



FEEDING THE WORLD

(HOW) WILL WE BE ABLE TO MEET THE PROTEIN DEMANDS OF THE WORLD'S GROWING POPULATION?

[TRANSCRIPT FROM THE FRIST SESSION OF THE FUTURE OF PROTEIN CONFERENCE]

John [00:00:00] Here to welcome you all to the campus of the University of Ottawa and to say that we're very proud to host you in our very own Faculty of Social Sciences building, which despite its lame and generic name, is actually quite a beautiful building we're very proud to have you here. One of the important things to note about our building is its basic design. If you go into some of the older buildings with the long hallways and the functional design with the with the offices off the site there's not much connection is not much interaction. You'll notice about this building that it's all built for a connection and interact interaction among our colleagues and so it's a really a wonderful place to host an event like this and it's great to have you here and I'm hoping you'll have a great couple of days making connections on this important topic the fact that social sciences with over hundred seventy researchers is dedicated not only to conducting research but also in forging connections with our research partners from across Canada and across the globe and finding optimal ways to share our research findings. The School of Political Studies with 47 faculty members is at the forefront of such efforts in our faculty. The school not only includes leaders in political theory but also scholars dedicated to ensuring that our policies and political actions are informed by clear thinking and solid evidence. And we are very fortunate not very long ago to welcome our our new our new colleague Ryan Katz Rosene to the faculty and clearly he's continuing on in that important tradition of the School of Political Studies. And we're very pleased to see the event that he's organised for you today and bringing you all together to discuss current thought and evidence to inform decisions that need to be made regarding ways to have a sustainable food supply. So therefore the Faculty of Social Sciences is very pleased to have provided financial support to this event and on behalf of the faculty I want to wish you again and welcome to our campus and to wish you a productive couple of days. So welcome. So we'll bring up our event organizer [Ryan] Katz Rosene.

Ryan Katz-Rosene [00:02:15] Good morning everyone, and thanks a lot John for your kind of welcome as you have just heard my name is Ryan Katz-Rosene. I'm an assistant professor here at the School of Political Studies and I'll be your conference chair today and I'm going to speak a little bit slower because we're having some as you also may have noticed some I.T. difficulties in the background. So they're going to be setting up the PowerPoint as I'm doing my introductory remarks. But I did want to start off by acknowledging that we are at the conference today is taking

place on land which is situated on land that is part of the unseeded territory of the Algonquin people. It's very nice to see all of you this morning in this beautiful room on this beautiful day. What it will I'm sure it will be a beautiful day to discuss what's becoming a very important issue for the policy and research communities and professionals in the agrifood sector in the health related sectors and other related sectors more broadly the future of sustainable protein. So why the future of sustainable protein? To answer this question I'm going to kind of lay out all my cards. I'm a professor of global environmental politics. I'm an environmentalist deeply concerned about climate change I'm an omnivore so-called foodie who relishes the perfectly cooked meal as I'm sure many in this crowd are as well. And I'm the husband of a small scale organic farmer who mainly raises livestock for a living and over the last number of years as I've navigated these roles I found myself specifically immersed in a number of discussions and debates respectful debates of course about the role that livestock in particular ought or ought not to play in a more sustainable world. And I followed and researched the emergence of new factors in this debate and on the whole I found there to be a number of factors worthy of mentioning today. The first is that the global agrifood sector is evolving very very quickly. Change is being driven by a wide range of interconnected forces. So for instance we know that the global population is growing very quickly. Incomes in a number of developing nations are rising and along with that the demand for meat in particular is growing food security and nutrition is facing a sort of double burden of widespread hunger and growing obesity. Natural resources are being depleted and contaminated to a severe and alarming degree. New ethical perspectives and cultural attitudes about food and human relationships with animals and technologies are emerging new innovations and technologies themselves are being developed. And of course the world's climate is changing at an alarming pace. These are just some of the factors that are driving rapid change in the global agrifood sector. And when it comes down to it all of these forces raise questions about how humanity is essentially going to provide itself with that one essential micronutrient that we all need protein a second thing worth mentioning is that it's evident that we could use a little bit more nuance context and an embrace of complexity when it comes to making decisions and especially policy decisions about the future of sustainable protein in short it's a very complicated world out there. There are a lot of factors. A lot of actors with varying interests. There are different places with different access points to food and on the whole I have found that the proposed solutions to the deep challenges that we face are perhaps somewhat narrow and deserving of nuance. So that's why we're focusing on the future of sustainable protein here and that's why we've gathered experts from so many different vantage points and perspectives to come and present on their approach to this challenge. OK so this is how the event's going to work. We're going to have six roundtables, four today and two tomorrow. And each roundtable showcases the work of four invited expert speakers and each roundtable will be chaired by a fellow colleague University of Ottawa professor I have asked all of the speakers to keep their prepared comments very brief in academic terms 10 minutes is brief. So we're really going to hold I'm asking the chairs also to hold the panelists to that to that timeline. And part of the reason for that is to maximize the amount of exchange and dialogue and informal discussion that occurs thereafter. So after all four speakers have presented the chairs going to open it up to open dialogue between panelists and with the audience at large at their discretion finally before we begin there are a few housekeeping items that I wanted to address. The first is an important announcement that you should. And somewhat legal-euse here. But please be advised that this workshop is being filmed in its entirety both for the purposes of live broadcast and recorded broadcast in the future. The recordings will also be used to produce a short film about the workshop which will be publicly available on the internet so please note that by remaining in this room you are implicitly consenting to the use of digital images of you and or your property for any of the outreach materials that are associated with this. This workshop. So you're not obligated to stay if you would prefer to watch the conference proceedings from elsewhere. It is broadcast on a Facebook Live event. You can find it on our Facebook page. But if you have any questions about that process please don't hesitate to come and ask myself. That's the legal part. Secondly I wanted to draw your attention to our sponsors our volunteer helpers and our lead conference organizers who are perhaps too numerous to name here but all of them are listed in the program. In particular I want to thank the Alex Trebek forum for dialogue series which hosted and largely funded the bulk of this event. There are a couple of other events held under the Alex Trebek Forum for Dialogue which are similar types of events seeking to to create dialogue around important and in some cases controversial issues on campus. So I encourage you to check out the Alex Trebek Forum for Dialogue website to see some of the other events that are taking place under that banner. But I again I want to thank all the sponsors for four and organizers for helping to

make this event possible. In particular I want to put a face to the name Shannon Sinclair If you could just stand up and wave. Thank you Shannon. She really does deserve a special thanks for her organizational efforts. And if there are any questions about the administration of the event you can either bring them to her or myself. So thanks again. I think that's it for announcements for now. And we will. We may have a couple more things to say before the before the break but we probably get to the panel now and I hope that the people arrive very shortly. Uh so with that I think what I'll do is I'll call up the four panelists and the chair to come up and get themselves set up. And welcome, in particular, Dr. Geoffrey Macartney, who's an assistant professor here at the University of Ottawa in the School of International Development and Global Studies and he's also the research director at the Institute of Environment and Smart Prosperity Institute who will be introducing the first roundtable.

Geoffrey McCarney [00:11:17] OK. Thank you Ryan. So as Ryan mentioned My name's Geoff McCarney. I'm a professor here at the Faculty of Social Sciences. I also spend half my time in the university's interdisciplinary Institute of the Environment where we work with students across a range of topics including environmental economics, environmental law, political science, and environmental sciences. So it's not unlike the challenge we have before us here today of trying to merge a range of conversations around challenging topics. We've picked a fairly modest beginning to try to address the challenges of meeting the protein demands of the world's globe growing population. So it's an interesting topic and I'm sure it will spur a range of good discussion across the panelists we have here today. I was sitting just brainstorming for two minutes before we got here, trying to think about the range of possible issues that could come up and things that cross my mind, not being an expert in this particular topic, are things like land use, climate change, development, growth, politics, equality, health, culture, and identity. And I'm sure I'm missing a range of very relevant topics. But our aim here is to try to tackle these things and to begin a dialogue across these themes to help guide further research initiatives. So my understanding is we're both trying to dive into what we know and also really trying to drive at what are key gaps in our understanding and our knowledge where could we do additional work going forward in this research program with Ryan. I've been told we're fairly strict on time for the panelists. So we have 10 minutes for initial comments. I don't think I have cards. So what I'll do is I'll put this is blue is when you've hit 10 minutes, if you're up at the podium, I'll put the blue folder ahead where you can see it. That suggests please wrap up your current thought. Once you get much past 12 minutes I'll interject at an appropriate point to keep things moving along. Okay so so fair warning in that regard. The idea is then we'll move to a moderated discussion. I'd like to give the panelists a chance to go back and forth with each other first, then to the roundtables and audience questions as well. OK so to introduce our panelists quickly before we get going. This is the order I had them on in the agenda I saw. So I hope it approximately reflects where we're supposed to go. First is Goretty Dias, who's an assistant professor at the School of Environment and Enterprise and Development at the University of Waterloo. Second is Hugo Melgar-Quinonez, director of the McGill University Institute for Global Food Security. Third I have Brent Preston who is an organic farmer, also a speaker, and author of The New Farm. And fourth is Mike von Massow, who is a professor. This is a slight change from the agenda. He's actually professor in the Department of Food Agriculture and Resource Economics at the University of Guelph. So I think we have about 90 minutes until about quarter past ten for this panel. Do we have slides ready to go? So we should be all set. Turn it over to the professor Dias

Goretty Dias [00:14:39] All right. So yes I'm Goretty Dias. In my research I use lifecycle approaches and perspectives looking at impacts across the food system from farm to fork. I'm also interested in looking at the impacts of dietary patterns. And today I want to make three main points based on my research and related experiences. First one is that livestock protein is not sustainable in its production or at today's consumption levels. Being very specific about that. Second, there are opportunities and challenges associated with alternative proteins. And third, there are other sustainability aspects that are in tension with reducing livestock protein. But before I even begin about what those points I just want to show you this map, which based on 2013 data, shows the protein supply, and basically it says that most countries have at least twice the protein that the average person needs. So right away we see that the future of protein asks us to understand how much we actually will need in the future, since we've already got twice what we need, and how it will be distributed, which is a question of food security. Back to my points, I'm very certain that livestock is being produced and the rates at which meat is being consumed is not environmentally sustainable. And

if we look at the current land use illustrated in this map based on proportions, not distribution, we see that about 30 percent of available land, on the left here with the red, is used for livestock and for growing the crops that feed them. And we have right now in the world, just to give you an idea how much livestock we have, just one billion head of cattle alone. In contrast only 10 percent of that land, which we see in the fuchsia color there, is used for growing crops for human consumption directly. So there aren't a lot of places that we can put more livestock or grow the feed for it without starting to encroach into forests and other ecosystems. We're also exceeding the boundaries of what's considered safe for the planet when it comes to biodiversity loss in the nitrogen and phosphorus cycle loops, which is shown in red here. And we're also there's increasing risk that land system change in climate change is going beyond the zone of uncertainty as to whether the planet can handle what we're doing in terms of climate change and land use. So these are all greatly affected by agricultural production. So it's a really important thing to consider. We did a very a study that's just been published in plus one where we analyzed land and climate change impacts associated with a healthy diet using the Harvard healthy eating plate, which is based on the best available nutrition science, it's not a food guide, based on nutrition national guidelines. On the left we show the carbon footprint of 2011 productions for 7 billion people, which in the red part of the bar is due to animal protein. And in the middle, we have what the carbon footprint would be of a healthy diet for seven billion people. And on the right, if we start trying to feed 9 billion people on a healthy diet, we're sort of back to where we started. So it's very hard to reduce our carbon footprint without trying to reduce milk and beef and meat consumption. I also my research is strongly related to sustainable development goal 12 which is responsible consumption and production. And I looked at my student I looked at an example or a sample of Ontario diets based on the Canadian Community Health Survey and we formulated dietary patterns based on what people currently eat and based on that. We did a carbon footprint and we found that for the most common diets, which was like a no beef and omnivore diet. So different types of omnivore diets, that the main part of the carbon impact was beef consumption. So shown here in purple you can see at the bottom here, from chicken to beef, you see a large difference in carbon footprint for different types of meat. So as this shows, along with this double food pyramid and environmental pyramid that was developed by the Burlington nutrition center, when we eat for our health and well-being we also have a lower impact. And that sustainable production consumption of food is key to addressing Sustainable Development Goals. So in terms of sustainable protein, what other options do we have? First I want to say that no matter what type of food we're talking about we need to move more toward regenerative agriculture modules, which I'm sure people will be talking about during this workshop. Technology technologically speaking we have things like cultured meat or lab meat and meat analogs and from a lifecycle perspective, looking at the environmental footprint of these, they do have much less impact than regular meat. But I wonder if we're missing anything in terms of sustainability and health and what types of impacts might occur as we scale up from demonstration projects to feeding more populations. And meat analogs, which is basically taking plant proteins and processing them to recreate the texture and taste of meat, are gaining popularity but they also have low lifecycle impacts compared to meat, but they do require a lot of processing of ingredients. And again I think are there any health concerns and what happens when we scale up production because we see lots of lifecycle studies showing this is great until you start scaling up and then you get into all kinds of problems. We have the potential of new crops for reducing impact and creating healthy protein and one of them, I just picked them out of the whole bunch of them, but Lupin is one thing that they're looking at. But as any new crop we need to consider it in terms of the sustainability, from its use of fertilizers, chemicals, water use, land use, and whether it's an invasive species like Lupin can be. We also need a lot more work on improving aquaculture and making it more sustainable. We've already overfished most of the commercial fish species, but fish, and particularly fatty fish, can be very good for our health. So aquaponics provides us both fish and fish protein and vegetables which we also need more of in the future. So we're going to be short on vegetables for a growing population and vegetables are very vulnerable to the climate and drought and frost and they're also travel long distances. And there's a lot of waste associated with that. And finally you know if we look at new products, micro protein or insect protein, one of the biggest challenges, and I'll speak specifically for insect protein as well as for aquaculture, is getting a sustainable feed source. They still have to be fed. And so to maximize economic benefits often grains are used to feed efficient insects, but lifecycle studies show that between the grains, or the feed, that you give insects and the energy use associated with them, there's certainly certain insects that are better than others and sometimes there's no difference between insects and let's say chicken. It just depends on the conditions

and type of insects you're growing. So, finally some of the tensions and I like to catch this in terms of also some of the Sustainable Development Goals. One of the first things I think about is cultural heritage through culinary practices where we might lose some of this due to reduced if we go to less meat. But it remains to be seen whether cultured meat or meat analogs can protect our cultural heritage. For small producers who rely on livestock for nutritional security and income, and in regions where people can't grow other food because of the climate, as in northern regions, animal agriculture makes a lot of sense. It's likely that we can achieve environmental sustainability and still meet some of our health aspects of meat consumption. But who gets to choose who can keep livestock if we have to go down that path? And finally we understand more as we understand more about animal intelligence, and I know some people are going to be touching on this today, even if we reduce livestock production to those areas where it is sustainable and where ecosystems don't allow other types of food production, we may begin to question our right to keep animals for food. So these are really my perspectives These are the issues that keep me up at night. I don't get to see visions of sugar plums. And so I'm looking forward to the rest of the workshop to see what we can learn from each other about the future protein. Thank you.

Geoffrey McCarney [00:23:59] Okay thank you very much. Next we have Professor Melgar-Quinonez.

Hugo Melgar-Quinonez [00:24:08] Thank you very much. I'm going to put here my own stopwatch so that our Chair doesn't need to - So our Chair doesn't has to use his laser to freeze me when the time comes. I'm very pleased to be here and I am very thankful for any invitation. Congratulations to the organizers and to the University of Ottawa for for this event. I have a number of thoughts, some reflections, perhaps some facts, that I would like to share with you. Each of these lines could be expanded for for a long time which which we don't have but I am hopeful that we will have the opportunity to discuss this further. I come from the Institute of Global Food Security at McGill University and at the center of our work we put what we call the definition of food security. It's a consensual definition that was put in place 22 years ago at an international conference at the World Food Summit of that year in 1996 and it talks about not only food security existing whether there's sufficient food for everybody at all times, it talks also about the quality in nutritional equality and the safety of such foods, food that should help people, not only to meet the dietary needs, but also to meet their cultural preferences, their traditions, what we called their food memories. The burdens that we're confronting and, at some point the double burden was mentioned here, the double burden of stunting and obesity coexisting within a household, within a community, and so on. I do think that there are many other burdens. Some colleagues, especially in the areas of food safety, talk about the triple burden, adding issues related to the to the safety of the production of all other kinds of foods, novel kinds of foods, unexploited kinds of foods, that may help us tackle the question of this panel. Are we able to feed the increasing world population with protein? Yes or no. And I'm not sure if we have an answer. What I can tell you is that food insecurity is a global problem and some reports, especially the traditional reports by the United Nations, the state of food insecurity, the world have been reporting, have been informing us that around eight hundred twenty million individuals go to bed hungry. Eight hundred twenty million individuals have no access or cannot consume basic energy requirements, only calories, as a number and the number is calculated. The estimate is based on a sedentary life, meaning if we were able to measure the physical activity of people and therefore have a better estimate of their energy requirements the number of people who go to bed hungry every day would be much larger. It's an increasing problem. The two last reports by United Nations, I said, traditionally presented by FAO, are now presented by a consortium of United Nations agencies, organizations including the World Health Organization, UNICEF, and others. Some other numbers show us well that one in four individuals on this planet deal with iron deficiency anemia. One in three women in sub-Saharan Africa, in some areas of Asia, especially in Southeast Asia, Southern Asia, are stunting, meaning a deficiency in the growth of children affects more than one in three children. That's the state of food insecurity we're dealing with. In our collaboration and the work we do, particularly across Latin America, Africa, we have been able to develop other kinds of measures that gives us other kind of situation and different magnitude of a problem. Through personal professional conversations we think that eight hundred twenty hungry people are really an underestimation and we're thinking about two to three billion people dealing with food insecurity at different levels. There are dimensions that we integrate in their reflections around food security. The dimension of food production food availability. That's the first one. The dimension of access, which is impaired mainly by people not having the means to access and and

afford and purchase the foods they need. The dimension of utilization, which is closely related generally to the use of foods, to the nutritional value, to the safety of the foods. We usually forget about, from my perspective, the most important or perhaps most critical by major of food security, which is related to stability. Social, environmental, economic, and political stability. And the last report by United Nations, showing an increase in the, not only the number, but also in the prevalence of food insecurity around the world, reflects upon the impact of conflict and climate change in those increases. Inequality is another big issue that refers to this to this dimension of stability, social stability. You know, if you have heard about the syndrome that plagues so many areas of sub-Saharan Africa called [...] related to the consumption of cassava and cassava is reaching [...] and mainly women and children suffer this this illness that affects critically the nervous system, the central nervous system, but not the men. And many of us have thought that women are the ones who are processing the cassava, the women and children are close by, they are processing, they are they are working the cassava, they are exposed to the [...] but not the men. And that's probably the problem. Well let me tell you that if those women were able to consume some some animal protein, which is what protects them, then they wouldn't have to deal with this with this syndrome in the way they do. The consumption of protein, animal protein in this case, is key to prevent the issue. Another reflection goes towards where does the protein come from that we consume? A protein supply comes mainly, around 60 percent, 57 percent, from plant sources, 80 percent from meat, 10 percent from dairy, 6 percent from fish, and 9 percent from other sources that were mentioned in in in the first in the first presentation. Insects, algae, new technologies to produce meat, etcetera, which carry with them also all the challenges, not only the technological challenges. Two thousand species of insects are consumed around the world, especially in developing countries. Mexico. Mexican people consume 500 different species of insects. There are therefore some, I wouldn't say solutions, but approaches that should be explored more in depth. But I do think that it's critical that this happens within a context of cultural respect or respectful approaches of the rescue of those food memories. There are there are things that are being consumed by the poorest of the poor. And it could be good sources to tackle this problem. So one of the things that I reflect upon in terms of approaches refers to the diversification of the sources of protein that we consume. I had a line I worked here around policy I do think that it will be discussed later. In my case from my perspective I do think that rescuing, innovating, rescuing new practices, exploring novel approaches, promotion of things that that are basically close to the problem is important. I do think I'm optimistic by nature. That's my main my my main burden I guess but sometimes it helps. It helps to be critical as well. I think that you if you're critical you might be an optimist. But I do think that it is possible to tackle the issue and so numbers show that as well. I come originally from Guatemala. This is the country where I grew up, a country plagued by food insecurity, where 50 percent of the children are stunted. I was a basketball player in Guatemala, probably for a joke. There is and to wrap up before I finish, we need I think we need a much broader approach. We need to think out of the box and I'm going to share with you an anecdote from the time when your ancestors, most of your ancestors, and my ancestors, arrived to this continent over 500 years ago and as pioneers, conquistador was talking to a Guarani chief in Paraguay and it was explain to the to the Guarani chief the vision that the Europeans brought to this continent and the chief was listen carefully and reply: You know what I like what you're telling me. I like that vision it's a good vision actually. I really think it scratches very well. The problem is it scratches when there is no itching. We have to scratch where it itches. Thank you.

Geoffrey McCarney [00:35:12] Again thank you very much. Next up we have Brent Preston.

Brent Preston [00:35:26] Alright thank you very much. It's really great to be here. I want to thank Ryan for inviting me. I have to say that this is a new thing for me. I'm used to talking to audiences that know less about food systems than I do, so it's a bit of a role reversal. So I wanted to start out try to establish some credibility. Just by show of hands here we're talking about the future protein. How many people in this room have killed an animal in order to eat it themselves? That totally backfired. I had a whole spiel set up if like one or two people raise their hands, but that's that's gone. So I might as we get the slides going here. I'm a is that going to work I hope so anyway. That's OK. I'm a I'm a farmer. My wife and I grow organic vegetables on a small farm northwest of Toronto near the village of Creemore. But we do raise and we don't sell animals. But we don't sell meat but we raise animals for our own consumption that we we kill and butcher on the farm and I come from a long line of butchers. So this idea of the

future of protein is very interesting to me. I'm going to talk today just briefly about my observations from the production side. I'm not a researcher but I've spent a long time interacting with and talking to and observing the conventional farmers in our neighborhood where I farm and all of them are farming in the same way. They're growing commodity crops, in large monocultures, using big machinery, and lots of chemicals. And when I try to talk to the people in my neighborhood about the possibility of a different model, that we're trying to pursue small scale for the local market growing organically, the thing that they always say to me is what you're doing won't feed the world. So the way that the sort of conventional agriculture community justifies and talks about the processes they use is by appealing to this idea of feeding the world. And when you're growing on a small scale organically you're not solving the problem. And this idea or attitude has been deeply internalized by the conventional farmers that I talked to. That the goal of conventional agriculture is to feed the world and that conventional agriculture is necessary to feed the world. There are big consortiums of chemical input producers and agriculture input producers who have aggressive social media campaigns to try to convince Canadians of this idea as well, that without pesticides we couldn't grow the amount of food that we need, we wouldn't have food security if it wasn't for all of these agricultural inputs and I think largely their success they've been successful in convincing the Canadian public of this. But when I look around at the at our neighborhood, what the farmers are producing around me, I often talk about the farm the field right across the street from our farm, which is a single field that's bigger than our whole operation. We only grow about 20 acres of vegetables and that's a small field in in the scheme of things in our area, and that field that I see everyday across the road from us is growing. Oh here we are. So that's our farm. We're gonna zip through this because I've gone ahead. So this is what I'm talking about the social media campaign to try to convince Canadians that that we need these kind of inputs and we need this kind of conventional farming system in order to feed the world. I know that that's a lie because I grow a lot of lettuce but the people in our neighborhood have really bought into it completely and like I said most Canadians I think have bought into it as well. So our operation, you can see there, is a total of less than 20 acres. And the farm right across the road, the field right across the road grows a steady rotation of corn, soy, and canola. Year after year, and I've been watching that field for 15 years, and it's the same rotation year after year. And it occurred to me at one point, first of all, that there was an incredible amount of stuff coming off that land. Just that one 20 acre field was producing tractor trailer loads of commodities every year. But it also occurred to me that what it was producing - that none of what it was producing you could actually eat. And this is a little mental exercise that I often talk about when I'm speaking to audiences. The next time you're out on a drive through farm country, if you stop your car and walked into any particular field would there be anything there that you could actually eat? And the answer is almost always no. Anywhere in North America, in large swaths of the world. Everything that's being grown across the street from my farm, and on almost every farm in North America, either has to be fed to animals or processed in order to be eaten. So it didn't take a whole lot of research from my my sort of lay background to realize that in terms of calories we've got a huge over abundance of food in the world, somewhere in the neighborhood, I think, of at least 25 percent excess of calories available at the household level. Even in Africa, despite all the food insecurity that Hugo was talking about, on average, we've got more food available at the household level than is required for for normal human activity. So so I think that the all of the problems or many of the problems we see with our current food system are best understood when you think about a food system that's producing too much food, and I won't talk about this in detail because I know this is the subject of the other round tables, but the most obvious impact here is human health, where the Lancet estimates that three times as many people now die of obesity related illness compared to malnutrition. You know, we see it in our own communities at every income level. This this epidemic of diet related illness and disease. There are obvious environmental impacts, animal agriculture is the biggest driver of habitat loss, climate, of course, we're gonna be talking a lot about this the enormous impact of animal agriculture in particular on the climate, but there's also problems with the farm economy. So we see that in our area, the farm across the road from us is farmed by a farmer who lives several kilometers away and farms all sorts of different farms that he leases out from the owners because you need huge scale in order to in order to make a living when you have an overabundance of food and therefore food is extremely cheap. So the in the last five years, Statistics Canada says we've lost 23000 farmers. And in Canada the average farm income is now negative and 41 percent of Canadian farmers work off farm in order to make a living. My wife and I work full time on the farm and have no other source of source of income and we are the only farm family that I know of anywhere in our community that is in that situation.

But the most important impact of this this overproducing food system, I think, is on the effect it's having on the productive capacity of our land. So the the sort of universally accepted model that's prevalent in our neighborhood of large machinery, large mono crops, commodity production, and use of extensive use of agricultural chemicals, is in almost every situation a degenerative model of growing food. It's reducing the productive capacity of our land. It destroys soil organic matter it leads to topsoil loss, erosion, and eventually, dramatic decreases in productive capacity and desertification. So this is this is to me the biggest problem with the food system with the productive system we have right now is that it's reducing our it's eventually going to reduce our capacity to grow food. So when you look at the question that conventional agriculture is says that they're asking, how are we going to feed the world, the the the answer the question that they're really asking is how are we going to feed the market. And that's a very very different question. So when there's a huge market in North America for corn to create ethanol and obvious and there are many farmers in our community who are growing corn for ethanol production. That's obviously doing nothing to feed the world. When we look at the question of of increasing incomes and changing lifestyles in emerging markets like China and India, when we're saying how are we going to keep up with the protein demand in that area? Well, if the protein demand if the protein consumption is leading to poor health and environmental problems, to me that's not feeding the world that's feeding the market. And the important thing I think to recognize is that from a producer standpoint the every level of government in Canada, all of the major or most of the major farm organizations, most farmers, and virtually all of our publicly funded agriculture schools are completely focused on expanding this model of agriculture to the to the exclusion of almost everything else. So as a as a progressive organic farmer we get basically zero support or input from any level of government or any public publicly funded institution. So another way to ask this question of how are we going to feed the market really is: How are we going to facilitate continued overconsumption? And so that's that's a very dangerous when we're when we're conflating those two ideas of feeding the world and facilitating overconsumption. And unfortunately all of the levels of government and public institutions are answering that question by saying we're going to use agricultural practices that are going to make it more difficult to feed ourselves in the future. So the question I think is not how much food do we need to produce, because that's always the question, it's: How are we going to produce that food and what food are we going to produce? And to me the what is is obvious from what other people are saying already and what we're going to talk about here is it's less meat, it's looking at alternatives, it's more fruits and vegetables and whole foods foods that people can actually eat that we want to be growing. And the question of how, to me, is regenerative agriculture. And I don't want to, I know Gabrielle is going to be speaking about this and I don't want to, I really wanted to do a whole presentation on regenerative agriculture but I didn't want to steal a topic matter from future roundtables, but in the progressive farming community, in terms of organic and conventional farmers, everybody right now is talking about regenerative. This is what everybody is excited about and it's a suite of low tech, cheap, effective methods that move carbon from the atmosphere to the soil. And I think that's really where and it has a huge role to play for animal agriculture as well. So I'll leave it at that. Thanks.

Geoffrey McCarney [00:48:08] OK. Thank you very much. And our last speaker is Professor Von Massow.

Mike von Massow [00:48:21] So one of the benefits of having no slides is when you're last, you realize you're going to skip chunks of what you were going to talk about because of what the previous speakers of have covered. So I'm going to apologize if I repeat some things but I think they're important. And and I'm going to raise some of the issues that other speakers have raised, probably through my own lens, and maybe give you a little bit different spin. Most of my work is at the consumer end of the food chain, is is thinking about how people think about food and how we make food decisions and where I'm going to finish is talking about if we are going to make some of the changes that we're talking about here at this panel, and I think in future in some of the panels coming up, is we're going to have to drive change at the consumer level. We're going to have to have people make decisions differently, because it doesn't matter, frankly, if we have products that can more sustainably provide protein if people aren't willing to eat them. So the question that I started with was: Can we meet the sustained protein demands of the world sustainably? And we heard Ryan say at the in the introduction demand is going up for food generally as population grows and as incomes rise we're seeing the demand for protein also go up. And so how do we meet at those increasing protein demands sustainably? And I've split that question into three questions. The first is, can we produce the protein? And

I think we heard to a degree from Goretty some of the things we can do differently. I'm only going to touch on those things very quickly. There are protein sources that are more sustainable. Plant based proteins are varied and available pulses are a huge crop in Canada that are probably significantly under consumed, particularly in the western world, and I think provide a real opportunity to to provide protein to our diets. We see soy based proteins, tofu, tempeh, edamame, I think, that can also provide and augment our protein nuts. I think we heard one speaker talk about all algae and seaweed. I think there are a variety of plant based proteins that we're presenting in a number of different forms to consumers that can provide good healthy proteins. Goretty also raised the issue of of farmed fish. Probably today, 60 percent of the food of the fish that we're seeing in retail, 60 or 70 percent of the food fish that we're seeing in retail, is probably farmed already. One of Ontario has a huge at a huge captive aquaculture system that is also providing good nutritious protein. We heard also about insect proteins, how efficient they are to produce that depends, as Goretty says, to a significant degree as to what feed stuff we're using. We're seeing sometimes we're feeding byproduct to them. But if we're diverting things from the food system the argument is they're maybe not much better than chicken in terms of in terms of conversions, we can use waste in some cases, and we understand that those are going mainstream now because you can get President's Choice cricket powder in Loblaw's. So these are not sort of abstractions, there are still significant icj factors. But what we need to articulate, I think to a significant degree to consumers is this isn't a cricket where you feel the feet scratching the roof of your mouth. These aren't sort of novelty treats. These are real proteins that we can build into that we can build into diets and we heard about lab grown meat products and we're also seeing progress in production technology where we are more efficiently producing some of our conventional proteins. So to a degree there are options out there and that that probably provide a more sustainable solution as we see protein demand goes up. To me the second question is, and we heard some of the previous speakers talk about this as well, is how much do we really need? And I think there are a number of issues relative to that question. How much do we need? Food waste is a significant issue. We are throwing away we are losing food throughout the system. And I think that that is something that doesn't come into the discussion enough, although we're hearing more and more. We're probably not wasting a lot of protein throughout the we're not wasting a lot of meat protein throughout the throughout the value chain, but that doesn't that that's not the only place. And that waste also means we're tying up productive capacity for food that's not actually making it where we could be using it for other uses and for some of the plant based proteins that waste throughout the production system becomes an issue. Now there's always the issue of cost and we understand parishability is a real constraint in food, but the reality is we are probably throwing away a lot more than we need to and if we focus on that that would that would mean we have a broader base of food available for consumption. We also heard about the issue of overconsumption in the developed world, protein specifically and food generally. We're probably eating more. Well not probably, we are eating more than we need. We're taking in more calories, we're taking in more protein. Kate and I we're having a discussion beforehand, we're feeding our pets more protein than we probably need to, so we are we are using more protein than we need to. So if we could get to a spot where we are where we're taking in an appropriate amount of protein, that would also a free up more protein for others that need it and reduce the overall the demand for protein. We also heard Ryan talk about non-farm uses of farmland, nonfood uses of farmland, and ethanol and other industrial products are placing are using up huge amounts of our crop outputs and we need to think if we are food constrained, if that's a good use, those are policy driven. It's not clear that they are doing much in terms of climate change or the contribution to to emissions. But it does seem to me to a significant degree, and I'm glad I'm in this audience because when I say this and other groups I often get things thrown at me, this is a farm policy issue. The reason we are producing grain for ethanol is to raise grain prices and, perhaps as Ryan said, we have issues with overproduction and and and low prices leading to leading to the need for farm policy to raise prices. But what we're doing is we're taking land production out of food production and and sort of robbing Peter to pay Paul to a significant degree. So given that, Why are why are we here? Why are we required to have this discussion? Why why do we have issues right now? And the thing is what we need to do is convince people to eat differently. We need to convince people to eat less. We need to convince people to eat less protein and we need to convince people to at least vary the amount of protein that they eat and that to me is probably the critical step here. Because without that none of the other stuff matters. So we, as as westerners we as people in developed countries, we can't expect others to change behavior if we're unwilling to. Right? And we hear that all the time with respect to other environmental things you know. Well we can't expect the developing world to adopt to lower their

carbon footprint if we're not willing to either. We've we've developed ours on the back of carbon emissions and we say oh no you guys gotta stop. But that relates to food too. Now I think there is some reason for optimism. Almost 85 percent of Canadians are saying they're at least they're eating at least one meal main meal per month without animal based protein. 50 percent are saying they're doing that once a week. Those people are going to drive change in protein production in protein consumption much more than the 7 or 8 percent that are vegetarian or vegan. They're important, but they're also different. I think we're seeing a change. And it's those sort of 'flexitarians', as they make adjustments, that are going to have the most significant impact on protein demand going forward and on changing behavior. So those numbers aren't big yet, but they're probably significantly different than they were five years ago. And I think we need to continue to work on that. We need to motivate change. I read that I think on the on this conference Twitter feed something that Ryan wrote about embracing complexity and and the truth is we're not going to have one message that that drives consumer behavior. Consumers are eating more variety. We have to understand what's important to them. We need to understand what's coming. And we need to develop. We need to offer food products to them that are relevant to their to their context. Some want meat analogs, plant based burgers. They want that real experience with the heme and you know the red. Others don't want that experience at all. And we can offer them things. We also need to to make sure we reflect convenience that is driving some people. Pulses I talked about. 70 percent of Canadians don't know what they're going to have for dinner at three o'clock in the afternoon. Pulses require soaking and all of that. So we have to come up with ways to make that protein more accessible to someone who wants to grab something or throw something together when they get home. So understanding those challenges at the consumer level becomes critical to driving consumer change. So I think I'm out of time and to wrap up just understanding that consumers will be a big part of achieving and driving change I think is critical. Thank you.

Geoffrey McCarney [00:59:41] OK. Thank you very much and thank you to all the speakers for being so diligent about staying on time. I didn't have to use my blue folder even once. That was great. So to give people a chance we're gonna move to a discussion now and I'll let the speakers have a chance to respond to each other quickly and then feed it from the audience and just to give you a moment to think about your questions. I mean Mike helped you with this a fair bit, summarizing some of the key points, but just a quick summary. We heard from Goretty that you know livestock is not sustainable current production levels. And she spoke to issues such as consumption and highlights highlighting distributional issues in terms of protein consumption around the world as well as land use and production issues and where things are being produced. She also framed unknown challenges as we scale alternatives to current protein and what sort of tensions or tradeoffs that might frame. We heard from Professor Melgar-Quinonez about a range of food security issues, food security construed as access and base requirements as well as nutritional quality and safety issues. How do we meet dietary needs which includes factors such as consult culture, tradition, and food memories? This was framed as a global challenge and he brought up questions of what do we have the right measures and are we capturing the range of activities that people actually undertake in terms of basic requirements as well as issues such as equality, gender was raised, and stability in food security is a key issue and he raised the idea of diversifying sources of protein. From Preston, we heard about appealing to the idea of feeding the world and dichotomy between small scale versus conventional farming. He raised issues of calories versus quality of food and whether we are producing animal feed and food requires processing versus whole food that can be for human consumption. This was linked to issues of the farm economy as well and production and income and at the end he raised the question of feeding the world versus feeding the markets and the two points of how are we producing and what are we producing with a discussion of agenda of agriculture. And finally Professor Von Massow spoke mainly to driving change at the consumer level. How do we convince people to eat differently? Addressing different groups of food consumers as well and understanding challenges at the consumer level. So quite a range of ideas and what I thought we'd do is, Mike just spoke but, maybe have a chance for people to respond in reverse order starting with Preston and then Mike can jump in when they want or if anybody has a particular pressing issue you can feel free to jump in.

Brent Preston [01:02:24] I guess I'll I'll jump in. I just want just, Goretty, when you're talk talk about the the sort of very very sort of broad statement that that we're the production of protein right now is unsustainable. The vault the the

volume and the method that we use is not sustainable. I think that that's probably true. But I think there's a huge scope for changing the way we produce protein to make it much more sustainable. And the the key I think is that our sort of conventional agricultural system has separated the production of separated animals from where their food comes from. So by integrating animals into fruit and vegetable production, into integrating them into the production of their own feed in terms of having animals on pasture and having rotations that are not you know corn, soy, canola over and over again but are, you know, fodder, pasture, vegetable production, we can have huge benefits for the soil and dramatically increase the amount of protein we produce on a given amount of land especially with techniques like planned or managed grazing. So to me I think that the the goal has been, for the past 50 years, to figure out the cheapest possible way to produce food, and when it's just the market driving your production choices, very very short term considerations, you end up with the kind of system we have now which is unsustainable. But by changing the way that we produce it we can actually increase the amount we can produce and do it in a way that's instead of degenerative is actually environmentally beneficial.

Geoffrey McCarney [01:04:17] [01:04:17] Goretty did you want to reply?[0.2s]

Goretty Dias [01:04:19] [01:04:19] I agree with you, Brent.[0.8s]

Brent Preston [01:04:21] [01:04:21] Thanks. [0.0s]

Goretty Dias [01:04:24] [01:04:24] And so part of the problem with the reason why meat, and we've got to remember we're talking about protein demand versus meat demand so there's two different things here, but meat, internationally, is produced sometimes not efficiently. Sometimes, like you said, with the animals separated from their food sources. And I think that, and I don't want to take away anybody else's talk here, but there's certain places and certain ways of, especially the most problematic one is cattle, there's certain ways of making them more efficient. So a lot of the problem that we have right now with producing meat and all the greenhouse gas emissions that come from cattle is that we don't give them good sources of feed. And I'm not talking about grain, I'm just talking about not having enough feed or the right type of feed or pastures that aren't healthy enough. And so there's a lot of room for efficiencies. Just better management of our livestock to to reduce some of the impacts. But then there's this whole thing is that how much land do we want to commit, even with these efficiencies improvements in efficiencies, how much land can we commit when we're taking away so much from ecosystems right now which is undermining our ability to grow to to survive as a species as well. So I agree with you. There's a lot of places we could improve and it's it's this model of factory farming and you know efficiencies in in the western system and then inefficiencies in some of the developing world that's causing a lot of problems. [101.2s]

Geoffrey McCarney [01:06:09] [01:06:09] Mike or Hugo did you want to feed in on anything? And I apologize, Brent, I had your last name written down. Sorry. [6.5s]

Hugo Melgar-Quinonez [01:06:16] I would like to raise a point that I think was part of our panel but I challenge us all of us to to move from global figures to more local figures and what I'm trying to say is, as an example, international estimates of food insecurity, meaning people not having access to the nutrients we are talking about, are based on developing world countries. In 2014, a number of institutions among others, some of our colleagues, our institutions at McGill, put out a report on food insecurity among Indigenous people in Canada. This report was presented by the Canadian Council of academies. It showed that in some places in Canada, certainly in the North, mainly, food insecurity affects up to 70 percent of the households in the territories. 70 percent that's much higher than some developing countries in the economy we have. And that's that's that's the problem we're dealing with internally. There are different kinds of forces that drive that situation. Yes, income in impoverished populations in developing countries. We used to call them third world countries. You know, I don't know if the younger people are familiar with that term but we used to call them that way. Coming from a third world country, I learned from the beginning of my life what does that exactly mean. Yes, income is increasing. And from a global perspective we're thinking about providing people providing the market with many different products that perhaps people just just

don't want to consume, just just don't have the money to afford it. Yes, income is increasing. It is increasing in many cases. It goes to the purchase of such devices like the screen we have there. There are market forces that are driving that behavior as well. People are consuming high amounts of refined sugars and refined flours. The consumption of pulses in India for the last 50 years roughly decline in 50 percent. The consumption of beans in Mexico, I'm talking about central staple foods to those countries, decline in the same way while the consumption of refined sugar increasing 200 and 300 percent respectively. These are things that we need to tackle, not only from, again, a global perspective mainly driven from what we discuss in forums like this, in our academic centers, in places where we're also facing challenges that are local, very close to us, but we need to look closer to what's going on on the ground I would say.

Geoffrey McCarney [01:09:35] Mike, do you want to pick up on that and then just a note that I'll come to the tables after so if you want to start thinking of questions or signal to me if you have something to add in.

Mike von Massow [01:09:46] One of the things that I that I would add uh to to Brent's comments is that uh I agree fundamentally with with sort of thinking about how we produce. Sustainability is less about scale necessarily than about thinking about the production practices that we're using. And I think often we get this this explicit trade off between oh well big farms are bad versus small farms and I'm not sure that that's necessarily true. I think that in some cases it's about the production practices that we that we use that is important in terms of sustainability. Some of the largest farms on the prairies are organic farms and it's about thinking it's about thinking differently in terms of in terms of stewardship of the land, soil organic matter, soil health, and all of those sorts of things and I think we are changing the paradigm for food production. One of the things that I often say if I see when I speak to producer groups is that farmers need to start thinking of themselves as managers rather than as producers because it will make them think differently how they manage the assets that they have and and you know I talk to students and people who've been in production for a long time and they say I produce I'm a producer. I produce this. And that makes them think very narrowly about what they produce. And I agree, I think we've lost, excuse me, we've lost that sort of integrated and diversified farm production that we've had that is really, to me, is a key to sustainability and thinking about that acre of land as an asset. And how do I make sure that I sustain the productive capacity of that while making sure I get a reasonable output from that land. And so the one thing I'd say is is we need to that there is nothing wrong with small scale production but there's also nothing wrong with large scale production. It is about what we're doing in that production process that I think is critical.

Geoffrey McCarney [01:12:11] Did you have any idea?

Brent Preston [01:12:12] Just quickly I completely agree. The problem is that the information and advice on how farmers can change their practices and be more sustainable has been almost completely outsourced to private corporations who have an interest in selling farmers inputs. So there are there is no agriculture public agricultural extension that I'm aware of left in in Canada, at least in Ontario so that there was one guy who worked for the Ministry of Agriculture in Ontario, a huy named Hugh Martin, who is the organic specialist and he retired five years ago and wasn't replaced. So as long as we have all of the information on how we can change our practices and how we can you know how we should produce our food coming, regardless of scale, coming from companies that have a vested interest in selling us stuff I think we're gonna have an uphill battle.

Mike von Massow [01:13:07] It's interesting. There are apparently a lot of Martins and organic. Yeah because I was talking to Ralph Martin at the University other day and one of the things that he highlighted to me is the value that organics research brings to non organic agriculture is that we're learning a lot about soil health. We're learning a lot about non chemical production practices that allows us to to sort of change sort of quote unquote conventional agriculture as well. So I think that there is a real out there is a real opportunity to say perhaps we need to have a broader perspective on production research.

Brent Preston [01:13:48] And it works both ways. There's information coming from conventional to organic now. And

I think that that's why this idea of regenerative agriculture is something that can bridge that gap.

Geoffrey McCarney [01:13:59] Hugo did you signal you wanted to add in?

Hugo Melgar-Quinonez [01:14:00] I certainly agree with many of the things that have been said, and they are correct that from my perspective. I just want to share that some of those perspectives, from a global perspective, worry me they worry me. Yes a farmer needs to be a manager. Farmer needs to be a manager and farmers manage in the best way they can. Perhaps not in the most adequate way that we expect them to manage but they but they manage until they cannot. At least 70 percent of the food in the developing world is produced by small farmers. And when we focus on issues of protein, we worry because the population in the developing world is increasing, because people are making more money, and because our planet has to produce more food to feed all those other people who are being born in the developing world. Well the reality of the developing world reflects in the march of thousands of Central Americans today trying to cross Mexico to reach the southern border of the United States and perhaps Canada. And this happens when you are not able to manage anymore even if you have the knowledge, even if you have the skills, even if you have the will, even if you have the experience of generations managing and producing the food that people are eating in those countries. The management can happen, but the conditions, and that's why I emphasize the issue of stability, is critical because there is no idea, no technology that can be sustainably applied to feed the people who are being born in increasing numbers in the developing world if there is no stability.

Geoffrey McCarney [01:15:59] Goretty anything to add?

Goretty Dias [01:16:02] I agree with everything that's been said and what Mike was saying about being managers. I talk to farmers and they say we think of ourselves as environmental stewards but the problem is we need to be paid to do the right thing as well. Not only farmers but our food prices reflect what needs to be done in terms of supporting farmers so that they can grow food the way it should be grown.

Geoffrey McCarney [01:16:28] Ok. I'm going to go here and then here and if there's anybody else, let me know.

Audience Member #1 [01:16:49] Yeah so. Again with a question back to Brent. It's a double question if you don't mind. First of all, what is the difference between regenerative agriculture and say something like agro-ecology? And second, the translating back to your comment about regenerative, how does that actually come back to the question about sustainable protein?

Brent Preston [01:16:55] Okay so regenerative agriculture and agro-ecology share a lot of a lot of common ideas, and and I know that Gabrielle can probably talk about this tomorrow in more detail, but the the the thing that attracts me to the idea of regenerative is is very specific. And so the goal is to increase soil carbon and to and to increase and nurture the life that exists within the soil to create it a living soil. And it involves things like minimal disturbance. So no till and maintaining living plants in the soil at all times ideally. And one of the one of the principles when it the second part of the question is that animals should be integrated into production systems wherever possible so the that the the recognition is that when you have animals on the part on pasture and you manage them well they actually drive really really rapid transfer of carbon from the atmosphere to the ground. So so the picture that's, actually she's still up on the screen here, there's too long swaths of white which are row cover covering our salad greens and then a big sort of silvery piece next to it and that's a tarp. That's a huge piece of plastic. So we're experimenting with no till techniques on our farm where we will, instead of tilling our salad stubble after harvesting, we'll cover it with that TARP allow it all to break down and then to plant into undisturbed soil and we're seeing unbelievable really rapid results. But the next step in a regenerative system would be when we plant cover crops on that piece of ground next year in order to nourish the soil that we add animals into grazed down those cover crops and it's going to just accelerate all that all that good stuff that's happening.

Geoffrey McCarney [01:18:47] Anybody else?

Goretty Dias [01:18:57] Ya I think also on regenerative agriculture, and I'm not the expert but from speaking with farmers who are doing it, it's about increasing ecosystem services period. Not just soil, but anything we can do to restore ecosystems that have been destroyed by anything like pollinator crops or hedgerows and providing providing a habitat for a different animal so that's it's a really holistic way of looking at things.

Geoffrey McCarney [01:19:22] Okay. Please introduce yourself before speaking.

Audience Member #2 [01:19:28] I'm Kathleen [...] with the faculty of agriculture in Nova Scotia. So I am delighted with the discussion today and I'm curious what you might all I'm going to offer a challenge at the end. If we want to get the world fed in a sustainably, healthy, and equitable manner, I'd like you to choose one of your favorite stakeholders, and what action would you get us on to like raise the bar for urgency, raise the bar for immediacy to some extent. Who would you call on to take action to make sure we're getting the world fed?

Geoffrey McCarney [01:20:04] Who would like to jump in first?

Mike von Massow [01:20:07] I'll go first. I'm going to stick with the persons that I talked about in my talk. Is that is the the people we will not drive change if we don't change consumer behavior. If we don't get North Americans and Europeans to eat less we will take some pressure off we will keep pressure on the food system. I think we also it it boggles my mind, Goretti said well farmers say they're not getting paid for stuff. To a significant degree consumers have no idea how food is produced. None. That's different than in the developing world where they're much closer to agriculture. But the average consumer, I am convinced there are kids in Toronto who think that milk comes grows on trees in four litre bags. There is just no understanding. And so if we're trying to articulate that we need to drive change in the food system, it's hard to to to get people to understand that abstraction if they don't know what the base is. And so to a significant we we regularly when we do consumer surveys we do tests of understanding. So so they understand they they they they sort of say well we think we understand relatively well and then we say OK. Prove it. And we asked them some questions and I mean simple questions like a cow has to have a calf in order to give milk. Only 25 percent of Canadians can answer that question correctly. So if you have something I mean that's a bit of an indictment of our high school biology because that's basic mammalian biology. But if you're then saying OK if you're speaking to a consumer who doesn't get that. how are you going to talk to them in a nuanced way about how we're changing production practice? You know issues of welfare, issues of antibiotic use, issues of balancing production. We're we're so so I think A) we need to to drive consumers to think differently about food. To think and it's complex because they're not all the same. But also probably, and get a little bit up on my hobby horse, get a little bit more food education into the education system so that people have a fun I mean it's so fundamental that that people have an understanding where things are coming from so they understand the implications of the choices they're making.

Geoffrey McCarney [01:22:46] Anybody else? Hugo?

Goretty Dias [01:22:48] We're trying we're being too polite. And so I agree with Mike and I said I can't choose [...] so I'm glad he said I could just agree with him. But the other thing there's a couple other things there on consumer behavior. I mean we've got climate change we keep saying people have to change what they do. Nobody is changing it. So it's really hard to do that. I think we need policy. And one of the things we did see in looking at the 2004 community health survey and the more recent one, my student is just putting the results together on this, is that there's been a huge decrease in beef consumption in Canada. And we see that also at the national level. And a lot of it has to do with price. It's gotten more expensive for people to be able to eat beef. So I think there is the education part. I think consumers are easily led around on diets as well. They want to lose weight. You've got Keto diets, you've got Paleo diets, you've got Atkins diets. They all emphasize protein and we're over protein-ated. We've got twice the protein that we actually need in our diet. So we saw that for looking at the protein levels as well. So I think, you know, policy makers are really really important and how you price their food is really important.

Geoffrey McCarney [01:24:10] Hugo did you want to add anything?

Hugo Melgar-Quinonez [01:24:11] Yeah. You know I think that's a great question and I'm a physician by training and I was taught that whatever a drug doesn't cure the knife will do the job. And with the time I got involved in these more complex and socially related, political related issues I work with nowadays. I do think that consumer behavior is an important driver. I am convinced that at that an educated consumer is a stronger driver. But I do think that an unorganized educated consumer, like myself, has very little impact in the system. I work with hundreds of students every year who are educated, who are conscious, and who purchase food on a daily basis. And I see and I discuss this issue with them. What is what you can do? Well I won't buy and so on. But there are other forces that need to be also confronted it in one way or the other. And I'm not an activist. I wish I were more of an activist. I'm not talking about riots. I'm not talking about demonstrations every day, stopping the traffic, that is already a problem in all the cities. I'm not talking about that. But I do think that, and some of you work in in raising the conscious of society, but society has also means of organizing itself. And there are many interesting examples related to food production, migrant farm workers, or immigrant farm workers in Florida got organized and got a fair, fairer, not necessarily a fair, but a better a better a better check when they organized themselves and can then negotiate can negotiate with decision makers but can negotiate also with the companies they work with. And some companies that, by some people are, you know, pointed out as part of the problem, have some have seen and have experienced that type of negotiation and have agreed upon better conditions. But if that doesn't happen I don't think we've got much of a chance.

Brent Preston [01:26:34] I just wanted to quickly go back to something that Hugo said earlier and that I think in terms of policy we need to on a global scale we need to recognize that most of the world's food right now is coming from small scale primarily female farmers in the developing world. And we have a lot of agricultural policies in Canada and in global institutions that are actively trying to supplant that production system with unsustainable Western based large scale corporate model. And we need to reverse that so we're actually supporting those farmers rather than trying to get rid of them.

Geoffrey McCarney [01:27:18] Okay. So you can come in here and then I'll come to the audience in the back so if you if there's anybody there start thinking.

Audience Member #3 [01:27:24] [...] You were talking about the scientific literacy of the general public and how that may affect how we move forward on this issue. I'm curious how much you think the non-scientific discussions that happen, so you were talking about when people make unscientific claims, pseudoscience, I mean yourself said [...] I know what you meant but I worry that some people might not understand the subtlety of what you're trying to say [...] How worried are you that people are going to make decisions about this based more on emotion, based sort of what people call naturalistic fallacy, rather than an actual data. I wonder how much you think that's going to play a role.

Geoffrey McCarney [01:28:13] Sorry and just introduce yourself quickly.

Audience Member #3 [01:28:18] Sorry. I'm Chris Labos from the McGill Office fo Science and Society.

Mike von Massow [01:28:18] I think that's a significant issue. Again I think what I always say to students is there is no the consumer anymore. So I think there are a significant there is a significant group of consumers who are making decisions based on something they read on social media or three lines they heard somewhere or whatever their source of information is. So there is a real problem with a lack of scientific literacy. And we were talking at breakfast this morning. Partly as academics we're to blame because we haven't to a significant degree interacted and articulated very well what we do, what we know, what we don't understand, and why that matters to consumers. So I think that consumers have not only a lack of understanding of science but a significant skepticism of science. And I think that that's something we need to I think though that there is also a significant group of consumers sort of in

the middle who are just going there's just you know I don't I don't get any of it. And we're bombarding them with information you know Goretty talked a little bit about policy. Policy is tough and doesn't always achieve what you wanted to achieve. And so to a degree we've got consumers who are skeptical of science and are making decisions based on bad information. We've got consumers who are overwhelmed with information and and then are defaulting to what they've bought in the past because it's easy or what is the cheapest because it's the cheapest. And and I'll give you an example. In Ontario now any restaurant that has more than 20 locations has to put nutrition information, calorie information, on the menu. And you know Health Canada also wants to put warnings on the front of packaging relative to sugar, sodium, and fat content and a lot of the research says that that's not working. We've done some work on menu labeling the impact on food decisions is minimal. It means that some people who were going to choose something healthy choose something marginally healthier. And we see some behavior where people go right on and actually increase the calorie content of what they're going to eat because you know they see it as a challenge and particularly given that they're eating in a restaurant. So I think that there is a to get back to your question there is a significant element of people making choices based on bad information and there is also significant information of people defaulting to no choice because of too much information.

Geoffrey McCarney [01:31:18] Hugo you want to add anything?

Hugo Melgar-Quinonez [01:31:19] I think that subjectivity plays a very important role. You and I are here because of subjectivity. We think this is important. We think we're going to learn something we can contribute to something. Our subjectivity is driving us. And it plays a big role in consumer behavior. What I'm a bit worried about is that given that consumer behavior is key to deal with the question we're dealing with, I feel like we shouldn't, even if it is that important, we shouldn't put all of our efforts at pointing sometimes at people who, yes, are consumers, but are victims also of a food system that is not working. There is people and the people who are suffering from the double burden, stunting, obesity. The more poor the poorer you are the higher your chances of being obese. That's what the literature shows. That's what our research shows. The more food insecure you are the more chances you have to deal with metabolic syndrome. Is it because of your emotions? Is it because of your subjectivity? Is it because you just don't want to use the means you have to acquire what the market is offering? Or is it become something else? I do think that subjectivity plays a role and emotions play a role but I think, in most of the cases, in the population groups that are suffering the issues that we that are basically underlying to all this discussion are people who just can't afford it.

Geoffrey McCarney [01:33:11] Goretty you look like you have something.

Goretty Dias [01:33:12] I guess just a quick thing around consumers and policy and I agree with I've I've seen that as well. Nutrition labels don't work very well just for nutrition alone. I was thinking more around food environments so, for example, [...] you can't put junk food commercials on kid's programming because you know there's that influence so the food environment and what we do in the food environment is important. Just like what we do with tobacco, you know, changing policy by you can't have tobacco in full view, you know you can't do this and this and that and that that has an influence so it's more about the food environment [...] but even as the educators we are, we don't always have a choice [...]

Mike von Massow [01:33:49] And again I wasn't disagreeing with you I was just I just think there isn't a single answer. And, as an example, we've seen both in the US in Ontario, changes in government that can then change policy that were probably positive originally for climate change that are now, in many people's views, taking a step back. And so again if we if we can't convince convince consumers who are also voters that some of this stuff matters then again we can get positive policy undone by changes in government. So I think it's we're not going to answer in a 20 minute panel those key questions. These are complex questions and there are multiple levers, I think, getting back to your question that it's hard to come up with just one thing. And we have to address these complex problems with complex solutions.

Geoffrey McCarney [01:34:56] Unless there's something I'm going to come here because we're starting to run short on time and then I'll go to the back if there's none there I'll come here.

Audience Member #4 [01:35:06] My name's [...] and I'm from [...] and since it came up a couple of times in this panel I just have a couple few points of reflection. One is, if you want to learn about food consumer behavior and choices, try to be [...] Westerners. A study was just done where they looked at data that's more sustainable, arguably healthy. And neither of those two are driving factors with what was the driving factor was can it be yummy. And it was amazing that even with that objectivity, you know, we were just talking earlier that we don't consume cars the same like we consume food. We've got safety records and we make more objective choices and food is so personal so it's interesting for us to see studies begin to look at [...] The second thing is that sometimes I think we are conflating two different issues because we have projects that are running out of Madagascar where we're using, you know [...] that are traditional that are being farmed for years but never in any kind of formal manner. And those issues of food insecurity in Africa and other places is very different than a project from President's Choice and getting the product on the shelves at Loblaws so as a company looking at this entire business structure and food and how it's going to work logistically, it's very interesting to have these two contrasting projects, if you will [...] and what we can learn from each other in respect to them. The third thing is that, if we talk specifically about cricket let's say cricket powder, unfortunately we used the term cricket protein and I agree that Westerners get enough protein. The question is whether or not it's sustainable. The good thing about insects is that it's not just protein, they're very high and you talked about iron deficiency [...] nutritional health problem on the planet. So it's efficiency of the food. So a study was done and looking at iron and [...] compared to iron and insects and not only was the concentration higher [...] it was almost 75 percent more [...] so when you're looking at LCAs and other things and looking to try make comparative analyses, if you don't know what kind of bang you're getting for your buck the studies may be heavily flawed at the time. The other detail...

Geoffrey McCarney [01:37:39] So we were getting close to the end of the session so to get the panel in. Yeah,

Audience Member #4 [01:37:43] [...] We're not getting enough fiber. And that's another piece of that ingredient that's protein macro micronutrients and fiber. So just try to set a context for that. So thank you.

Geoffrey McCarney [01:37:59] Thank you. Is there any any response?

Hugo Melgar-Quinonez [01:38:02] Thank you very much for that. I do think that we have some grad students working on insects and insect properties in Africa. What we have learned is that an insect is not equal to another insect and that the crucial qualities might be different. And also the anthropological fact you alluded to plays a big role. There are places where people raise or harvest wild animals or insects to sell someone somewhere else because in their beliefs they shouldn't eat those animals themselves. But others can and we can get somebody [...]

Mike von Massow [01:38:44] I've just done a little bit of work on insects. We're doing some more. The issue of it's got to taste good is true no matter what you're eating. So it's going to be hard to get people to eat something that they really don't like and that's I think that's true. That's why we're eating lots of refined sugar. That's why that's why the food insecure it's cheap. Fat, sugar, salt, or cheap. And so no matter who you are getting people the the the the additional issue, relative to insects particularly, in the western world is even if you get to taste good if you tell some people that it's insects there's the ick factor even if they can't taste it. So it's again it's not eating a cricket and having the feet you know chocolate covered or whatever a novelty treat, even if you tell someone that this protein bar with chocolate and oats and other things in it has some cricket powder in it they they will cringe before they even and it will it if you don't tell them they'll like it if you do tell them they won't. So it is not an insignificant challenge. But but but I don't think it's an insurmountable one.

Geoffrey McCarney [01:40:04] I'm going to try to give [...] somebody from the audience a chance to ask a question. We have a couple of minutes left. So we'll go to the back. Gentleman there. Did you raise your hand? Yes. Yes please

go ahead.

Audience Member #5 [01:40:16] [...] the problem with ethical frameworks traditionally is their individual place. The accountability that we're talking about. The accountability to teach others and ourselves [...] An individual can hold themselves responsible for climate change, for environmental destruction, for habitat loss [...] There needs to be a re-envisioning of ethics to include both that level of accountability and a level of accountability at a higher level where we can actually see you know as [...] that there are actual people like [...] arguing this is a fundamental problem with our traditional ethical frameworks. It's recurring implicitly in all of what you're saying, but there is a need to wrap up the discussion with a re-envisioning of [...] accountability and responsibility that translates into something that means something at the individual level [...].

Geoffrey McCarney [01:41:42] OK. I'm not sure if I got a specific question there but we're at the end of the session if anybody has any last burning thoughts that they want to add in one minute or less.

Brent Preston [01:41:54] I just wanted to quickly get back to the question of deliciousness because I think it's important when you're talking about food and I think when we're talking about driving consumer behavior we've found that working with chefs has been extremely important because the the the biggest trend that we've seen in our in our restaurant customers over the past 10 years has been a move away from protein at the center of the plate to vegetables and that is having a ripple effect all down through the society and I think it eventually permeates to all levels of society. And and the way that chefs have managed to do that is by making it delicious. You know the the level of vegetarian or vegan cooking now is light years ahead of where it was 10 years ago. And so that all of these cultural and emotional and pleasure aspects to this discussion are super important and I think working you know farmers and academics have to work with these sort of tastemakers in society to to gently push our agenda.

Geoffrey McCarney [01:43:01] Okay. Thank you. In the interests of time I think we'll end it there but I would like to say thank you to all our panelists for a very interesting discussion and thank you to you as well.

[END]