: I like that. I like that Robb, find a new planet. That's really good. Just one.

Robb: The one we got.

Peter: It's like when you have guests and you live in a big city and you have guests visit all of a sudden you see things in your city you never would go to when you're just living there. You know maybe we need to look at Earth as from the tourist point of view.

Robb: Because we kind of are. Man I could seriously drive this thing for three hours if guys were willing to do it but to kind of circle back to one of the first things that Russ mentioned when we crack this thing open. The number of people that once were involved with farming and food production and have smaller number that is now, it's interesting from kind of an economic perspective where manufacturing has been

outsourced and there's all kinds of different efficiencies that seem to be going in the manufacturing where is this holistic management of food production.

I mean maybe we'll someday have a smart enough robot to pull a lot of that stuff off but it seems that's maybe another century down the road or something like that.But it seems like there s a huge opportunity for a lot of folks that were popping out of college, they don't know what they're going to do, they're not really satisfied with the current system and maybe we need to start educating people about how to be farmers and then we aggregate some money and buy vast tracks of land and do some experimentation on all these and we both are propping up our economic side by getting people into a career path that could be multigenerational type approaches.

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But it's also patching up the soil and solving a lot of other problems because the historical manufacturing base of the United States is just gone. And you know there's all kinds of wistful talking about bringing that back and I think that's a pipe dream. But if we were to reallocate a lot of resources and skull sweat into producing healthy food in a healthy environment then everybody seems to win out of that.

Russ: I think that one of the a-ha moment for me in this whole last two years of really working at this and thinking about it and meeting so many smart people is that we truly could be looking at a way to create a vibrant, agrarian middle class. And again everyone wins and just one little thing about that. I was just at the TomKat ranch out in California. And there was this guy there he graduated from Stanford and he's working on a ranch. And it's not like he's working on a ranch for his summer, didn't go back and get his finance job.

He's working on a ranch because his career is going to be in the soil. And he's happy about it and his parents are happy about it. And his advisers at Stanford are happy about it. And that right there is what you're talking about in three dimensions.

Russ: Yeah. At Stanford of all places, right? I grew up in Nebraska and went to school in Iowa so you expect that out of there, it's still really small

movement Robb and you probably see some from your side too. I know you know Chris Kresser and that Savory Institute.

There's a budding community of practitioners here that are kind of, they are entrepreneurs. They're heading out to reinvent agriculture and it's just inspiring to meet with them and again to offer insights in any way to help them. Really exciting stuff going on there and I do hope that we could kind of recreate the middle class.

And by the way, the only thing where maybe my perspective is slightly different here I want to be cautious not to paint this as some sort of return to the old ways, I think of this is if we get it right it's kind of like a positively ever expanding spiral or history you know the current reality rhymes with history but isn't that the same.

I think there's plenty of room for technology to enable this kind of stuff to happen well but it's got to be thought of in a different context right? So things like we mentioned missing microbes for antibiotics very effectives, save billions of people, brought health to masses and now we start recognize non-intended consequences. But the replay of opportunities for different ways of dealing with infectious disease that are more sustainable. And I think the same thing will be true here as well.

So big data, IT systems for ranch management, water management, soil carbon. We're working with computer – just got a meeting a couple of weeks ago with guys at NASA JPL on measuring things from satellite. And so this isn't a kind of diverse world. It's not like you have the opportunity to do some interesting kind of forward technologies stuff. Let's use that technological innovation insight inside of a sustainable paradigm let's say on how to grow food in our economy in a way where everybody wins.

And by the way I think it's also going to couple – I may have mentioned in my introduction, I think that our food systems, our energy systems and our water systems all get reconnected again once we figure this stuff out and so that's the scope of space where entrepreneurs would be able to enter in, make some big stuff happen.

Robb: Awesome. Well I've got to tell you guys this is the most exciting element of this whole ancestral health story is actually the food production side. And everything that's happening with this and I keep telling people that when I feel I've cracked a nut on this health care side of things I'm going

to disappear like a thief in the night and I'll be out on a farm somewhere being completely incapable at first but figuring out how to do this stuff for myself and my family. That's the next step for me is actually getting in and becoming part of this food production scene not just talking about it.

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And you know what it's interesting when I first stumbled on to this Paleo diet concept, there were maybe 200 people in the world that would have known what the heck it was. And now you know it's millions of people doing it, it's been on an exponential growth. Trend it on Google searches since around 2006 and it seems like we're just at the front wave of this. So it's really exciting to see this next phase where there may be relatively few people today involved in this holistic management of food production.

But what's really cool is that there is a built in market of this ancestral health scene that is just waiting for folks to scale this and run with it. So I'm hoping that the run way is much shorter and the climb is much faster for this food production story than what it was even for this health and medicine story.

Russ: Us too.

Robb: Awesome. Peter, Russ, thank you guys so much for being on the show. Anything that I can do to this bigger community can do to support you guys, I'm absolutely here for you. If you ever want to undertake some crowd funding type activities, glad to help with that. Any projects that you're working on, always glad to get the message out. So carte blanche, anything you want, we'll do it. Other than me dancing or singing that would be…

Peter: Robb, we might want that too.

Robb: There's a genre for everything apparently. Guys, thank you so much and I look forward to seeing what you have going in the future.

Peter: Thank you Robb. Happy thanksgiving.

Robb: You too, take care.

Russ: Bye.

[1:07:04] **End of Audio**