Dan Seed:

Welcome to Big Ideas, a podcast from Texas State University, in San Marcos, Texas. I'm Dan Seed from the School of Journalism and Mass Communication. And we're turning our focus in this episode to a grant from the US Department of Agriculture, that's leading to a study on a potentially game-changing source of feed for cattle. We're joined by Doctor Merritt Drewery, assistant professor in the Department of Agricultural Sciences. Dr. Drewery's research focuses on the identification of novel feedstuffs to enhance livestock production. Certainly a key area of the economy here in Texas. Dr. Drewery thanks so much for joining us.

Doctor Merritt Drewery:

Thanks for having me Dan.

Dan Seed:

So tell us a little bit about yourself. How'd you get into this field? What drew you to it?

Doctor Merritt Drewery:

I started my academic career wanting to be a veterinarian. And somehow I got roped into undergraduate research and the rest is history. I just loved research and specifically, I've always had a love of agriculture, but also nutrition. So I pursued a Master's in Ruminant Nutrition and today we're talking about ruminants. Cattle are ruminants, that's their specific digestive physiology. And in my Master's, we fed cattle algae and it was algae that had the oil extracted for biofuel conversion. So it was kind of this novel feedstuff identification, and I just really thought it was cool and a sustainable approach to agriculture. In my PhD I got away from that, I went to human nutrition, but when it came back to my further academic career, as a professor, I just love agriculture and wanted to come full circle. So here I am and the algae story has kind of been told, but I wanted to continue my research on alternative, more sustainable, feeds for cattle.

Dan Seed:

All right. So this grant that we started the show with, it's a $200,000 grant that's supporting your project that looks at black soldier fly larvae as a protein source for cattle. So first off, what are black soldier flies?

Doctor Merritt Drewery:

They're not the common housefly. They are similar, however. And why they're so interesting is because they're not a disease vector. They don't bite. They're not something that like a termite that would chew your house up or be invasive. So they're just like a non-pest insect species.

Dan Seed:

So why attempt this with these particular flies in order to create this sustainable food source for cattle?

Doctor Merritt Drewery:

That's the big question, Dan. And as you know there's a lot of different insects out there and why black soldier flies are interesting is because they are such efficient converters of their feed into their biomass and they can feed on waste. They can feed on organic waste, food waste, manure, and things like this and turn it into their veins. And they are really protein-rich. And so it's that protein we're looking to harvest. So that's one really, really great aspect of black soldier flies. And also they've demonstrated that they are appropriate for large-scale production. So they're able to be grown on a very large scale in a commercial situation. Some of the reasons, but there's more sorry I could, I could go on and on. I just think they're the coolest insects in the world, but I think those are the big points.

Dan Seed:

You touched on this. There's a potential here for this study to have a real domino effect, potentially a new feed source, an environmentally sustainable feed source for cattle. And that's important, right? As demand for meat is going to increase more than likely as the world's population grows. Is that kind of the idea behind this study, to look at these flies as a potential food source?

Doctor Merritt Drewery:

Yeah, absolutely. And I should just say for our listeners, these flies are grown in a large situation. They're harvested at the larval phase. They're dried and they're ground. They're going to be ground into not quite a flour, but something a little bit more fibrous. Okay. So the whole thought behind this is, cattle conventionally are grown on things like soybean meal and some of these other conventional feedstuffs to supplement their diets. Perhaps it's a forage-based diet or perhaps they're in a feedlot. So a lot of these grains, in different products that cattle are raised on, you and I Dan can consume, they're fit for human consumption and they're also associated with environmental degradation. And so the question is, can we spare some of these grains that are fit for human consumption? And can we start feeding cattle, something that you and I Dan, don't want to eat? I don't know how adventurous you are, but I'm sure you don't want to eat black soldier fly larva.

Dan Seed:

Yeah. I'm not, I'm not sure about that. Maybe if I were on Survivor and there was a contest, maybe I'd go that way, not as an everyday or weekend choice.

Doctor Merritt Drewery:

Right. And that tends to be the attitude of the Western consumer, although these black soldier flies are very nutrient rich. We just are pretty adverse to them. Livestock however, if you think about cattle or just livestock in general, insects are part of their natural diet. They eat insects naturally when they're grazing. If you have backyard chickens, you definitely see them trying to peck at the insects or the different grub worms. So this isn't like something that's totally unnatural. And again, it's something you and I don't want to eat. So we spare some of those other grains that are fit for our plate for consumption. They're very environmentally sustainable, still getting more data about the different environmental and natural resource inputs required to grow them. But a lot of the preliminary data look really good, such that the flies can be raised sustainably and they're associated with less natural resource inputs than some of the conventional grains, kind of a win-win situation.

Dan Seed:

Well, I think he did a good job painting a picture for us in terms of what the process is like, because in my mind, when we're talking about feeding cattle black fly larva, I'm picturing them eating the larva, right? Like the whole deal and putting it in that perspective and painting that picture as you did really puts that in to a pretty good perspective in terms of what we're looking at with this project here. You mentioned that the flies are sustainable and easy to raise or have them be produced. Walk us through that process. How does that happen?

Doctor Merritt Drewery:

I've only had the fortune of being at one of these facilities once. I'm hoping to be invited. What I've seen, Dan, is that they have, let's call it a breeding herd. So they have separate mature male and female flies. And then where we're actually getting the larva is kind of a separate area. So in this separate area, let's just imagine a big tub or a big bucket if you will. And that's where all of the larva feed will go. And so then we take out one of our bred females, females carry eggs, and so the females will deposit eggs in this bucket. And the great thing about the larva once they go from being eggs to being larva is they're deposited in the food they eat. So now they're eating whatever food is in that bucket. So it's pretty quick. But when they're ready to pupate, which is the next life phase for them, these buckets tend to have a little ramp.

Doctor Merritt Drewery:

It's not scientific, it's not fancy. It's like a literal ramp, Dan. And so what the larva do, they have this natural instinct when they're ready to pupate their mouth turns into this hook because they're going to hang and pupate and then go to the next phase, which would be a fly. So when their mouth turns into a hook, they know it's time to stop eating. And then they crawl up the ramp to get away from the food and to a really dry place to pupate. So when they crawl up this ramp, they then fall into this hole and it's like a second bucket. Let's call it a bucket within a bucket. And they [inaudible 00:09:04] the bucket within the bucket. And then the fly producer can get that bucket and he has this larva they've harvested themselves. It's really cool, this natural physiological instinct allows us to not get our hands too dirty. All you have to do is get the bucket out of the bucket and then dry the larva. So I'm sorry if you own an insect rearing facility, because you're probably offended because it's way more difficult than that. But I think that kind of paints the picture. Was that okay?

Dan Seed:

Yeah. Perfect. And like you said, not getting your hands too dirty. I don't know if that would be for me, but for the folks that do that, kudos to you. When we're talking about feeding cattle, how many of these flies are needed to be ground down into this material that you're talking about, in order to satiate the cattle? Thousands, millions, what are we talking?

Doctor Merritt Drewery:

That's a great question, Dan. I don't have the answer. I think it would depend on where this feed would be marketed. Would it be the feedlot industry? Would it be a cow-calf industry? So I guess it would really depend, Dan, but I will answer a kind of underlying question, is the capacity there? I think the answer is yes. So this industry is very much in its infancy and that's great because we have the opportunity. That's why I'm conducting this research. I'm trying to inform those that are in the insect rearing business, potential markets for their products. Because I think ideally they would like these products to enter the human food sector.

Doctor Merritt Drewery:

But as you just demonstrated, you and I probably aren't going to have black soldier fly larva on our plate tonight. So I am hoping that kind of the secondary, backup option will be livestock feed. And just a spoiler alert, Dan, black soldier fly larva are already approved in the U.S. for poultry diets and for some aquaculture. So I think salmon is as well. And I think we just got new legislation that they're approved for swine, pig diets as well. So definitely think that the industry will be able to meet demands of the livestock, especially as they continue to grow. And these startups continue to get more and more funding, which we have seen this industry, the insect rearing industry, has been really great that fundraising.

Dan Seed:

And so the study that you're going on here or working on through this grant is really cutting edge in terms of the fact that dealing with cattle.

Doctor Merritt Drewery:

Yeah, I think so and shout out to the USDA for funding it, I guess they think so as well. So we just went into that line of inquiry with this USDA grant because the pigs, the fish, poultry, they all have a different digestive system than cattle. Ruminants. And so there is reason to believe that cattle will be able to use black soldier fly larva better than the animals that it is currently approved for. So I think it will be a more efficient process and we'll see better productivity out of our livestock.

Dan Seed:

So as you mention and as you said, this is cutting edge and you're doing this for the first time with cattle, best to your knowledge, knowing that you're just at this forefront, what is that like for you?

Doctor Merritt Drewery:

Oh, it's really humbling. I didn't come about this myself. I have a lot of people to thank and I do feel that I kind of stumbled into this line of inquiry. So it's really humbling to receive this grant and to be here with you today, Dan, and it's really exciting. A lot of our students are excited about it. I'm so happy the industry's interested in it. So it's exciting and humbling. And it really validates that I made the right career choice and being here at Texas State where we have the capacity to do this. So I'm feeling pretty good, Dan. Yeah.

Speaker 2:

Yeah, it's always good to get that validation, right? Walk us through a little bit on the study, the mechanism of it, how is all this going to work? How long is it going to take?

Doctor Merritt Drewery:

So we studied a summer and it was funded by a separate USDA grant actually. But I do have those data. If anybody wants to see them, they're published as a thesis, we'll be presenting it at conferences. So listeners definitely reach out to me if you're interested in those data. So what we do next is feeded at different inclusion rates. We're really interested in how the insects stimulate forage intake and digestibility. We're looking at more forage based operations within the cattle industry. So that would be a cow-calf operation. And so that's kind of where we're going with it. I'm also interested in looking at not just the black soldier flies themselves, but the black soldier fly larva frass. And so frass, Dan, is the excrement. Can I say poop? I'm not sure. Can I say that on this podcast?

Dan Seed:

You sure can. You just did, it's okay.

Doctor Merritt Drewery:

So I'm interested in feeding the insect frass as well. We need to continue to compare it to conventional feedstuffs. Last summer, when we fed it, it was whole black soldier fly larva, in the future I want to feed defatted black soldier fly larva. So it had the oil extracted, that oil has applications perhaps in the biofuel industry, pharmaceutical industry, cosmetic industry. So again, this defatted biomass would be kind of a waste, you know? So what do we do with the leftover protein, feed it to livestock.

Dan Seed:

Yeah, I mean, the way that you're describing this and talking about it, it's pretty fascinating to think all the possibilities that come from these fly larva when we look at them as pests or we look at them as problematic and instead these things are able to potentially have such an impact across a number of industries.

Doctor Merritt Drewery:

I think what you're saying is valid. This has an cross-industry impact and historically we ate insects and in many regions of the world, consumers still eat insects and they're very nutritious. They're safe to consume. But the Western consumer in most developed regions as well is not interested. There's that eww factor that kind of gross factor associated with it.

Dan Seed:

So where is this going to happen?

Doctor Merritt Drewery:

Our trial last summer was in collaboration with Texas A&M University Department of Animal Science. That's where my mentor is still employed, Dr. Tryon Wickersham. And that's where I conducted my Master's work. This summer as well we will be doing a trial with them. And then the trial that was funded by the USDA will be here in San Marcos, at Texas State University. The university operates the Freeman Center and they have a herd of cows. They have goats. There's a lot of just great research going on out there. So I'm really excited to be part of that club and bring this research here. Last summer, we had an undergraduate honors thesis with our preliminary work. This summer we'll be a graduate student and this specific trial funded by the USDA that we're talking about today, will involve two graduate students and probably two or three undergraduate research workers. So that's kind of what the team looks like again with our collaborators at A&M as well. They will be helping me manage the trial.

Dan Seed:

So let's talk about that a little bit, right? Working with students, bringing students in. For you as a faculty member, what is that experience like? What do you enjoy most about that opportunity to involve students in a project like this, in a cutting edge project like this?

Doctor Merritt Drewery:

It is phenomenal. And we already talked about validation of decisions. This is really what makes me so happy to be a faculty member and be a faculty member at Texas State University. I was really drawn to this institution because, as you know, we're a Hispanic serving institution, meaning the majority... Well, we're actually a minority serving institution as well. The majority of our student population are minorities. And we also have a very high percentage of first gen students.

Doctor Merritt Drewery:

And so for me, the opportunity to work with these students is just so phenomenal because they, much like myself, I was a first gen student, as you noted Dan. And I felt that I had a lot of drive and a great work ethic. I just needed some direction. And that's where my academic mentor came in and really showed me the way. And I really attribute him, Dr. Wickersham, who we talked about. I attribute him with a lot of my success today. So to be able to pass that on just feels so good and so fulfilling. I do feel I've come kind of full circle. And at the end of the day, again I'll use the word humbling, but also kind of scary. Sometimes I'm like, oh, these students are trusting me with this, kind of doubt yourself. But it's been really fun, they really energize me and keep me on my toes.

Dan Seed:

So what do you like best about what you do? Because what you do is very unique, clearly, what is it that drives you every day?

Doctor Merritt Drewery:

I love being a scientist and conducting research, but if I never have an article in, Science or Nature Journal or whatever I'm going to be, okay. What drives me is working with the students and this trial is cutting edge, it's at the forefront of the industry. So I really just want to put these students in good positions, with really cool research, really cool opportunities, that give them practical, hands-on experience, teach them how to think critically and get some recognition so that when they're ready to pursue a professional career or perhaps a Masters or a Doctoral degree or vet school, or whatever's next for them, they feel that they are really set up to achieve. So really that's the favorite part of my job, being a mentor and just hopefully positively impacting these students.

Dan Seed:

Is there anything else that you'd like to add or say about this project, this grant or your own work that we haven't touched on that you'd like to get to?

Doctor Merritt Drewery:

I would just really like to encourage our listeners to reach out to me if they have any questions. We're going to be presenting this work at different conferences in the coming year or so. So definitely if anybody wants to collaborate, we're also conducting some social science survey research around this, around consumer perception and acceptance of these products. So definitely I welcome any dialogue, any collaboration, any thoughts, or just questions. And students, if any students are listening and they want to be a part of this, I also invite them to reach out to me.

Dan Seed:

And how can they reach out to you?

Doctor Merritt Drewery:

You can always Google my name and I have my email and my contact information is listed on the Department of Agricultural Sciences at Texas State University, on that webpage. So they can very easily Google me and find me that way.

Dan Seed:

All right, great, Dr. Merritt Drewery thank you so much for joining us.

Doctor Merritt Drewery:

Yeah. Thanks for having me, Dan, a.

Dan Seed:

And thank you for joining us for this episode of Big Ideas, until next time stay well and stay informed.

Speaker 4:

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