University of Manitoba: “What’s the Big Idea?”
Series 2, Episode 3 Dr Nazim Cicek

TITLE IDEA:

Feeding the world without costing the earth with Nazim Cicek

INTRODUCTION MONTAGE:

Trudeau’s speech at the Canadian Federation of Agriculture’s (CFA) 2023 Annual General Meeting:

“Climate change is an increasingly urgent issue for farmers... Hurricane Fiona damaged barns, orchards, and fields, destroying crops and killing cattle.”

MUSIC SWELLS

Nazim Cicek teaser clips: So many of our programs at the university have a sustainability angle to them, our researchers are key to innovation, but also to training the next generation of folks that can work in this area.

So we are gonna have hotter and drier summers, and we are gonna have wetter winters that's projected. We know that that's gonna wreak some havoc because more flood and drought is upon us, and we need to grow the varieties and develop those varieties that are, that can withstand some of that.

INTRO MUSIC STARTS

Michael: Hello, I’m Michael Benarroch, President of the University of Manitoba. Welcome to season two of my podcast, “What’s the Big Idea?” I’m excited to share more conversations with big thinkers from the UM community who are contributing to the cultural, social, and economic well-being of Manitoba, Canada, and the world. Together, we’ll unpack the “big idea” their work explores. With topics ranging from health research to climate science to social justice, there’s something for everyone.

MUSIC SWELLS

In this episode, I sit down with Nazem Cicek, whose big ideas are proving that it doesn't have to cost the earth to feed the world. He's a professor in the Department of Biosystems Engineering and Associate Dean Research in the Faculty of Agriculture and Food Science.

I spoke to Nazim about how research is advancing sustainable agriculture to address food shortages and the climate crisis. His expertise in both engineering and agriculture set him apart as a thought leader on this topic. It was a fascinating conversation, and I know you'll enjoy it as much as I did.

MAIN MUSIC ENDS

MAIN INTERVIEW

Michael: So, professor Cicek, uh, it's a real pleasure to be able to sit down with you. For about 20 years now, you have been what we consider one of the leading thinkers in the University of Manitoba's department of Biosystems Engineering, which is in many ways a unique department. And that it's, it's in part in two faculties in the price faculty of engineering, and then the faculty of agricultural and food science. You're now the associate Dean of Research in Agriculture. So, I wanna begin this conversation with the question I've been asking at the beginning of this podcast. Um, and so I'd like you to answer our central question of what's your big idea,

Nazim:
The big idea is really not just one idea, it's a set of ideas around the central question we have. And that is how we make sure we meet the demand, the growing demand of food, which is supposed to increase by another 25% by 2050 globally, while at the same time reducing the environmental footprint that production imposes. and that footprint, many people just think about greenhouse gases, but it goes beyond that. So how do we increase food production for a growing population, a population that demands more, while at the same time reducing our overall, uh, impact on the planet.

So in that regard, there's many, um, you know, arrows we have to throw at this because there's no single silver bullet single solution. And they start from, on the field work in the barn work, uh, what happens in a food processing environment or,, storage environment. And ultimately what happens in our kitchens and our homes. So in all of those, in the entire supply chain, we have to be conscious of what is it that we are trying to achieve, which is healthy, safe, abundant nutrition, while protecting the planet. So the big ideas are really revolving around, those topics.

Michael:
So 25% that's a big increase, while also protecting the planet. So you once wrote that agriculture is really heavily dependent on innovation, and so to feed future, uh, generations in a sustainable way, you said that we need to be smarter. So how can we be smarter?

Nazim:

Yeah. So in many ways, we have an opportunity that's unique to our times. We have access to more data, to more information, and we have the ability to turn that information into decisions that benefit productivity, um, farmer wellbeing, but also environmental sustainability. So working smarter doesn't necessarily mean that we have to change practices fully, but by adjusting, uh, to what we engage in, in our daily activities there's an opportunity to reduce our overall impact. We need to figure out what tool is, available to us at the right place, and then how can we best implement that change? And that's really the difficult part of that question is, is how do we make sure that people are incentivized to do better for the environment? And that's, that's not an easy, easy, topic to cross.

Michael:
So, on that, and, and I know you said it's not all about technology, but, but how has agriculture changed in that way?, like what tools and technologies are on the horizon, um, that, uh, can be used to advance sustainable food production? What are we researching now?

Nazim:
Yeah, so we, that's really, um, an emerging area and constantly changing, right? So in the field, uh, we have tools that we never had before. We have, uh, you know, technology that now tells us what's going on in the soil, at the plant canopy level, in the microenvironment. Um, and beyond that, even in regional scale, you know, with satellite imaging, drone footage, uh, weather stations. So connecting those sorts of information in a way that a farmer can make a real time decision really drives how we can be smarter, as we just talked about in, producing food. Now, the same kind of technologies are available in livestock production. You have cameras, you have, machine learning algorithms that you can apply to make sure that what happens within a livestock facilities is more, you know, is lower impact overall is more productive.

Lower feed intake, for example, making sure that whatever waste we produce is properly stored and managed, and ultimately animal welfare and farmer mental health, for example, can be improved. So technologies are there for us to make sense of what is going on at real time and make the right decisions to advance our processes. There is beyond that also a data revolution, right? So now we're talking about having access to market data, to consumer data, to understanding genomics in a, in a different way. So all of that helps us leverage that data, uh, to make the right decisions at the right time.

Michael:
And so that is a real change. And, I suspect how farmers would've done this before, right? They would've had to take a sample somewhere, right? Get it tested, that would've taken time, and so they can actually adapt on the go.

Nazim:
Yeah, exactly. I mean, uh, remote sensing tools were not available to us in the same way they are now, right? And then the ability to see that information in your palm on an ongoing basis, make decisions right at that time to turn your irrigation system on, maybe look at variable rate, uh, fertilizer application, maybe make a decision on how your, uh, you know, grain is doing in

the bin. Should I sell? Should I move it? Should I dry it? Those are now available, at all times, on your phone in an app. So 10 years ago, those decisions would have had to be made by taking a sample, taking it to the lab, or analyzing it, uh, locally. And, uh, that time lag really prevents you be from being most effective. And if you're talking about food waste, for example, making those decisions at the right time is critical.
Up to 50% of our food that comes off the farm does not turn into nutrition. And there's waste all the way throughout that supply chain.

Michael:
So we may be able to increase 25% without actually increasing production?

Nazim:
We can, and I think to some extent the opportunities are even more significant in Canada. So there's lots of areas of the world where we know climate change is gonna wreak havoc, right? We are gonna have arable land,, being threatened in those areas. Here in Canada. We have an opportunity to expand our food production base, maybe,, take advantage of the longer growing seasons. Right now we know we are gonna have climate variability and at times stress associated with change. But in Canada, we have this opportunity to be a main, exporter of food. We already export $75 billion worth of food on an annual basis that's projected to increase as other parts of the world suffer., you know, whether that's through geopolitical issues or it might very well be climate or other factors, Canada can step in. So for us, we have a unique place in the global food security arena and I think overall, when you think about what that then means for us as a responsibility as,, having a large land base, stable, you know, economic and political system, an educated workforce, we are in a unique position to feed the world., but will we do that at the expense of some of our environmental stewardship that we need to also have? that remains to be seen.

Michael:
and so, I mean, you talked about kind of a whole loop 'cause you started from production and you went all the way right to consumption. And I'm just wondering, is there a glaring gap somewhere in the loop that, that we just haven't closed in the food system?

Nazim:
I think there's many gaps. There's lots of opportunities. So we always talk about from the farm gate all the way to the human gut, right? So there is waste or lost opportunity right throughout. So we waste on the field in storage, post harvesting in processing, but most importantly, we waste in restaurants, in grocery stores and in our kitchens. And then where that waste ends up going will really determine our whole lifecycle footprint, of that food. Because if it goes to a landfill and produces methane, uh, that is obviously not good for the environment. If it causes health issues, sanitation issues, that's not good. But if we are finding ways to bring that waste, you know, back onto the field, into the barn, into some sort of upcycling environment, now you're reducing your environmental footprint. You're also benefiting the overall economics of that cycle.

So that's one way to think about it. Another way to think about it is, I think within agricultural production, you know, we have crop production, we have livestock production. By properly integrating those two, making sure that waste from one enters the other, and the other way around circularity becomes the norm, right? So now you're thinking, uh, more systems based rather than just your operations. So if you can, uh, partner up food processing company or an outfit or your neighbor who might be a livestock producer and your crop producer, or find regional ways of, better utilizing,, waste, you closing that loop. And so there's many ways to be smarter about that. I think we're doing a good job., Canada is known to be conscious, in terms of livestock crop integration, in terms of using food waste from processing facilities. We've do, we are doing that already, but we can do more

Michael:
Right. At, at a household level. it's been interesting as we've seen so much inflation and food costs, that there has been a lot of talk about how much waste happens even at a household level, right? And so being more conscious of that, given that the price of food has risen so much.

Nazim:
Exactly. I mean, I think, uh, one way to limit the impact of inflationary pressures on your household budget is to be smarter about what you buy, how long you keep it, what do you do with it. There in that picture comes kind of,, your understanding of food,, of cooking generally, or food processing or storage in your house. So,, having food literacy in households becomes essential. What do you do with all parts of your vegetable? Or when you purchase something, how do you make best use of it? Can you, you know, preserve it for longer periods of time? There's some technology that can help with that. We have smarter ways of,, packaging food that now gives you real time information on, you know, not just the best before date, but is it actually time to,, utilize what you have in your fridge or in your cupboard., but overall, I think we have to take responsibility in our own in our own lives to make better use of our resources.

Michael:
And I mean, you've spent your life working in a university doing research, spanning from, you know, agriculture, uh, to engineering. What do you see as the role that universities and researchers can play in this process or to overcome these challenges?

Nazim:
I mean, I think everybody knows that science and knowledge is power is key, right? When you, when you're trying to make decisions that are fact-based, that build on others that have worked before you, that research is really at the core of it is science and application. Ultimately, you want to use that information in a way that benefits society. So, faculty members, we have over 80 of them in our faculty alone, wanna make an impact. Their research needs to mean something. **So many of our programs at the university have a sustainability angle to them, So our researchers are key to innovation, but also to training the next generation of folks that can work in this area.**

Michael:
And a lot of the research the faculty has been doing is very connected to what the industry needs. And so recently, we've launched new research chairs in natural system agriculture. We've launched one in or soon to launch one in sustainable protein and soon to launch one in potato sustainability. All of these are really grounded on the practices, many of them local, but also globally and we're opening a new Prairie Crops and soil research facility. And so can you tell us a little bit about not only the importance of this, but the impact in advancing some of the ideas that you've been putting forward and, and what, you know, farmers can expect to see coming out of this in the future?

Nazim:
Yeah, so those examples you gave Michael, the, they're mostly related to some of our new initiatives around research chair programming, right? So those are flagship programs for our faculty. And what you notice in all three of those chair programs is that they have a sustainability angle to them. Potato sustainability, you know, sustainable protein production, natural systems, agriculture for climate solutions. So those programs are essential for us because, within them train the next generation of graduate and undergraduate students that will be champions in this area. The Prairie Crops and Soils research facility provides us with new infrastructure that's essential to make sure that our field work that happens is, you know, properly resourced.

So we, we have soil and plant samples that come from a multitude of our research stations and fields that need to be processed, that need to be archived, that need to be properly stored. So researchers can take advantage of that, uh, 10, 20, 30 year studies, um, well into the future. So that facility in itself is essential for our training.

Michael:
And, and as you said all around the theme of sustainability, right? And so the RBC Foundation, Royal Bank Foundation has just recently announced a major investment for faculty and, and training on the next generation of sustainable food producers. And I know they're really excited about this opportunity and we're really excited when they visited some of our research facilities. And so, can you tell us a little bit about how that will benefit our students and the benefits to the AgriFood community at large?

Nazim:
Yeah, it was really exciting to host, uh, a few of the, uh, RBC folks out at our research station recently. Um, it was, um, great to see that traditionally non-ag based sector was willing to invest in training within our faculty and in the process, they, uh, you know, provided some resources for us to provide hands-on training for undergraduate and graduate students, particularly in sustainable agriculture. So those areas include things like,, fertilizer management, um, livestock production efficiency, and livestock nutrition, anaerobic digestion, manure management. So they know that those areas require human capital and, uh, farmers can benefit from talent that has knowledge in that area. And our producer groups are excited to work with these RBC scholars going forward, uh, so we can extend the knowledge they have gained, um, you know, landscape wide.

Michael:
Right? So that's really exciting. I wanted to switch a little bit to talk about your, your teaching and some of the innovations you've brought to the classroom. Um, and I know that one of your courses that I thought was really interesting is titled Impact of Engineering on the Environment, and that could be a big title, right? I mean, you can go anywhere with that almost, well, maybe not anywhere, but

Nazim:
Many places, .

Michael:
But one of the things you're trying to teach students is how to meaningfully engage and learn from indigenous elders and those with close connection to the land. And I thought that was a really interesting connection. We often begin ceremonies with a land acknowledgement, and here you are bringing it to engineering. So can you explain a little bit about how this traditional knowledge and western scientific knowledge can come together to help improve agricultural systems and practices?

Nazim:
Yeah, certainly. I, I think to start off, that course has obviously a broad reach. It's about assessing the impact of large scale or small scale projects for that matter their impact on the environment. So when we think about, for example, large scale hydro development, right? Or, building a new transmission line or a highway or looking at opening up, changing how water flows in our environment. All of that has massive implications on land usage. And much of that land might very well be sovereign land of first nations and indigenous people have certainly land rights that are recognized, by law and, engagement with them,, is now essential. You can't build on land that is,, that is rightfully owned by indigenous people without proper consultation. And through that consultation is a real opportunity to learn from the original,, you know, stewards of that land.

Indigenous people have been farming or taking advantage of this land for many, many years,, before we settled, this, this part of the world. And they have been able to actually practice those very, same things that we're trying to teach our students now, regenerative farming practices, livestock, crop integration, respecting land in, in ways that, that,, benefits future generations. You know, the seven generation principles. So when we talk about, uh, engaging with elders, what we are really talking about is engaging with knowledge holders because they have been on that land, understand, uh, how it has changed over generations, right? Soil has been around forever in these parts. Now, you know, our impact has been limited, but we have been managing the grasslands through bison in the past. We have looked at different kinds of production systems that we can learn from, indigenous elders So there's an opportunity there. And the other way around, there's an opportunity for us to bring some of our western science,, to solve critical issues that are plaguing our, indigenous peoples now, nutritional security, access to fresh

food, understanding how they can integrate better in the workforce around food and food production, food storage, preservation.

Michael:
Hmm. Thank you for that. Um, so just, just following back to the thread again about sustainable, so University of Manitoba runs one of the world's longest studies comparing conventional to organic cropping systems and for years, people have said that then argued that you can't feed the world using organic systems, but we have plant scientists that our universities, such as Martin Ends who lead, uh, a natural systems agricultural group that seems to be showing that perhaps we can, and so how, how, how should we think about these ideas going forward? And can you tell us a little bit about their project?

Nazim:
Yeah. So that's a unique study., As you said, it's a 30 year running study started in 1993, uh, two, and you know, in agriculture, you can't learn things just in two, three years. You know, it's con continuously changing environment. You need side-by-side plots. You need to manage 'em for a long time to take out some of that variability that just is part of nature. And for Martin to have run those plots, for that long and understand truly what, uh, different management practices can,, resultant is really a treasure trove of data and information, right? Uh, you know, what he's showing is that, you know, he probably can't feed the world with no input agriculture obviously, or low input agriculture, but there is room to do better. And many of his studies around better utilization of fertilizer, better understanding of,, manure management, um, you know, maybe using new technology around,, weeded management, right?on those plots have really opened the eyes of many producers. And there's a premium that people are willing to pay for low impact, uh, food production, right? Consumers demand that nowadays, even if we don't feel it's gonna feed the world, if it is feeding,, the folks that wanna pay for it, it's a worthwhile endeavor. And I, I don't think we should just think about what Manitobans or Canadians would like to see. There's a global marketplace for low impact, low input, uh, food, right? And, uh, I think that's not gonna go away. So lessons learned from that site will be valuable for our producers going forward. So, if they wanna reduce their greenhouse gas impact or their overall impact on water quality or biodiversity, there's many lessons to be learned from organic production. not all of them will be financially feasible, and we know that., but, you know, knowledge is power and,, we can learn from those examples.

Michael:
And related to this, the faculty is championing, a one health approach, which basically means that agriculture and food practices are connected to the health of the entire planet. And healthy soils produce healthy plants which support healthy animals and ecosystems all of which are connected to healthy food systems and healthy people. And can you help explain this concept a little bit more, about one's health?

Nazim:
Yeah. So this is also quite intuitive, right? So if you think about, uh, what we've gone through the last few years with Covid and, who was most affected vulnerable communities, communities that

had, poor nutrition or chronic diseases or had just basic health, pre morbidity, factors, right? Uh, you can always look at food as, as something that can be,, you know, preventative healthcare, right? In many ways it could,, help us be,, healthier people generally populations,, need that. But when it comes to these things like pandemics or,, or other issues, having,, you know, clean food that's nutritious benefits everybody. So, let's go back to this kind of one health approach. If we run our farms in a way that, for example, reduces exposure of people to antibiotic resistance or, estrogenic compounds or metals or other kind of things that we don't want in our bodies, and that translates all the way into our food system and into our nutrition.

You know, we can expect healthier populations, and that makes for more resilient communities. So this one health approach of being good stewards, right through that entire supply chain, helps us with that. So, a great example is chronic diseases. If you, uh, many of our people are nutritional sciences in our faculty that work on things like, you know, heart disease, diabetes or kidney disease. And we know that nutrition is an important aspect of that. So if you go, uh, to certain communities where there's poor nutrition, you see the prevalence of these chronic diseases, and we know what that, uh, load will be on our healthcare system. We know what that means overall, to the wellbeing of populations and economic wellbeing for that matter. So, food is an important aspect there.

Michael:
So it in some ways comes back to your first point, but from a different angle that it's all interconnected. Um, the whole thing is interconnected, whether it's the growing cycle to the feeding cycle or the health cycle.

Nazim:
Yeah, I think so. And I, I don't think, that requires a ton of explanation when we look into our own lives. If we eat well, if we provide good nutrition to our children, we know that intrinsically we're gonna have a healthier population,, and that's gonna help us overall.Thank you for that.

So I've come to the end of the, part of my formal questions, and I want to open it up to anybody who wants to ask, uh, Dr. Cicek a question today. Don't worry, we won't re Well, we might record you, but we won't put you on the podcast. If Yes, put the mic away.

Speaker 5:
Where do ag producers find or create plans for ag production with the changing environment? Most of it has to do with people living at sea level or the Arctic ice cap melting. None of this is preparing us in ag production for Western Canada. I looked into this topic and found that we're to have drier summers and wetter and milder winters. What does that mean when we look at crops, we should be growing. Like, it should be winter wheat, winter barley, winter kaley, right? Like they do in Nebraska or Kansas? Do we have to provide shelter for, keep the rain off their backs like they do in the coast?
Nazim:

Right? as the climate change is how do we change here in Manitoba or in Canada generally? So we are gonna have hotter and drier summers, and we are gonna have wetter winters that's projected. We know that that's gonna wreak some havoc because more flood and drought is upon us, and we need to grow the varieties and develop those varieties that are, that can withstand some of that. So we have researchers that work in, you know, um, climate resilient breeding, let's call it, right? So, uh, drought resilience, uh, moisture resilience, disease, uh, resilience, which comes mostly with moisture. So livestock is the same way you can, uh, think about, uh, winter grazing, for example. Is that gonna be a common practice over wintering? How would, how would we, uh, manage our, uh, livestock facilities differently than we are right now?

There's people doing, uh, work in that area. Uh, winter wheat development, penalization, we have, uh, perennial wheat developers or breeders in the faculty. All of them have some climate change adaptation associated with them. I guess if I had to say, will we be able to do all of those things that you mentioned in your list, and, will Manitoba look like the coast or Nebraska or other parts? Probably not. It will not, uh, mimic anywhere else. It's unique, right? It has different soil, different microclimate, different moisture, uh, profiles. But we can learn from all of those environments. I think we have an opportunity because our growing seasons are gonna, uh, you know, widen, if you wanna call them on the shoulder season. We're gonna have more, uh, heat, which means new varieties might be upon us, but at the same time, we're gonna have to manage the moisture.

So yeah, it's, it's gonna be a challenge that will be with us for a long time, uh, into the foreseeable future. We have the right people to do research in that area, but so close they have production.

Michael:
Thank you for that. I wanna thank Dr. Nazim for a fascinating conversation. from the farm gate to the human gut.I really like that, and I wish I knew that when my kids were young and not eating their meals!

Nazim:

Thanks.

OUTRO MUSIC FADES IN

Michael:

Thank you so much for listening to another episode of “What’s the Big Idea”.
If you enjoyed our conversation, share it with a friend and make sure to subscribe, rate and review the series.

MUSIC SWELLS

Next time, I'll be joined by Suzanne Gagnon, Canada Life Chair in Leadership Education at UM.

Suzanne is a highly experienced leadership guru and researcher who's helping train the next generation of leaders. We discuss how leaders need to adapt to the ever-changing global context. You're going to learn so much.

For more information about the University of Manitoba and our global impact, visit umanitoba.ca. See you next time.

MUSIC FADES