NUTRITION AND HEALTH

WHAT DOES THE LATEST RESEARCH TELL US ABOUT THE HEALTH BENEFITS AND RISKS INVOLVED IN CONSUMING ANIMAL AND PLANT-BASED PROTEINS?

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

Susan Tosh [00:00:00] [...] trains dieticians and we're going to expand in the next couple of years into teaching food sciences as well. And we have a continuing education program in food policy and regulatory affairs, if you know of anyone who would like to have more continuing education in that area. So I just thought I would make a couple of comments before we start. And so there's food is at it's basis how the energy and the nutrients that we need to survive. But we all know that it's far more than that. It's a basis of our culture, its enjoyment, its family, it's all kinds of things beyond basic nutrition. And if it was all just about nutrition we would all just eat what we were supposed to eat. But there is a big determinants such as habits. What did you buy last time you went to the grocery store and what will you buy next time? There is a big predictor there. Culture. What do other people that you associate with eat? What you enjoy eating with them? There's personal preference. Everybody has one thing they never eat. And then there's also such things as cost and availability that also are major determinants in what everybody eats. So I would just wanted to throw up one slide that I produced. Well maybe a couple. This one is what is the actual the commodities that we eat in terms of in Canada. So this is 2016 data that comes from Stats Canada on the proportions of different things that we have in our diets. And you'll see that milk, eggs, meat, fish, and poultry make up a large portion of that pie diagram and you'll see that nuts are a much smaller one and pulses are so small they don't even show up. And in terms of the actual sources of protein in the Canadian diet the biggest single source of protein is actually wheat flour. We haven't talked at all today about cereals but cereals are a major contributor of protein kind of to the Canadian diet and wheat flour, although it's the largest source, is not a particularly good source of protein. It's low digestability and poor amino acid balance. Then we next down the list we have milk, chicken, beef, pork, eggs, fish, then we have potatoes. No one ever thinks of that as a source of protein, but because we generally conserve consume at least one serving a day it actually is a major contributor. Turkey and peanuts round out the top 10 list. And again you'll see that most of the vegetable sources that we talk about as good sources of proteins, the pulses, the seeds, the nuts, aren't don't show up there other than peanuts. And so having given you that just for a little bit of context and how we actually what sources of protein are, we'll move on to our panelist. So our first panelist today is Mahshid Dehghan, who is an investigator with the Nutritional Epidemiology program, the Population Health Research Institute, and Senior Research Associate and Professor with the Department of Medicine at McMaster University. [208.2s]

Mahshid Dehghan [00:04:14]First of all I would like to thank the organizers of the meeting Ryan. It's a great pleasure to be here. I'm going to talk about health benefit and the risks involved in consuming animal and plant protein. I'm

nutrition epidemiologist, therefore my interest is to look at the association between diet and disease. Therefore, during my presentation, I will talk about the association between total protein, major sources of animal and plant protein, with cardiovascular disease and mortality. We all know that protein is an essential component of our diet and we usually consume it on a daily basis. Therefore it's good to know the effect of protein on our health. Just to give you a background, we are conducting a large epidemiological study in twenty three countries. Low, middle, and high income countries. And we have recruited about one hundred seventy thousand individuals so far but our target is to recruit two hundred thousand participants. One of the major objective of our study is to look at the association between nutrient, food, and cardiovascular disease and mortality in low, middle, and high income countries because they are different. They are really different. What we did last year we published a paper and looked at the association between carbohydrate, fat, and protein and health outcome. And this slide shows the result one of the result of our paper. This slide shows the risk of mortality by percent energy provided by protein. In this analysis we included one hundred thirty five thousand individuals from 18 countries with about seven years of follow up. And to assist the association, we grouped individuals based on their intake into quintile, and we use the lowest quintile as a reference group. As you see here as protein consumption increases there is lower risk of health outcome. For example, for mortality, people who had high protein intake had 12 percent lower risk of mortality, 10 percent lower risk of non CVD death, and 15 percent lower risk of CVD death. Just I would like to bring to your attention here that the lowest group was consuming 11 percent from protein and the highest group were consuming 20 percent, about 20 percent energy from protein, and all models that I'm presenting here are adjusted for potential confounding factors such as age, smoking, education, and so on. But this is a reductionist approach when we look at nutrient and health outcome, and may not be the best approach because we eat food and food has many components. Some are beneficial some are harmful. Therefore it's better to look at the sources of protein. And one of the good sources is dairy. A recent meta analysis published by Alexandra in the British Journal of Nutrition included forty five thousand individuals. So he lost. Forty five thousand individuals, from five cohort studies, with 15 to 20 years of follow up, and result of meta analysis showed that those who had a higher protein consumption had 12 percent lower risk of cardiovascular disease. We did the same analysis using pure data. In this analysis, that be published September in the Journal of Lancet, they included one hundred thirty six thousand individuals, from 21 countries, with nine years of follow up. The group individual. Sorry. They grouped individuals, based on their consumption, into zero, less than one, one to two, and more than two servings per day and use the lowest group as our reference group. Again you see that those who had two to three servings of dairy had 16 percent lower risk of composite outcome. Composite is the composite of mortality and major CVD. For mortality, again we see higher consumption was associated with 17 percent lower risk. For major CVD, it was related to 22 percent lower risk and the association was stronger for stroke. Very similar result that you see from the previous meta analysis. However, we know that in some region people consume less, in some regions people consume more dairy. Then what we did, we created two regions based on their intake. Low intake regions are China, South Asia, Southeast Asia, and Africa and high intake regions are Europe, North America, South America, and Middle East. And we repeated the analysis and you see the same trend exists in low and high intake regions even in low intake region it is a stronger. We see benefits of dairy consumption. Moving to another source: meat. Meat is very controversial and for meat, here, I mean red meat. Beef. It's very controversial because in the field of nutrition epidemiology some studies has shown no association between red meat consumption and health outcomes. And some studies have shown harm. However a meta analysis recently published in The Journal of American Journal of Clinical Nutrition included one hundred seventy seven thousand case of a mortality. And they showed that for each hunderd gram increase in red meat, there is 10 percent higher risk of mortality. And for each 50 gram increase in processed meat, there is 23 percent higher risk of all cause mortality. The harmful effect of red meat. This story is very different for a white meat. There is more agreement on beneficial effect of white meat. Many study has shown white meat is protective for cardiovascular disease and other health outcomes. And this slide shows result of a prospective study of over half a million people in U.S. The table is only for men, but results are very very similar for women. And they reported inverse association between white meat consumption and all cause mortality, cancer mortality, CVD mortality, mortality from injury, and from any other causes. This is a very large study. Therefore, the result should be very reliable. Egg is a very nutrient rich food. It's not energy dense but it's very nutrient rich. But for many years we've been told to limit our egg consumption with the assumption that increase egg consumption increases total cholesterol, cause [...] sclerosi leading to coronary heart disease. But there is no evidence about this traditional thinking and there are many studies which has shown no association between egg consumption and risk of coronary heart disease. And this is a meta analysis published in The Journal British Journal of nutrition and they showed that one egg per day was not associated with risk of coronary heart disease. In fact the risk ratio is point ninety nine with confidence interval of point eighty five to one sixty. And for stroke, we see trend toward lower risk. The risk ratio is point ninety one with confidence interval of point eighty one and one point oh two. For a stroke we see that stroke behaves differently and for saturated fat also we see really protective for stroke. Legumes are very good source of protein and what we did last year we looked at the association between legume and mortality, on the right you see and result. Major C the left and right right is major CVD. And we reported that people who had one serving of legume per day had 26 percent lower risk of mortality and 17 percent lower risk of major CVD. In conclusion, higher total protein, dairy, white meat, and legume consumption, were associated with lower risk of mortality and cardiovascular disease. Higher intake of red meat and processed meat were associated with higher risk of mortality. Proteins are essential micronutrients and my belief is that we need to encourage people to consume it, but in moderation. Thank you very much.

Susan Tosh [00:15:21] Thank you Mahshid. So our next speaker is Christopher Labos who is a Pofessor and member

of the Division of Cardiology at McGill University Health Centre and a columnist with the Montreal Gazette.

Christopher Labos [00:15:39] OK let me just say so thank you for giving you a promotion. I'm actually not a professor yet still at the entry level stuff. My main affiliation here is with the McGill Office of Science and Society. What this office does I think is relatively unique in Canada. We are an organization that tries to communicate science to the public. We try to point out pseudoscience. We try to critique bad science and we try to improve scientific literacy among the general population. It is not going well. We face a lot of challenges trying to dispel some of the many many myths that exist on the Internet and especially when it comes to food because there are a lot of them. There's a lot of diet books, there's a lot of diet books that are mutually exclusive and contradictory to each other. And people feel very fiercely and passionately about these issues, often when there's very little evidence to justify either side of the debate. And the fundamental problem is, I'm gonna keep my remarks relatively short and I'll get into more specifics when we have the discussion, one of the fundamental problems is is that most food research is observational in nature. It's not done with randomized trials, it's based on the idea of food questionnaires right? I give you a questionnaire and I ask you over the past three years on average how many eggs do you eat per week? Tell me. How many eggs do you eat per week on average over three years? Can anybody answer that question accurately? I can't. I don't know. And especially the way these things are listed they'll often be like: Do you eat them daily, three or four times a week, once or twice a week, or never? And you're giving people a multiple choice answer and most people are probably guessing. And there's been quite a bit of criticism of food questionnaires, John Ioannidis just recently wrote a very large editorial about this in JAMA, and saying that look we have a fundamental problem in nutritional epidemiology that you know if we're gonna rely on self reputed food questionnaires we have to acknowledge that a lot of the data that we're basing our conclusions on are not really that solid, because the goal of all of this, I would hope, is not to do nutritional epidemiology for its own sake ,but to prevent disease, right? To prevent cancer to prevent heart disease. And the problem is is that for every food that's out there, and this is another paper by John Ioannidis I quote him extensively because you know he's my hero, for every food that's out there a study has shown that it can prevent cancer and another study has shown that it can cause cancer and this is true for most food products that are out there. So I think we have to be a little bit skeptical of anybody who's too vociferous in their claims and there are a lot of people on the Internet out there that have staked out a position and are starting to defend it in very very aggressive manners and are unwilling to acknowledge that there is some doubt about the solid or about how solid the evidence truly is. The problem is it's very hard to do randomized trials in food research. You know there's very few circumstances where you can lock people into a room and you know force them to eat whatever you give them. You can do it. It's very hard. It's very expensive. One of the largest randomized trials that was ever done was the party med trial, and that was for the Mediterranean diet, which was the one thing I think most people could agree on that most people said the evidence for the Mediterranean diet is pretty solid it's obviously good for you. And just recently that trial had to be retracted re-published because there was a problem with the randomization. So it's very hard to do nutritional epidemiology and I am you know I I'm I'm very amazed by the people who go out and do it because it has such technical problems to it because what we eat also changes over time so you can't just take a snapshot of food at one point in time and see what happens five years later because how you eat is going to change. And there's so many confounding factors. We've heard multiple times today that you know the richer you are the healthier you eat, but the richer you are means you also have access to better better medical care. So is it the food or is it the fact that you're better off that's making you healthier and live longer? You know also where does exercise fit into all of this? If you eat healthier you probably exercise more so is it the exercise or is it the food. It's very hard to tease these things out if you don't do randomized trials and like I said we don't have that many randomized trials in food research. So I'm just gonna wrap it up now. My or the the goal of our organization is to combat pseudoscience and I think part of that is to acknowledge when our own research has problems and to acknowledge some degree of uncertainty, because if we don't do that we're just going to bombard people with information. And so I can show you a study that milk is good for you and I can show you another study that milk is bad for you. I can show you a study that eggs are good for you and I can show you a study that eggs are bad for you. And then the public will just stop believing us altogether and we'll get into a point I don't know how many people are familiar with the YouTube channel College Humor but they had one very very funny skit on this issue and you had a college student and what they said was they were talking about the various felt had health fads you know the gluten free and the juicing and the cleanses and all the stuff that has no scientific basis. And one of them says the other you should take Vitamin C. It's basically magic in that I don't know how it works and I believe it can do anything. And part of the problem is that we're getting into an era where a lot of people think that way. They don't really understand how this stuff works because they hear so much conflicting information. They genuinely believe they can do anything because they hear people make claims that if you buy my diet book and follow my diet I can prevent heart disease, cancer, and arthritis, ignoring the fact that those three things are different diseases caused by different things altogether. But it's very tempting to give people simple solutions to complex problems and so this will be often jokingly referred to in the psy-com community as you know the one cause to rule them all. That's very attractive to people. And I think a lot of people out there are going to promote this idea of the one cause to rule them all. And our job, as scientists, as people who interact with the public, is one to interact with the public more and to spread good information to try to combat the amount of bad information that is out there. So I look forward to taking your questions during the panel discussion.

Susan Tosh [00:22:13] Thank you very much. And moving on very quickly I guess we'll talk to we'll hear from Diana Rodgers who is a Registered Dietitian Nutritionist and host of Sustainable Dish Podcast.

Diana Rodgers [00:22:42] I really like red meat. I'll just give you a quick background because I have a different I'm not an academic. I have a clinical nutrition practice where I help people with G.I. issues, mostly, and metabolic problems. I live on a working organic farm where we raise vegetables and animals. I have a podcast. I'm working on a documentary film right now about the food we eat and the importance of better meat in our food system. And I'm very very excited about this conference because I don't think we need more human feed. I think we need better protein. So thank you for inviting me. I am seeing a lot on social media about the vilification of meat and I think that it's not the cow it's the how. It's not it's not that red meat is necessarily bad, it's how we raise it, how we repair it, and what do we eat it with. So National Geographic has a really awesome website: What the World Eats. And when you look at worldwide consumption of meat, beef is actually at 0 percent growth. And what we're seeing is much more poultry and pork and seafood. And poultry poultry and pork, in particular, are problematic because industrial industrially raised pork and chicken is 100 percent grain fed. That's 100 percent competing with calories that we could be consuming ourselves. Cattle is a very different story and they can actually up cycle nutrients and I think that they're actually a net protein win for our food system. We're spending less on meat than we ever have before. If you look at our spending in America on processed foods that has doubled. So we're eating more nutrient poor food and less nutrient rich food. And we're being told that bacon is as bad as cigarette smoking and red meat is as bad as glyphosate by the WHO and unfortunately media likes to pull out sensational headlines and vilification of red meat is really popular right now. But the the relative risk of smoking versus eating bacon every single day is dramatically different. So epidemiology is awesome at showing the risk of smoking to lung cancer. I don't think it's as good at helping us to set nutritional policy when it comes to very small increases in risk especially when you back out all the confounding factors. I'm just not sure that nutritional epidemiology should be used to set policy. I think it's really great to explore you know look at results and explore further. And so just to same thing that the previous two speakers were talking about, when we're looking at associations, you know, eating saturated fat is linked to increased cholesterol so therefore if you just eat less fat you have a lower chance of dying. I could use that same logic with eating ice creams associated with warmer temperatures. And so if you don't want to die of a shark attack just don't eat ice cream. Or telephones in homes leads to more calls the police when you have more calls to police it's a higher murder rate. So if we just got rid of telephones in the home we could reduce our murder rate. OK. And of course the dangers of diet recall, people are they may remember the burger that they ate last week or three weeks ago but they're much less likely to remember the large fry, the 72 ounce soda, and the deep fried apple pie that they had with it. So diet recall is a pretty poor indicator of actual diet intake and I'm a huge fan of John Ioannidis, however you say his last name, as well and he might be a good person to bring in the future. And there's also the healthy user bias as well. When they've looked at people that shopped at health food stores, so taking into account you know the type of lifestyle that people have, they found actually no difference at all in all cause mortality between vegetarians and meat eaters. And I actually think that we need more protein. So I know this is very different than what a lot of other speakers were saying. When I look at the USDA food availability adjusted for loss we're actually only eating about five and half ounces of animal protein per day in the US. That's pretty low. When you look at the protein ranges, so the upper range at 35 percent, that's the macronutrient distribution range, and the lowest end, 10 percent, we're much closer to the lower end and especially women and children are very low in that range. And my when I was looking at how they came up with the protein recommendations it's based on nitrogen balance studies which are highly flawed. Also the RDA in the US, point eight grams per kilogram body weight is the minimum protein requirement. What I see in my clinical practice is give people more protein and they actually reduce their overall caloric intake because they're more satiated. So when we eat less protein we have to fill it up in some way and that's either more fat or more usually ultra processed carbohydrates which is what we're seeing in America. And now we have more than half of Americans overweight or obese and I'm not the only one who thinks this. Here is an article in New York Times. We need double the protein especially especially if we're over 40, so it's i'm not just this rogue crazy protein avangelist actually. This came out actually after I did a lot of research into our protein requirement and how the recommendations are actually based on pretty poor science. And then when we look at how are we going to get one point six grams per kilogram of body weigh, meat is a really awesome source so protein per serving the the meat wins. I mean we've got lentils is one of the best plant based sauces. But it's only 18 grams of protein per serving. And then we go down from there and what I don't have in here actually is the caloric. I have this on my blog. But the caloric expense of these protein calories. So it's about 200 calories worth of beef for 30 grams of protein or 700 calories worth of peanut butter. About 400 calories worth of lentils. So if we're trying to reduce overall caloric intake, which is one of the causes of our obesity, we're trying to reduce carbohydrate intake and up protein, meat is actually our best option at that. And then we've got iron and B-12 as some of the leading nutrient deficiencies worldwide. Red meat is the best source of B-12 and iron and that's the Academy of Nutrition and Dietetics agrees with me on that one. Red meat is just incredibly nutrient dense, not only for its protein and minerals, but also the bio active compounds. Organ meat in particular is also incredibly nutrient dense. We're not eating enough of it. And what I think we need is better meat. We need less meat that is fed a hundred percent grains. I think there's a lot of reasons why chicken is presumed to be better. It's white, so it doesn't remind us of blood. It doesn't remind us of the animal that it came from. It's likely not on a bone. It's a reasonable size. It doesn't feel too big. It's it's pretty much like the meat version of tofu. And I think there's a lot of emotion going into our vilification of meat that's just unfounded. OK. And red meat is about 30 percent more nutrient dense than chicken. We've also got a really big problem with super bugs and [...] are not helping this cause. When we look at our farming, so this is my sustainability, we've only got about 60 years left of farming at our current rates and I don't think things like lab meat are actually going to contribute to soil health. I think that they're just highly processed, plant based, false solutions to our protein dilemmas when we can

actually be using regenerative agriculture as one of our solutions. So lab meat is made from industrial plant production which is harming our soils, not helping anything. So grazing animals leads to soil health, lab meat is just more mono crops. And there's a lot of financial gain that companies have from pushing this and there's a lot of bias and emotion at play here. Feeling that it's better because animals didn't die. So I believe that when we have more ruminants that can mine the soil for us, that can convert food we can't eat,, grass on land we can't crop, which is most of our agricultural land, into nutrient dense protein it's a just net protein win.

Susan Tosh [00:33:37] Thank you very much. Seems like we do have a diversity of attitudes here. OK so our next speaker, fourth in the session, is a Kate Anna Kate Shoveler who is an Assistant Professor of Animal Biosciences at the University of Guelph.

Anna Kate Shoveler [00:34:01] OK I'm gunna put a little bit of a different perspective. I also think I might be the only one here I I sit in a cluster of all animal nutritionists so I sit beside the beef nutritionist and the dairy nutritionist and the swine nutritionist and the poultry nutritionist and the aquatics nutritionist and together we unifiably look at nutrition different than human nutrition. So I hope I bring a little bit of that perspective to you today as well. And so similar to what everybody else has done and we have a lot of information pushed to us and I can find almost anything on the Internet to fit my narrative of what I'm going to choose to pick at the grocery store and to put on the table for for my family. And so on one hand here we have the top 11 protein foods and you can see here that it's predominately animal based, lentils just similar to the other data. Right behind that. But I can also search for meatless alternatives and then I'm going to get I'm going to get nuts and dairy but I can also search for all the things that I shouldn't eat. And I have an interesting perspective because I spend a lot of time in the pet food industry and working on on how that industry is reflective of both animal agriculture and human nutrition. And we started about ten years ago calling them the "No No" diets. Don't put corn in it. Don't put animal byproducts in it. And when I was when when that kind of saying came about I was working for Procter and Gamble who not surprisingly their motto is consumer knows best. And this really has driven to a lot of the other points how we've decided to design the foods that we make for not only pets but also humans. And so we see a lot of advertising on our pet foods about "does not contain X Y and Z or Z" so you can tell I spend a couple of years in the States. I have some really funny sayings too that not good. So one of the one of the things that I think is really interesting is that when we look at the government in Canada's build a healthy meal we see here fruits and vegetables, grain products, meat, and I'm gonna bring up alternatives here because it's very important. We are recommending alternatives. but I going to tell you a problem that we have in actually communicating that to the consumer. And so the other problem that I see is, here, this is my family, and our healthy plate looks very different. And to me, and probably all the dietitians in the room, this makes a ton of sense. Of course my son has more meat and alternatives on his plate because he has a higher protein requirement than we do. And that's because he's depositing protein, he's just not maintaining protein. And so it makes sense that, if you have kids, you probably know that they hit the meat a lot harder than you want to hit the meat. And that's partly because of of their requirements as well. And I always like to throw my husband under the bus here with his choice of the amount of grain products he chooses in contrast to the fruits and vegetables that I choose. So this is a little bit of a snapshot about the marketing and the consumer narrative that has gone around pet food, which, if I had have had time to pepper this in, right now in the United States there is a monstrous issue going on with pet food primarily targeted at foods that went in grain free with the implication that the increased consumption of legumes and potato is underpinning a cardiovascular disease in dogs. There are soft recalls being made, there is pandemonium, absolute pandemonium, in the pet food industry. And all of this is so interesting to me because it was all a consumer driven consumer driven kind of change in the industry. And I hear all the time, I start feeding I start teaching Pet Nutrition and my students say well if I wouldn't want to eat it, a.k.a. by product, right, Oregon meat as a great example, why would my dog? And then I remind them that the dog's second most preferred food is your feces. That's why they became domesticated. So we have these conversations about the emotion of food and we deny some fundamental facts that I think we should consider across our food chain. So a lot of my job and my my colleagues job is to look at ingredients and more specifically how we provide nutrients across the food chain. So we're all talking about ingredients, animal nutritionists, we formulate to nutrients. We use ingredients to hit nutrient targets and that's why we're to look why you know we can't eat hay and harvest energy and protein. We don't want to eat all the little bits and pieces that are coming from food animal proteins that you don't eat, but we can put them send them to a renderer and we can make bacterially stable meat meals, meat oils, and we can use them across our food chain. So I want you to not forget about all these byproducts, which is about half of the animal agricultural industry. And then, we have Entimo here, I work a lot within viral flight in the United States. We're looking at Block slow soldier fly larvae and think beyond protein. There is a really high amount of loric acid in black soldier fly larvae, and this is an anti-microbial oil. And so there are duplicitous reasons why we should look at all other alternatives, such as removing antibiotics from our animal food chain and replacing them with a healthier choice that can actually help combat antimicrobial resistance. And so part of why I'm here is my food from thought, and now my swine cluster projects, are all looking at protein quality and asking the questions about comparing different kinds of approaches. And we've already had nitrogen balance as the underpinning for amino acid and protein requirements. I also work on amino acid and protein requirements in many animals. And then the reason I do that is we're talking about protein content. We're talking about amino acid composition and we're talking about protein and amino acid availability. I've heard all those today but you know what we don't do? We don't match those with different animals. And newsflash, all different animals have different amino acid requirements. So why are we all fighting over the same high quality protein sources when we should be better allocating them across the entire food

chain? So a prime example, is I also look at protein quality in brows for giraffes at the zoo. OK? So we can find protein everywhere. We have to best allocate it. And why do we need to do this? Well this is us simplest kind of simplistic explanation of why it's not just about protein but it's about the quality of proteins. And so the example is in rice. It's limiting in an amino acid called lysine, but that's OK because most people who eat lots of rice usually pair it with beans which are a little bit higher proportionally in lysine but then beans are deficient in methionine. And so animal nutritionist, we pair these up and in fact we have dropped the protein levels that we feed to chickens and pigs. As an example, to a very large amount to try to mitigate nitrogen that's coming off of our farms as one example. Coming back to building a healthy plate, it does kind of build all of those together. The healthy plate, what it is based on is our amino acid requirements and we don't have requirements for protein, we have requirements for amino acids and we have tried a little bit, there you go, to start talking about how we discuss this with the consumer. And so one of the things my protein quality program has gotten involved in is really looking at how we convey these message to the Canadian public and in Canada we use the rat growth assay to be able for an ingredient to get a protein claim. So good quality protein excellent quality protein. We use that we feed that ingredient to rats and we look at how they grow in contrast to being fed casein. In the United States they don't, they use a different they use a mathematical algorithm to develop their protein quality claims. And what's really important here is what happens when we feed rats is rats have really high requirements for methionine. And what did I say beans were deficient in? Methionine. Hence, none of our beans get a protein claim. They don't carry a message saying that they're a good quality protein in Canada, but in the United States they do. And that makes sense because we say meat and meat alternatives and the U.S. actually says meat, poultry, fish, dried beans, eggs, and nuts. OK. So they provide more guidance to those protein rich. And so we've written one opinion piece called appetite for modernizing the regulatory framework for protein content claims in Canada and you can see why that has brought together. And then I've talked a little bit about being an animal nutritionist and we already are doing Precision Nutrition and so we wrote a piece about lessons from animal nutritionists because we have already done Precision Nutrition when we talk about animals. And last but not least we're now going on with a really big program to try to look at all these protein quality methodologies and talk about how we should best use them and allocate our protein ingredients across the food chain. Thank you.

Susan Tosh [00:44:46] So thank you very much to all of our speakers. That was very informative and I'm sure that everyone learned something. So next I would like to allow the panelists, for about 10 minutes, to speak to each other and to exchange ideas.

Mahshid Dehghan [00:45:07] What I would like to get what I would like to emphasize is that food frequency questionnaire that we use to measure diet of people in large epidemiological study, we do not ask during last three years. We ask, during last year how often did you have milk? And my friend forgot that FFQ is not measure of absolute intake. It's good for ranking individual. If, in this show, I ask you how often you drink milk, many of you you know that you drink milk, maybe once a week, twice a week, three times a week, and there are some people who do not drink milk. This is the way that we do the analysis. This is the way of ranking individual, distinguishing or discriminating between people who consume milk and those who do not consume milk. And this is the reason that we do categorical analysis. We don't do continuous variable analysis. This is one point. The other point about nutrition epidemiology. This is a very new science. It's 50 years old and science evolve. You see that message has changed. Message change about dairy. First of all the design of the studies are different, there are many smaller studies we measured which measure diet and have their results published which is nothing wrong with that. Therefore the design is different. The population is different. Majority of our knowledge are from Western countries, North America and Europe. And when information come from other part of the world, non Western countries, their consumption is different. Therefore you see different results. It's not a surprise. Change in science, it is very natural. In medicine we don't behave the way that you we used to behave 50 years ago. You're a physician. I don't think you treat your patien,t or surgeon, they don't do the surgery now the way that they used to do it 50 years ago. This is the nature of science. It's not just nutrition epidemiology but because nutrition epidemiology is very young. Fifty years old is nothing in the science. You see lots of up and down and very normal. Randomised trial is the best. Is gold. There is no discussion about it. But randomized trial can be used to see effect of diet on risk marker. You can ask people to participate in a randomized trial for let's say six months or seven months and feed them, give them high fat diet, low fat diet dairy, non-dairy diet, and see changing blood pressure, blood lipids, risk marker. But if you want to do a randomized trial for cancer you need to put people on diet for 20 years. It's a chronic disease. Doesn't happen overnight. Cardiovascular disease doesn't happen overnight. Therefore although we all agree that randomized trials are the best. They are gold standard. But in nutrition epidemiology it's very difficult to do it. WOMAN has initiative spend billions of dollars on a randomized trial. Didn't work. [...] They did their best and to my belief there is one of the best but they found that there were problems with their randomization because it is very difficult for people to follow your advice for five 10 years for a long period of time.

Susan Tosh [00:49:15] Thank you very much.

Christopher Labos [00:49:18] I think the message that we need to take away from some of the criticisms that have been leveled against food questioners and nutritional epidemiology is that we have to acknowledge uncertainty in the stuff we do. And there are many people, and we see this a lot in quite a few debates that are going on in medicine now, where people become increasingly entrenched in their positions and they fail to acknowledge the uncertainty

that exists. One of the analogies which I thought was particularly unhelpful was there have been some studies not recently on salt in people being it's just you know one group saying that salt is dangerous. Other groups of things actually pure recently have said that you know there's a threshold effect beyond which lowering salt it doesn't make a difference. And these two groups, multiple researchers on both sides of the Atlantic, became increasingly bitter and antagonistic towards each other and started accusing each other personally of being you know in the pocket of big salt and getting money from sources and increasingly acrimonious discussions that were no longer productive. And you know and then at one point people said listen this has to end. They got together and they said OK we're the only way we're gonna solve this is if we do this large randomized trial and the only way that we can actually get people to eat what we tell them to eat, force them to you know eat the thing that the randomized to, is to experiment on prisoners. And that was their solution. Like we're going to go and experiment on prisoners. And there has to come a point where we take a step back and say OK we have this uncertainty, does this matter enough that we are going to spend finite research dollars trying to answer this question? And to answer it in, with respect to experimenting on prisoners,I think is a little bit ethically questionable. Okay. We know that having a lot of salt in your diet is bad for you. I think no one's really going to argue that. Do we really need to spend that much money and that much time and that much effort figuring out where the lower threshold is? I would say it's not that important. And so when we come to a lot of these issues in nutritional epidemiology, arguing about this specific food or that specific food or this specific thing or that specific thing, a lot of this probably doesn't matter all that much. We know big things are true. We know that eating a lot of sugar is bad for you. We know that smoking is bad for you. It's not nutritional epidemiology but I thought I'd throw that in there. We know that eating a lot of salt is bad for you. We're pretty sure that eating poly unsaturated fats as opposed to trans fats is good for you. OK so we know these big concepts and these are things that we can probably move forward on and so we have moved forward on a lot of stuff, taking trans fats out of the diet, reducing salt and sugar, all this other stuff. So if we're going to talk, I'm going to try to bring this back to proteins that we're talking about here, if we're going to talk about protein and meat and like what's important for your health or not, you know, do we really need to argue that much about the source of the protein? I would say that it's possibly slash probably true that the more we switch away from animal based proteins to plant based proteins we'll be on average healthier. I don't have very very solid evidence to back that up, but I think most people would say that that's probably true. That's how I hedge my bets. But the more important thing, irrespective of whether eating red meat or not, is probably whether the meat is ultra processed or not. So whether it's being prepared in some ways. So if it's like a cured meat, if it's the salted, if it's a smoked, right, as opposed to just having something that you're cooking on your barbecue. That type of thing matters. So rather than looking at food nutrients or food products we should look at the foods that are actually people are eating. If you're concerned about your kid's health it's not quote unquote necessary to make them vegetarian because if they're vegetarian they can still eat french fries. The most important things that get them to stop eating hotdogs. We know that's unhealthy. So we have to identify junk food. We have a problem with childhood obesity in North American and in Western Europe. We have to get kids to eat less junk food and probably eat less altogether. And we can do that now with the information we have in sort of becoming too acrimonious in our debates about some of these very very subtle points is probably not the best use of our time because frankly research money is finite and we can't keep throwing it into these projects that end up being. This is good one day. This is bad the the next day and when you have multiple groups doing the same research coming to contradictory results.

Susan Tosh [00:53:36] Thank you.

Christopher Labos [00:53:36] May oh sorry maybe we have to acknowledge that there's probably no effect there. Sorry about that.

Anna Kate Shoveler [00:53:42] I'm gunna more so ask a question. I think it's apropos that I left this this slides up with the quote from Albert Einstein because I'm sitting up here and I'm not sure what the problem is. Right? We're talking about protein. By this is we're also talking about health. And so and how nutrition kind of supports health. So I think maybe we could all agree that the biggest problem between nutrition and health right now is hands down overall energy consumption. Is this pretty fair? So then then the next question would be how to curtail that and what role protein has in that. which I believe that we've heard some really good points for that. So I would one thing that I would be curious to know from the panel is how many people have Fitbits on. I just didn't leave put mine on this morning. But we we we Fitbit most of our ag animals at Guelph as an example. And not only that but we also put indwelling bio sensors in so we can tell when they're hungry, when they need to lactate if they're a dairy cow, whether they have subacute disease. Maybe it's not only about what we're eating, how much we're eating, what we're eating, but I would also say it's about when we're eating and what that's important and how do we convey that coming back to communication. I can tell you that Millennials love it when you tell them exactly how to follow. So maybe if they're Fitbits went "now is a good time to eat protein because your blood urea's low" then men then maybe that would work out a little bit better. So there's my crazy proposal for you and what do you all think about that?

Christopher Labos [00:55:47] I have something to say but I don't want to monopolize the conversation. I'll let other people go first.

Mahshid Dehghan [00:55:55] I have to ask you a question. How do you know [...]?

Christopher Labos [00:55:58] Well I was just saying I'm not absolutely certain it's true. I'm basing this on large epidemiology analyses that are seem to suggest that's the case and you have thing but but that's why. But that's why I hedge my bets and I say probably.

Mahshid Dehghan [00:56:11] You are basing basing what you are saying based on the epidemiology that you are criticizing. This is my point that it is really bad to confuse a I'm are not saying that [...] it's bad to confuse people or attack troops because they are doing something differently. They're all still knowledge that we have started from measuring [...] They started buying water from [...] And they've been doing [...] showing that poly unsaturdated fat is good for you and you are referring to [...] while you are criticizing it. That's my point. Yes. There is no good and bad [...] That's what I saw.

Unknown [00:57:06] If I can throw something else in here as somebody who does actually random controlled trials and that is what I find them the most useful for is looking at mechanisms for over a course of like one to six months, if you increase or these a particular food a particular active ingredient in the diet how do you does that actually change your metabolism. So they're not good for long term, looking at dietary patterns. But because they all of these things are based on the medical model, that's what is used as the gold standard, when in food and nutrition research they're actually serve a completely different purposes.

Christopher Labos [00:57:55] So to answer your question there you're talking about the Fitbit I have I have an issue with with Fitbits, like I have an issue with most things because I hate everything. No so fitness are very interesting because they're very good for what they were designed to do, to be essentially be step counters, to be activity monitors. They're not as good for some of the other stuff that they proclaim to be like you know calc calculating in number of calories you burned and stuff like that. And the problem with the Fitbit is that you have to wear it for it to be effective. And what happens a lot of people will get the Fitbit or get some sort of monitor and then they'll use it for six months and then they'll let it go. So I mean I agree with what you're saying. I just I I question how effective these devices are going to be and I think a lot of times that we end up embracing something without actually testing it to see if it'll actually work and in the longer term.

Anna Kate Shoveler [00:58:46] So tell me about real time interstitial glucose and timing of your next insulin dose and how well that's working? Pretty well. There is an example of a real time bio sensor.

Christopher Labos [00:58:57] You mean with the insulin pumps?

Anna Kate Shoveler [00:58:58] Yup.

Christopher Labos [00:58:58] Yeah yeah.

Anna Kate Shoveler [00:58:59] That is working real time. Yeah. So I used Fitbit as one example. I think that we can innovate it out of the box to better guide people to a healthier life and and we're we're doing that with animal ag now.

Christopher Labos [00:59:14] Listen if you can get it to work so much the better. I'm not opposed to anything. My point is, prove to me that something works and then I'll believe it. And that's what I ask and that's I think is the scientific process. Prove to me that something works.

Susan Tosh [00:59:26] OK so now I would like to open this up to the panelists around the table.

Unknown [00:59:30] [Background]

Audience Member #1 [00:59:37] All hi. I probably don't need the mic. I'm loud. But. All right. Perfect. So [...] I'm from university Fraser Valley and I want to ask Diane a question and I'm trying to sort of parse it in my head. So a couple of things. Number one I'm I'm the lab grown meat woman in the audience. I'm sure Ryan invited me, too, so we could have this discussion. And I wanted to dig in a bit on your slide that meat wasn't evil and I will say just so you don't think I'm a British Columbian granola cruncher. I grew up on a halibut boat. I was literally in a slaughter house two days ago. So but evil is a cultural concept. It is completely a human construction. And so there are definitely people in the world for religious reasons, moral reasons, who would say of course killing that cow is evil. It goes against all my beliefs. And so I kind of wondered wondered if you'd unpack that a bit more. Sort of can you for me balance the live and let live sort of view. Or do you actually think there is danger in the fact there's all these Hindus not killing cows and is are they wrong for feeling it's evil?

Diana Rodgers [01:01:13] Well I think that vegetarians who drink milk can only exist if there are people that they can send the meat to, right? So that they can only exist if there's you know the Muslims eating meat. Right. So the meat's going to die whether or not they're the ones who killed it or not. So I I have no problem if someone doesn't want to eat it for whatever their reason, but it's not nutritionally, environmentally, or I'd like to even think ethically superior to choose plants over animals.

Ryan Katz-Rosene [01:01:56] At the risk of stepping in here we do have a panel in the next session actually is getting into a lot of these issues and I'm sure these very questions will come up if it's OK with you [...] We can you can ask that question again after the next.

Susan Tosh [01:02:13] So next question. At the back.

Audience Member #2 [01:02:22] Hi. I just have a question. Sorry about the attitude towards research is I find that as a consumer when I read kind of research it's more about what is kind of like the best thing, this is a superfood, this is going to change everything and I really resonated to like I came in late so I missed your name but the gentleman on the panel there where it was more it's like it makes everything way more confusing. And my question is about is there kind of a attitude in research where we ask what's good enough in terms of like healthiness or is it is it like a lot of it trying to find what's best? Because I find that if you're looking at what's best it's very energy intensive and for everybody to consume what's best I think it would be really hard on the environment. So that's my question.

Ryan Katz-Rosene [01:03:16] And just just to follow up their work there are people watching on the live feed and asking questions via Twitter and there was a question that echoed this one as well. You're not the only one asking that.

Anna Kate Shoveler [01:03:26] So I'll take a stab at that because I do amino acid requirements studies and and I would disagree with your last statement but I'm going to tell you why is that if we truly understand what controls nutrient requirements. So, for me as an example, I've recently demonstrated that small, medium, and large breed dogs have different amino acid requirements, some not all, as an example. This starts to allow us to build populations of different levels of requirements and then target and more precisely feed them. So if I was to bring my overlay over of trying to optimize everybody's diet, optimization of diet through Precision Nutrition will help us better allocate these ingredients and not over or under supply any nutrient. That's an extremely idealistic answer.

Diana Rodgers [01:04:27] I can also just add to that that I think that when we want to look at what diet is most sustainable and ethical we have to start with what's the optimal human diet and then how do we how can we produce those foods in an ethical and sustainable way. Because the danger of not looking at human nutritional requirements first and optimal health first is that we end up just producing calories and feed and we're in the same situation that we're in now with overconsumption of calories.

Susan Tosh [01:05:03] While we're waiting if I could just add as far as superfoods are concerned I think that it's just an opportunity to highlight things that are really high in nutrient density and so bringing in things like raising the profile of things like quinoa is bringing in things that or or black beans that we're bringing to people's consciousness that these things are are low are good quality foods that are not consumed in large amounts and then they start getting added into things like restaurant meals and I think that's a good thing even though I the concept of it being a super food is is a myth.

Diana Rodgers [01:05:45] But then people are eating quinoa thinking it's high in protein it's actually a very poor source of protein. It's not you. And the amount of calories you need to to get 30 grams of protein from beans plus rice is so much higher. If we're having a problem with humans eating too many calories and not getting enough nutrition then I think we need to look at what is the best way to get nutrient dense food into them and it's it's the very food that we're vilifying that can actually sequester carbon and and heal the environment at the same time.

Susan Tosh [01:06:20] There is also a problem of lack of fiber in in the diets. There are some people only consume half the fiber that they need. Finally so beans and quinoa and these vegetarian other than tofu where they take most of it out. These are very good sources of fiber which we need more of in our diet.

Diana Rodgers [01:06:40] There has been some papers out recently questioning the the idea that we need so much fiber.

Susan Tosh [01:06:45] And there there's also very low fibers is low nutrient density.

Diana Rodgers [01:06:50] Well we've got we've got lots of examples of populations that had extremely high intakes of you know the Maasai, blood and milk, no fiber, virtually no vegetable products. You've got the Inuit. I mean we've got a lot of traditional populations that were extremely healthy on very low fiber diets and there there are some really good papers coming out talking about it could we could be wrong about fiber.

Mahshid Dehghan [01:07:22] But Maasai are hunter. They run maybe 30 km per day. Does any of us walk 10 minutes per day? No. Therefore this is the wrong comparison. Their lifestyle is completely different.

Diana Rodgers [01:07:34] But they're not eating fiber.

Mahshid Dehghan [01:07:36] No no no no no. You are talking about having the reason that you bring up Masaai here is that you are defending that I agree that we need meat. We need red meat. I don't. I'm not against that. I'm against too much meat. But comparing Masaai with our population, with our lifestyle is completely different because they are hunter in Africa and everything is different therefore affecting the food in your blood, comparing with our behavior is very very wrong comparison. I know that lots of people do that. What they don't remember that [...] they are not good model to compare.

Diana Rodgers [01:08:20] OK but the argument was we need fiber.

Mahshid Dehghan [01:08:22] I know you're saying that we don't need fiber. Masaai don't need fiber they don't eat fiber and are healthy. I'm saying the reason that they are healthy may be because they are very active. It's not just the fiber that your pointing. Their lifestyle is completely different. This is the reason that they are healthy. Not just because of the fiber that they don't eat.

Susan Tosh [01:08:44] OK thank you.

Ryan Katz-Rosene [01:08:47] If you guys don't mind if you could share that microphone between the two of you so that we're picking up the audio from the machine good.

Audience Member #3 [01:08:55] I think I'd just like to comment with respect to Anna's points that you know a lot of cancers are curable today because of data. And science is different than evidence which is different than data. And even with respect to certain health diseases the amount of protein you intake can effect their resolution or their acceleration. So there is no average amount of protein per day. If you have leukemia it's different than breast cancer. If you have no disease it's different than if you have disease. So I think breaking that down is really important too. But the other really awesome saying that Albert Einstein had, and I think it's also apropos now, is that he also said the hardest thing for a person to do is remove themselves from their own bias to look at things objectively. And I I really I I consider that almost every day, teaching, I teach at the Chiropractic College, and am involved in research and now obviously running running this bug business. And I think that we should all challenge ourselves to consider what Einstein was saying and how can we better remove ourselves from our bias to look at data and look at evidence more objectively.

Susan Tosh [01:10:11] Somebody else?

Audience Member #4 [01:10:14] I'm wondering if the each of the panelists could also address the issue of let's call it corporate capture. I don't think it's specific to your discipline. I think I think in general and society we've seen a shift towards more let's say more practical or more business focused research in universities and elsewhere. But I think in the context nutrition is more accurate. So I'm not talking about just always being what but it's also research is being done or not done. And how is impacting actually on on what is being said you know? Because it's confusing everybody which we can understand the complexity. I totally get this argument. But it is also a you know an elephant in the room as well also which might make things even more complicated. So I just like to know if each of you could maybe address briefly on if it's an issue, how do you deal with it, what's the impact of that.

Christopher Labos [01:11:19] I think you've raised a very very good point. Research costs money and that money has to come from somewhere. And although we as a population say that we want good scientific research we are surprisingly unwilling to pay for it with higher taxes. And governments when they're trying to cut cut their budgets will cut scientific research. That has happened. And there's a problem. If we go to private interests to fund our research we risk introducing bias into that research whether consciously or subconsciously and it's an issue that has happened and continues to happen and whether it's with food producers influencing food research, which has happened, or whether it's with the pharmaceutical industry affecting research, and you know are certain medications that has happened as well, I don't know how to resolve the problem, unfortunately. I think what we need to do is need to be a lot more open about disclosures and be a lot more open about where the money is coming from and try as much as possible to limit that that association. We should not have academic researchers beholden to private interests for their research funding. That's an idealized thing. Unfortunately I don't know how to solve the problem unless we you know governments become a lot more proactive in funding research. But I agree with you I just don't know how to solve the problem.

Diana Rodgers [01:12:38] There's also status quo bias as well. So there's less funding going into research that is questioning things like Mediterranean diet which is extremely popular and everyone's kind of comfortable with it because there's not a lot of red meat there. You know fish is is given a pass and heavy grain consumption is is assumed to be more pure than eating red meat which is so evil and bad right. So I think it's harder to get funding for research if you're just questioning basic ideas.

Susan Tosh [01:13:17] Anna Kate?

Anna Kate Shoveler [01:13:19] I'm going to give you a little bit of perspective because I've worked in government

industry and back in academia. I think first and foremost in especially in our academic programs, whether that's undergraduate or graduate school, we have to impress the importance about the commitment that scientists that you make when you become a scientist. Similar to board certification in the people who who practice, whether those be physicians, veterinarians, chiropractors, and and there's there's some really interesting literature on when scientists have been forced to take off their scientific hat. The Challenger Launch was a great one where the scientists said I am feeling uncomfortable. We haven't tested those gaskets at this well take put your business hat on. We're gonna lose a lot of money if we don't launch this. And what did he do? He took a scientific hat on put his business hat on what happened? Blew up. Bad. So we have to remember that it is also our moral responsibility as scientists to to fight for the right research questions and that's why we have checks and balances. I won't do any work that isn't publishable, as an example. You come to me. You really want me to do something. And it's not publishable? Either you're going to pay a ridiculous amount that will fund my lab for the next five years or I'm not taking it. So we also have to remember it's academic academia's responsibility to make sure that we do the right research with the right questions and the right partners. In food I can tell you that, as an example, I'm doing a bunch of stuff on legumes and I'm doing a bunch of stuff on insects and it's the pulse groups in Canada and it's the insect farmers that are funding it. They will have to prove the value of their ingredient before it's taken up by the industry. So that's where the funding has changed.

Susan Tosh [01:15:32] Mahshid did you have anything?

Mahshid Dehghan [01:15:32] Only one point that we know that funding is limited especially for epidemiological studies and nutrition. And I do see the opportunity to receive funding from food industry as long as you don't let them do your analysis. You'll have you'll have the ownership of your data and you'll have your question ahead of time. This is what people do for drug therefore they get money from pharma company, they test their drug, and there is nothing wrong with that. The nutrition epidemiology we can do that because we know that research funding is very limited.

Audience Member #5 [01:16:15] So thank you for that. I'm going to ask a question blending the first panel with yours so I'd like to hear more from you about getting the world fed. And I'm not hearing much about the reality that we have higher levels of diseases around the world in Canada, and I'm from Nova Scotia, unacceptable levels. We spend more than 50 percent of our budgets on illness. That's a lot of money that could go to other things. And I'm not hearing anything really different in terms of what you're saying. I'm not hearing any suggestions in terms of how you would do some modification to get us to different outcomes. So I'd be really curious to hear of your strategies from the health and nutrition panel about where this is going to line up with some of the other thinking by particular about feeding us so that we have health outcomes that are different than what we have now.

Susan Tosh [01:17:03] Can I address that one. So one of the things that has come to my attention as being somebody in the Faculty of Health Sciences, competing with the Faculty of Medicine for funds, and in the twentieth century most of the big health problems were things that could be solved with drugs, so infectious diseases, in particular, we needed good drugs. The things that are really facing us now, cardiovascular disease, obesity, diabetes, these things all have a huge component of them that is related to diet, and yet the medical and drug research is still getting a huge proportion of the research funds. And we're getting almost nothing. CIHR three years ago funded one nutrition study. In all of the funding that they had available for the year, 1 nutrition study. So if so rather than putting all of our effort into trying to resolve nutrition related diseases, why don't we put more research funds into preventing them?

Christopher Labos [01:18:26] Can I just make one one comment? There's this notion out there that cancer is becoming more common, that we're getting sicker as a population. In fact the opposite is true. Cardiovascular disease rates are going down, cancer rates are going down, when you adjust for age. We see more cancer now because our population is aging. So the country is seeing more cancer, but your risk of developing cancer is lower today than it was 20 30 years ago. So there's this notion that we're getting sicker but in fact we're not. And it's because of the triumphs of epidemiology and public health and getting people to lead healthier lives from a variety of reasons right. So while all this stuff is important we it's very important to realize that we are actually better now than we have been in the past. Life expectancy is higher now than it has ever been and we are. It is very good to be alive. If somebody ever offers you a time machine to go live in the past. Don't take them up on it. Things were worse in the past. They're much better today than they were.

Susan Tosh [01:19:28] So yeah it has been in the past a great idea to fund research that would extend life by you know keeping from people from dying of pneumonia and leukemia. Or sorry not leukemia. But something you know these infectious diseases. But times have changed.

Diana Rodgers [01:19:47] I just wanted to add to that our overconsumption of highly processed hyper palatable foods is what is driving our obesity and diabetes epidemics. There was a very good study that looked at a ketogenic diet for this population, I'm not saying that everybody needs to be on a ketogenic diet, but here's a diet is very high in animal products. 60 percent of of the people in this study had remission from type 2 diabetes compared to the standard American Diabetes Association guidelines. So protein animal fats can be very helpful in this. I think the biggest elephant in the room that people aren't talking about is our you know simple carbohydrate intake.

Unknown [01:20:40] [Background]

Anna Kate Shoveler [01:20:45] I was going to remind everybody that there's only been one thing that's ever been shown to extend life which is calorie restriction, right? So to build on your point, it's not what it's how much.

Diana Rodgers [01:21:00] Everything in moderation that we're telling people absolutely does not work in our modern food environment with these foods that are stimulating us to over consume.

Audience Member #6 [01:21:11] On my end perhaps it's a reaction but it's a question as well. When we're talking about we, whom are we're talking about? Because I see in the developing world the increase in chronic disease and I know people whom the probabilities tell me ,and they are much younger than I am, I will probably die at an earlier age than their parents or grandparents. And I'm not talking about the DR Congo. I'm talking about Mexico or Brazil or Bolivia. When we talk about we, whom are we're talking about?

Diana Rodgers [01:21:52] And we're seeing like corporations like Nestlé going into small towns in Brazil, encouraging discouraging breastfeeding and encouraging processed food.

Unknown [01:22:11] [Background]

Audience Member #7 [01:22:16] I'm going to tie back to the question from the woman who was a consumer and and relate a little bit to what Kate was saying earlier is, are we guilty sometimes of being too prescriptive and and say this is what you should eat or this is what you shouldn't eat and say here are our dietary requirements, here are some things to avoid. Would we make it easier for people to adjust if we if we highlighted the fact that some of these things are uncertain and that there is no silver bullet?

Christopher Labos [01:22:51] Yes.

Diana Rodgers [01:22:53] Yes.

Susan Tosh [01:22:54] Yes.

Anna Kate Shoveler [01:22:55] I was actually going to push that back on you and say, wouldn't that confuse them though? I'm really I say this because I spend a lot of time with undergraduate students and if if I start going into an avenue of well this is what we think, but now let me tell you about all these other variables that might play a role and need to be investigated and woah that makes us super uncertain. They literally want to cry at the end of the lecture. So I don't know which one it is. So I'm also asking for how do we make sure that they'll feel comfortable with ambiguity and be confident that they will make the right decision. Because they're certainly worried that they're going to make the wrong decision.

Diana Rodgers [01:23:41] I just think given how many things we don't know to tell like in the case of America with you know six or 12 servings of grains per day for all Americans it's we're you know people are eating pearl barley when they're eating greens or eating highly processed grains. And it's not working. We're failing.

Audience Member #8 [01:24:08] Thank you. I didn't introduce myself the first question earlier. So Paul Ace from the Arrell Food Institute University of Guelph. This is actually a question coming back to a specific processing question regarding animal animal farming and health. Would anybody like to comment on the whole question about gut health, human gut health, and translating that back to the challenges that might be coming from animal husbandry?

Christopher Labos [01:24:45] So I just I make sure understand your question. You're talking about like the gut microbiome. Right? That's what you're getting at. Yeah. So the gut microbiome is a very interesting field of research. A lot has been written on it. A lot has been written on the gut microbiome. I'm not sure how much of it is valid because there's I shouldn't say valid. There's a few problems with looking at the gut microbiome. First of all your gut microbiome changes over the course of your life depending on what you eat. And it's not clear as of yet how much those changes tie into long term disease prognostication. So I think it's interesting. I think there are some people, predominantly on the Internet, that have overstated the importance of this. I think it is going to be interesting to see where the research plays out. But the truth is I don't think we know enough about it yet to be too dogmatic about how important it's going to be or what role it has. Much of what we eat will much of what affects our gut microbiome is what we eat. Right. So is that independent of our nutrition or is nutrition just mediating our health through the gut microbiome? These are interesting questions I don't think anybody has the answers to them yet.

Susan Tosh [01:25:55] So I would disagree I'd say there isn't nearly enough known yet about the gut microbiome, that we're really still in the infancy of looking at how it's going to to just manage all of that data and to look at large enough populations because there is so much interpersonal variability that we really don't know yet.

Anna Kate Shoveler [01:26:19] I can tell you sorry I'm going to leap into animals again. Animal. Yes so part of what we see with the optimization of protein delivery to mono Gastric, so pigs and chickens who are a lot more like us than than cattle are, as an example, what we do see when we optimize and may I be clear that I'm saying optimize protein and amino acids so I'm saying above your threshold of your requirement. That usually means a reduction in total nitrogen and indeed what that does is when that nitrogen isn't fermented in the hindgut. We do see an increase in diversity and a skew in the short chain fatty acids that come from fermentation of carbohydrates in contrast to proteins. So there is the suggestion that it may be beneficial to optimize your protein to carb to fiber. And when I say carb I mean complex carbs not simple carbs. I don't I'm unaware of that that kind of research but. So there is a benefit of optimizing that and maximizing the digestability of protein as well. And so in animal agriculture the vast majority of what we're trying to do is make all the protein that we provide as available as possible to mitigate the the flow to the hindgut. So we are working on gut health. Insects are we're finding is is a huge potential boon because it brings in total dietary fiber at the same time because [...] is a fiber. So we're doing a good job there I think. And we're also employing things like enzyme treatments, fermentation, all kinds of things that we can do to change the substrate that we're feeding to animals to increase gut health which is kind of what we think underpins herd health in a lot of cases.

Audience Member #9 [01:28:35] You said earlier that you know that sugar is bad for us. What do you think the mechanism is? Why is sugar bad for us?

Christopher Labos [01:28:38] Why is sugar bad for us? Because when you have too much sugar in your bloodstream eventually your pancreas is a bit. Your pancreas' is ability to produce enough insulin to get into your cells starts to fail, you develop insulin resistance, and you develop diabetes and diabetes results in glycosulated end products which cause the micro vascular complications, which is blindness to amputations, and the macro vascular complications, which are increasing your risk of heart attack and stroke.

Unknown [01:29:00] That also happens with simple carbs.

Christopher Labos [01:29:02] Sorry?

Audience Member #9 [01:29:05] Where does that mediation begin?

Christopher Labos [01:29:05] What do you mean?

Audience Member #9 [01:29:07] I'm saying that to not imply that there's an impact on the gut biome.

Christopher Labos [01:29:12] Yeah.

Audience Member #9 [01:29:12] That sugar has a negative correlative impact on the gut biome.

Christopher Labos [01:29:21] Right.

Audience Member #9 [01:29:21] Bacteria associated with cardiovascular disease or the absence of cardiovascular disease.

Christopher Labos [01:29:22] Right.

Audience Member #9 [01:29:22] I've looked at the literature it seems to be pretty empirical to me.

Christopher Labos [01:29:30] I'm not quite sure I understand your point. You're trying to say that sugar mediates its negative effects by changing the gut microbiome? Is that right? Okay.

Unknown [01:29:40] It doesn't get to the colon.

Christopher Labos [01:29:45] Yeah.

Susan Tosh [01:29:45] Sorry. We're going to move on. There's a question here that I've been. Yeah? OK. This lady.

Audience Member #10 [01:29:51] Quickly. [...] I have a question. I guess it's a mostly a comment. But it does resonate with many of the excellent debates and conversation we had since this morning. I'm very curious to know what you think and by listening to especially like nutritionist and people that are in harder science than I am let's say, as a social scientist I think you know one of the thing that we heard from this women down there is like how much can we get satisfaction out of our diet. And then you were talking about how undergrad students really want to have specifics and they like when they know and the Fitbit and all of that and I kind of get a lot of what you mean but I also feel, and I may be wrong, as professors that food literacy and I would say agrifood literacy is really what's lacking.

And when you get into, at least for me, very detailed analysis which are absolutely essential I find fascinating to listen to you guys and get much more precise information on many of those amino acid whatever. But then I'm looking at something like the Brazilian food guy that is talking about cultural patterns and talking about who has access to how much meat and what kind and if it is extremely context related. And I think many of those data that are super precise and the Fitbit is certainly not accessible to most of us. And I'm also including Canadians as well. So I think those analysis are extremely important and may be very helpful to think about sustainable future in our agrifood systems. So necessary yes. But then what about this guide for the general populations that we can really I think there is lots to be done in terms of literacy about agrifood systems. To me this is like the beginning of the solution and coming in with specific datas on calories I think is killing and I hope that the next generation is going to be much better tooled to be able to make better choice and that's what I'm trying to tell my kids but I'm not sure coming in with lots of details about specifics may give them this freedom that they like as teenagers to be able to make some good choices. So just a comment I guess.

Diana Rodgers [01:32:43] I think the strength of the Brazilian food guide is in how they discourage ultra processed food intake and encourage home cooking. They actually say to buy from local farmers, to learn how to cook yourself, to teach other people how to cook. I think that's that's where the Brazilian.Yeah.

Susan Tosh [01:33:04] One last question?

Mahshid Dehghan [01:33:05] You are absolutely right. I think we are going to so much detail but we need to distinguish between what we do as a scientific community and the message that we are going to deliver. When we do say it between us here in this room, discussion is very different from when you want to deliver, because when you're sitting here and we're talking about red meat consumption or ketogenic diet, this is for this room. For people in India or China that they do not have access, or if they do have access they can not afford a piece 30 gram meat per day, this is not a solution. Therefore we have to customize, population by population, affordability, accessibility. These are important. We cannot write a prescription for the whole world. And even in Canada we have population who cannot afford meat. Therefore telling them that this is really good for you is not a solution. You are absolutely right. It shouldn't be that the message should be delivered to people when they can afford it. When it is accessible.

Audience Member #11 [01:34:20] So I I mentioned earlier that you know the current levels of meat production, livestock, is not sustainable from a consumption level, possibly, but also from the way we produce it and I wasn't suggesting we should just stop meat animal ethics aside it's not why. But Anna you have a very balanced look at you know protein and we keep equating protein and meat in the same. You know we keep interchanging it but it's not the same thing. And I'm just curious maybe whether Diana you could clarify a little bit, I know you're worried about vilifying beef, how much of a solution from a protein source for humans and sustainability is beef? Like to what kind of levels do you think we can consume that and be sustainable and also healthy? And it might be something other people want to talk about as well.

Diana Rodgers [01:35:26] I think that looking at lab meat as a solution and that it's better when it's highly processed, reliant on mono cropping, which is destroying our soils, is it's not a great solution. And cattle can actually improve ecosystems. They can increase biodiversity. They can improve the water holding capacity of the soil and when they're managed correctly, like through intensive management, you can actually way increase the stocking density. If we didn't have cattle. Eighty five percent of the cattle in the US are grazed on land that cannot be cropped. So if we didn't use that, that land would become desert. So I think we need to actually shift to less meat that's eaten grains like chicken and pork and more animals that are grazing and restoring ecosystems.

Anna Kate Shoveler [01:36:25] I would just add, because I think your you may be interested, there is a I'm going to bugger up the name a little bit but there is a beef sustainability thank you. OK. OK. So I mean working towards that and I agree. I think it's about right sizing. I we shouldn't be having conversations about get rid of that upscale that it should be right sizing based around the real nutrient needs of our population eventually. And I don't think it's today. I think it's 20 years from now that this push'll come to shove.

Susan Tosh [01:37:05] OK so we've now reached lunchtime. So unless there are any really burning questions I think that I will hand it back to Jason.

Ryan Katz-Rosene [01:37:18] I don't have nothing to add. There is a there is food in the hallway and it may take a couple minutes to set up but thank you for to all the panelists for both morning sessions. I think we can give a round of applause to both panels for giving us a lot of food for thought. And I don't have a schedule in front of me but we will reconvene for the third panel at 1:30 pm.

[END]