Danny Lennon: Hello and welcome to Episode 133 of Sigma Nutrition Radio. I am your host, Danny Lennon, and today I'm delighted to have Emma McCrudden on the show to discuss vegan and vegetarian athlete nutritional programming. And this is a really important topic because it hasn't really been addressed full-on on the show previously, at least in any great detail or any particular focus, and especially some of the considerations that crop up not only dealing with general health considerations for people who are perhaps switching to this dietary approach but then also how that may play a particular role for athletes and how that might show itself in athletic performance.

I'm really excited to have Emma on because her background is not only a blend of high-level qualifications and working within academic institutions but she just worked as a practitioner in elite-level sport in some of the absolute best places in the world. Emma was previously working with Leinster Rugby when she was back in Ireland, having already completed her master's at Loughborough University in the UK, and after that she also worked as a performance dietitian with the English Institute of Sport where she was working with all sorts of elite-level athletes and Olympic athletes as well. And a bit of time after that, she ended up moving to Canada, where she worked with the Canadian Sports Institute in Vancouver and is now currently at the University of British Columbia where she has split her time between lecturing in kinesiology

and then on the other side being a practitioner and working every day with the elite athletes that are on campus there. So she has a really broad, extensive range of not only having background in dietetics and having done her degree in dietetics and a master's in sports nutrition, but then had so much experience of working with real-world athletes and seeing how this stuff applies.

And so this is, like I said, a really big conversation I think can be very useful to you whether you are a vegetarian or vegan athlete or even just someone who's going with that dietary approach just for general health. There are some really important messages here if you're kind of new to that stuff of eating, but even more so I think for any of you practitioners out there who are either coaches or nutritionists or working with groups of people where you will at some point bound to come across someone who's on a plant-based diet, and so having an awareness of these key issues of how you could implement that to allow that person to remain healthy and performing at their absolute best while on a certain dieting strategy is important.

So I hope you take a lot from this. The show notes are going to be at SigmaNutrition.com/episode133 and I will link up anything that gets mentioned in this particular episode as well as a link to get the transcripts to all the podcast episodes that are released weekly on Sigma Nutrition Radio. So, without further ado, let's get into this week's episode.

Hey Emma, welcome to the show.

Emma McCrudden: Thanks, Danny. Thanks for having me.

Danny Lennon: Now, I'm really interested to get into a chat around some of the stuff we're going to talk about because I don't think it's really been addressed all that much on the show before and is certainly particularly for people in the audience who are practitioners and coaches, but before we get into any of that stuff, can you maybe introduce people to your own background, bringing us up to the point you're at now and what you're currently doing?

Emma McCrudden: Yeah, sure. So I trained as a dietitian initially in Ireland and straight after that I completed the master's in sport nutrition in Loughborough University. Immediately after that then, I was very lucky, very fortunate to work for the English Institute of Sport based in the Southwest in Bath. So I was straight into working with pretty high-level Olympic athletes down there, and while that was a steep learning curve for me coming straight out of university, but it was fantastic. I had a great mentor down there in

Nathan Lewis and learned quite a lot from him about nutrition and actually working in the real world of nutrition.

A little while after that, I actually got the opportunity to work with Leinster Rugby in Ireland and made the bizarre kind of decision to keep on my job in the English Institute of Sport in Bath and fly back and forth to work with Leinster Rugby because I realized I was still quite young in my field and really needed the support of the other nutritionists in the institute. And I managed to do that for four years, so very familiar with Bristol Airport and Dublin Airport and…

Danny Lennon: I'd imagine.

Emma McCrudden: Yeah. [Chuckles] And then I actually got a really good opportunity to move to North America back in 2013. Very hard decision to make to leave a fantastic job and fantastic colleagues back home, but I suppose I wanted a challenge and it was certainly that. So I moved to another institute of sport, working with the Canadian Sport Center Pacific or the Canadian Sport Institute as it's now known, and then I left that job actually in January just of this year to start working in the University of British Columbia where my position is slightly different now. It's part-time practitioner for the university athletics teams and part-time instructor on kinesiology courses. I'm trying to start introducing sport nutrition and the concept of sport nutrition to those students.

Danny Lennon: With that then, you obviously are interacting with a ton of high-level athletes, and so I think today we'd want to dive into some of the concepts around nutritional programming for those but focusing in on this area of vegan and vegetarian athletes because, obviously, very specific requirements for those and there are obviously some issues that tend to crop up with then that can be, if people aren't looking out for them, potentially detrimental not only to performance but maybe to health in a more general term.

Emma McCrudden: Mm-hmm.

Danny Lennon: That kind of term of vegetarian I suppose falls within a number of different ways people can go. What type of different vegetarian diets are [00:07:40] what type of spectrum have you seen with people you're working with in how far they push that?

Emma McCrudden: Yeah, it's incredibly diverse and I think my knowledge and my awareness of particularly veganism coming from Europe was…it was pretty limited,

if I'm honest, before I moved here, but I think there's been a huge shift in interest towards these dietary choices and you can probably assume that some of those have been influenced by the documentaries that we now see on Netflix and popularity of some athletes talking about their veganism or vegetarianism. So yeah, there's lots of different types and I think that's part of the job that I have, is to very much understand how much into a vegan or vegetarian lifestyle an athlete is or what I need to manipulate whenever they come and see me.

So, in general, there are about five different types at the moment and I'm sure there are more to come. Semi-vegetarian or casual vegetarian is sometimes what I have where some athletes might avoid some but not all animal-derived foods. Most popular that they'll avoid is red meat or consume it in very limited amounts. And then we get into the lacto-ovo vegetarian, which will include milk and other dairy products and eggs but they will avoid meat, poultry, fish, and other seafoods. Ovo vegetarians then will include eggs but avoid milk and other dairy products and the previously proteins, and then the next level to that is vegan athletes who avoid everything animal-derived including milk, dairy products, eggs, meat, fish, etc.

Danny Lennon: Cool. So if we start looking at this from a broad-overview level, what are the challenges that are typically inherent to any athlete that's coming to you that's either on a vegetarian or a vegan diet? So generally like we have health bases, but then also we have concepts for athletic performance. What are just kind of I suppose a list of some of the main things you generally look out for, main considerations they should be aware of that could be posed by this type of dietary approach?

Emma McCrudden: I kind of split the two into two categories in my work because I do get asked quite a lot by friends and by colleagues about this kind of lifestyle. So kind of from a general perspective, I'm happy to talk about that first and then maybe delve into a little bit more about the high-performance athlete perspective.

So I think one step that I kind of want to take back before we just talk about some of the challenges is I think it's very important for practitioners to understand why someone has embarked on this lifestyle. You need to be very conscious that you're sort of unearthing any issues that they may have around food or around eating behaviors. So if an athlete, for example, assumes that or an individual assumes that following a vegan or vegetarian lifestyle is associated with weight loss, there might be some issues that

you need to explore with that athlete before addressing some of their dietary concerns, and also then understanding if there are ethical or if there are religious beliefs behind it or if they simply have an aversion to the textures or to the taste of some of their animal product. So I focus quite a lot on trying to understand why they might have chosen to follow this, and then I kind of get into more of the, yeah, the challenges as you say.

So first one very obviously is, are they consuming enough energy for the activity that they're undertaking or the program that they want to follow? Previously, I think we were very much under the impression that all vegetarians or all vegans are under-fueled quite substantially, but I think with recent trends in the popularity of higher-fat foods and higher-fat diets and a widened food availability just worldwide through technology and however else we're moving food around the world, sometimes I can see that energy balance isn't an issue and sometimes actually we can see that over-consuming particularly a lot of carbohydrate-dense foods can be a challenge, so we've got to address the overall energy intake and make sure that calories-wise they're not in deficit or not in surplus for whatever activity they're pursuing.

And then in terms of macronutrients, lack of protein is obviously…it's right up there. A lot of time I think whenever someone who's quite naïve steps into this world and just starts to remove any animal-derived products from their diet, they're really not aware of substitutions for protein and also protein combinations that they need to use to make sure that they're getting access to lots of essential amino acids. But I think that's improving, that's getting better, thanks to the world of the Internet. People's skills and awareness and knowledge of what to do with plant-based proteins and how to prepare them is getting a lot better, but we definitely still have a responsibility there.

And then you get into some of the micronutrients. I mean, calcium is a big challenge in terms of bone health. So often I will see vegetarian athletes who come to me who assume because they're eating certain plant-based foods that are rich in calcium that their calcium levels are fine, but I think what a lot of people don't know is because of the oxalate content in plant-based foods that the actual that the body can draw out of plant-based foods is quite limited and can be as low actually as 5% until you take certain vegetables like kale and broccoli and bok choy, which the calcium's a bit more readily absorbed from those. But nine times out of 10, we have to resort to calcium supplementation if they're avoiding dairy products. So that's definitely a concern.

And vitamin B12 then depends on whether they're vegan or whether they're vegetarian, but certainly looking at it from the point of view of iron deficiency and bone health and anemia and making sure that they're either supplementing with B12 or that they've got lots of B12-rich foods.

And last but not least but probably starts to bridge into the athletic side of things is iron, obviously making sure that they have sufficient iron in their diet. And again, I think similar to calcium, people assume because plant-based foods have some iron in them—it's not very high compared to animal products but they do have some in them—that they're getting enough iron, but I think what a lot of people don't know is that vegetarians or vegans have almost double the recommended daily intakes of iron compared to animal-based-protein eaters because, again, similar to calcium, the availability of iron from plant-based foods is quite limited, so it's really important that we pay attention to that.

Danny Lennon: When we look at that then on some of the practical steps for that, I think B12 is one that I think out of all those a lot of people are relatively familiar with that if they're working with a client who is perhaps a vegan that a B12 supplement is a decent option.

Emma McCrudden: Mm-hmm.

Danny Lennon: Does B12 supplementation become just as easy as an across-the-board recommendation or is it more a case of for a specific individual there are different ways to address how they should tackle that B12 issue?

Emma McCrudden: Yeah, well, I think in my experience when we've screened or when we've looked for B12 deficiency, if an individual is completely avoiding all animal products, so that includes eggs and dairy and animal products, then yeah, B12 supplementation is just something that we would look at, and we do obviously try to increase their intake through the diet and, love it or hate it, marmite and vegemite are two of the most B12-rich foods that we have available to us. So I do have some vegan athletes who will take that, but again, B12 supplementation largely seems to be the way that we need to go to raise their levels. And I think it's quite a complex area as well because B12 deficiency can be masked quite easily by a high folate intake, which if you look at the folate intake of typical foods that a vegetarian or a vegan might eat like okra and spinach and lots of lentils and beans, they have a very high folate content. So B12 deficiency can be masked.

Danny Lennon: And so on the other one then when we talk about iron as a similar issue there, and I think it's a really important point that you mentioned, Emma,

around the higher requirements for those that are on a vegetarian or vegan diet that I suppose many people may be unaware of, is that down to the form that it's coming in? Are we talking about heme versus non-heme or is it simply that there are other things affecting the bioavailability of the iron they're taking in within their diet?

Emma McCrudden: It's down to both, really. I suppose the non-heme form of iron that's available in plant-based foods is very challenging for the body to easily absorb, so like I said, similar to calcium there are really complex issues with some of the kind of antinutrients, they're called, that are in iron-based plant foods that really make it quite difficult for the body to use and to easily absorb that iron. So I think, yeah, that's definitely a challenge, and then if you look at some of the other nutrients that interfere with iron absorption, so things like phytates, things like very high fiber intake, it can be really challenging for a vegetarian or a vegan athlete when they're eating their main meal or they're eating their recovery meal or their breakfast, based on the foods that they choose they do tend to have quite a high antinutrient content to iron. So I think, yeah, they're challenged kind of on both ends of the spectrum, and in the populations that I work with, vegetarian and vegan populations, we largely, particularly with female athletes, it's usually a given that they're going to have to take an iron supplement, which a lot of them accept. I know you've had previous guests on talking about compliance with some of the advice that you give athletes and you would think that taking an iron supplement is one of the easiest things that you could ask someone to do, but sometimes we do have issues with compliance with that and athletes really feel the effects of having low serum ferritin or low iron available. So it's something that we have to work on and constantly remind them that if they're making these choices with their diet that, yes, they're going to have to take some supplements to try to counteract some of those effects.

Danny Lennon: Yeah, and I think that's a really important point from a practical perspective of just getting someone to comply with some of these changes. And so, obviously, if we're talking about a B12 supplement or an iron supplement can be I suppose for a lot of athletes relatively straightforward in that it doesn't disrupt too much. But then when we talk about the protein issue that you mentioned, that I assume is going to be more challenging for some of them if they're having an issue hitting certain probably total intake per day, number one, switching to these types of diets, and then secondly, the quality of the protein in terms of, are they getting sufficient amounts of the different amino acids and amino acid

profiles? Presumably, that's a bit more of a challenge in making sure they are hitting those two things correctly. How do you go about addressing some of that stuff with the athlete?

Emma McCrudden: Mm-hmm. Yeah, I think it's an area that it's been really interesting to me to try to delve a little bit more into it and, since I started in Vancouver, Vancouver's home to probably one of the biggest vegan protein brands I would say in the world and I think that's led to a real culture of vegetarian/veganism here, so I definitely had to delve into some of the nutrient fact panels on some of those products that are available but been somewhat pleasantly surprised. I mean, I'm never going to argue I think based on the literature that we have available, you know, we're fairly confident that animal-based amino acids elicit the best response that we see in muscle protein synthesis when it comes to athletes and what they're trying to do when they train so hard, but I have to be respectful of their views and if they've chosen this lifestyle then I've got to work with that.

So, yeah, I recently read a paper, it was Luc van Loon's group who are based in the Netherlands who've started to look again, relook again at some of the anabolic response to plant and animal protein consumption, because I think they recognize that the trend is starting to move more towards vegetable and vegan protein, so maybe we need to relook at the literature again. Predominantly, the conclusions that we've made when we've looked at muscle protein synthesis and whey protein in particular versus plant-based protein, we've always looked at soy protein and I think that poses some challenges in itself because soy is a protein that isn't particularly high in leucine, also not very high in methionine and lysine. Looking at the literature, there seems to be an indication, and we're all very familiar I think with the impact of leucine on muscle protein synthesis, that we might need to look at different types of protein blends in order to help these athletes recover and build tissue and build muscle protein tissue and to the best of their abilities. So I've started to look more at, basically, how am I going to build a meal or how am I going to build a recover drink around different types of amino acids and using protein blends and using the products that are available on the market that do have these types of proteins in the right percentages to elicit the best response that we have.

Danny Lennon: Yeah, I think that's a really important aspect of it as opposed to someone thinking, "Oh, someone that's on a vegetarian diet will just take where someone else might be having 30 grams of whey after this training session and someone has 30 grams of this vegan source," instead of trying to be a

bit more smart about it, I suppose, and thinking about, “Okay, over the course of their day, how can we create meals that are likely going to get past X amount of grams of leucine per meal?” And thinking about it in a much smarter way like that I think makes a ton of sense.

Emma McCrudden: Yeah.

Danny Lennon: Have you done anything with athletes particularly who are struggling to get enough quality protein of just simply using a leucine supplement to add at specific times throughout the day so that they do kind of pass that threshold regardless of what the actual meal looks like or is the focus still trying to actually change proper meal patterns and approaches to it?

Emma McCrudden: Well, I think looking at most of the athletes that I work with, and obviously they're training twice a day and if they do choose to use a vegan protein recovery drink they are now being supplemented with over 3 grams of leucine per serve, so it's quite nice because I do know that they're hitting that threshold that's required for them to hit that. When it comes to meals, I think it's an area that we don't know enough about the exact content and the exact effect of blended meals and the content of leucine in those blended meals. So I have, dependent on the athlete again because some of the leucine supplements that are out there, leucine itself, I think it's fairly tasteless, but a lot of the supplements that are obviously tested for use with athletes as well are very heavily sweetened, really overpoweringly sweetened as well, so some athletes just try them, but as a regular part of when you're asking them to take them at least twice a day on top of their two-a-day leucine-enriched protein shakes they just won't take them.

Danny Lennon: Right.

Emma McCrudden: So I've tried, dependent on the part of the macro cycle that they're in as well, stressing the importance of it at different areas or at different times. I have tried the unflavored leucine with them and some of them will take that, but it really just depends, I suppose. I'm trying to get the maximum leucine content that I can out of their meal but also trying to highlight to them that if you take this approved powder or this supplement that you are definitely assured that you're hitting that threshold.

Danny Lennon: One thing I did want to jump back to is the B12 thing because if we switch our focus towards, again, athletes in particular, so high-level athletes, you mentioned the potential for anemia to develop there and we have seen some sort of research that associates that with reduced oxygen transport.

So could then indirectly that have an actual impact on performance as opposed to just health alone? Is that a concern? Do you actually see that on any of their aerobic performance that you have seen a decrease, and then once they're screened they actually see, okay, this athlete may have some sort of anemia here?

Emma McCrudden: Absolutely. Yeah, there's no doubt about it. I mean, the degree to which it affects the athlete performance-wise depends on the sport that they're in, obviously. So if you take a javelin thrower, for example, they might see the effects of iron deficiency and anemia through health or through illness or through fatigue, but it might not directly impact their acute performance versus some of the track and field athletes that we have, the 10K runners, who will absolutely feel the effects of that fatigue on their performance. So it's definitely something that we screen for and in UBC we've just started to screen all of our athletic population once a year, and we're working towards trying to screen the high-risk athletes at least twice a year. When we work with the Olympic athletes, we encourage the high-risk populations, so females and particularly that was involved in striker and endurance sports, to screen minimum twice a year and at least eight weeks before a competition or, if they were going to altitude, we would screen them as well to make sure that their iron stores weren't going to hold them back at all from some of that adaptation. So yeah, we certainly see it.

I think we're learning a little bit more about the relationship between iron-deficiency anemia and the athletic population in terms of the hepcidin relationship as well and just how challenging it really is for high-performing athletes to maximize their iron stores even with supplementation as well. So it's really interesting, but I think it's certainly challenging for them.

Danny Lennon: So do you find the case, and this could be with other things outside of iron, that they'll start to, particularly with athletes because a lot of their metrics are being tracked so regularly, that is it a case where often the first signs that they may have an underlying deficiency somewhere, an underlying health issue, actually shows up in their performance first before they either get screened or feel ill health effects that they actually see in performance first?

Emma McCrudden: I don't know. I think in my experience it really depends on the athletes. I don't know how you feel about that, but I think athletes are pretty tough creatures by nature and I think they're…

Danny Lennon: Yeah.

Emma McCrudden: …expectations of what they have to put their bodies through and how they feel pain and how they feel fatigue are so far removed from the nonathletic population that sometimes I think they just accept pain or sickness or really high levels of fatigue as just part and parcel of what they're doing.

Danny Lennon: They do.

Emma McCrudden: So yeah, I don't think it's always the case, but then you might have some athletes and maybe the more experienced athletes who really start to know their training loads, how they respond, if they track really well RPEs and their sleep cycle and their lifts, and if they track things really well they may start to see indications of some of these underlying health issues, but I think the younger athletic population are still really expectant that there's going to be a level of fatigue and struggle and it's going to be hard and they just accept that as part and parcel of what they're doing. So I don't think they're always as intuitive maybe when they're a little bit younger as they are whenever they have more experience.

Danny Lennon: One of the other considerations that you'd mentioned to me over email and for athletes in particular was around basal muscle creatine levels. Is creatine supplementation then something that you'll end up using with the very high number of vegetarian athletes for that particular reason? And maybe first you can explain to people why the case is that muscle creatine levels could be more of an issue for this particular client population type.

Emma McCrudden: Yeah, it's certainly something that we'll look at. I mean, creatine, many of your listeners will know this already, but it is found predominantly in meat, fish, and poultry, and so a typical omnivore's diet provides about 1 gram per day at least. And also, we have endogenous synthesis of about 1 gram per day as well in our body, so an omnivore roughly kind of has access to about 2 grams at least of creatine per day. Using it with an omnivore, I mean, it's no different to using it with a vegetarian, we'd still use a similar dose, but obviously the vegetarian having such a lower level of endogenous creatine stores generally will see a much more rapid and a much more responsive increase to creatine when they start supplementing. Obviously, there are individual responses and nonresponses within that, but what I generally tend to do is to explain to someone who's following a plant-based diet why this might be important for them, the potential performance benefits, and then encourage them to at least trial it to see if we can observe any differences or to see if we can actually track

differences in the gym with strength and conditioning coaches and with an athlete's coach. And usually most athletes, particularly those who are vegan or the lacto-ovo vegetarians will also come back and report improvements in performance, so it is definitely something that we, yeah, that we look at quite closely with them.

Danny Lennon: Right at the top of the show you mentioned that there are a number of different reasons why any given individual may have selected as to why they're following this typical dietary approach, and so obviously if it's a moral issue or a religious issue, etc., etc., that's something that we can obviously respect and then we work with the athlete to do that. Have you found any cases where an athlete came and their number one reason for selecting a vegetarian diet was because they had heard somewhere that it's actually going to help their performance and that the sole reason they're using it is just because they want to be a better athlete? And if that's the case, then how does that kind of conversation develop from there?

Emma McCrudden: For me, whenever I need an athlete like that that, you know, as you've alluded to, that I'm pretty compassionate and very aware that they're easily influenced and I suppose I've got to earn their trust first, and I think it's really important that you respect them and respect the information that they have come forward with as well and just make sure that they know it's a safe place and they can tell you their thoughts on it. And I think then I try very much to deconstruct I suppose some of the myths maybe that they've come forward with and outline some of the challenges that they're likely to face if they do pursue with this dietary practice and make sure that they're aware of what they're going to need to do to compensate for some of these changes as well, and I think they start to kind of understand I think the enormity of making a decision like this. Sometimes the parents might come back to me in a few weeks' time or whatever and say, well, they've actually started to eat eggs and dairy again or they've started to eat fish or they've decided that it's just red meat that they're only going to have on occasion, and they kind of fall into that semi-vegetarian…which over a duration of time isn't as much of a concern provided we're checking some of those blood markers. Yeah, they can tend to change their minds whenever they come and it's a recent development in their nutrition behaviors, but certainly there are younger athletes who through food aversion have never eaten meat and will never eat meat or will never eat animal products because of an aversion to those foods or taste preferences.

So I think trying to educate them in what they need to do, as I say whenever they go down this road, is really, really important, but I think I

see more and more, and you probably see it too, Danny, the influence that athletes or celebrity athletes are having on some dietary choices that particularly very young athletes are making and I think the sweeping statements of "I have removed meat from my diet and it led to X, Y, and Z" or "I removed dairy from my diet and it led to X, Y and Z," I think people have much more responsibility to be very careful about how they're displaying that kind of information because a young athlete will just do that. They will not understand the need to supplement or to start examining more closely the types of foods that they're eating.

Danny Lennon: Right.

Emma McCrudden: They will just pop those foods out. And I think that, if you think of things like, you know, yes, iron-deficiency anemia, but even more severity like osteoporosis and stress fractures in athletes if they remove calcium from their diet, I think there's a real danger that a young athlete might suffer from those because of decisions that they made based on flippant comments that the media kind of publicize about an athlete's dietary choices. So I think if any parents out there or if anyone's listening that is interested in this kind of lifestyle, don't just get your information from Google. You have to go to someone who knows what they're talking about to try to make sure that you're covering all your bases.

Danny Lennon: Yeah, for sure. So just don't go on a gluten-free diet because you want to be the next Novak Djokovic, for example.

Emma McCrudden: [Laughs] Exactly.

Danny Lennon: Right?

Emma McCrudden: Exactly. I've had that one a few times. [Laughs] Yeah.

Danny Lennon: Yeah. Yeah, but it's a really important point, goes right back to what you said right at the start of trying to understand if you're working with athletes why they're doing something, first of all, as opposed to just trying to give, give, give information all the time straight off.

Emma McCrudden: Mm-hmm. Mm-hmm.

Danny Lennon: There is something in this area that I've kind of been interested in kind of thinking about and not sure how much if I can actually get this out of my head, but it's interesting to think of when you consider that obviously even anecdotally we know that there are some athletes who have used vegan and vegetarian diets and been world-classed in their particular field and

have had huge success, so it's obvious that it is possible for someone to succeed. But then just kind of thinking of when we know how variable is how different people respond to different types of diets, is there a potential then for certain types of people to be almost predisposed to working better or worse with different types of dietary approaches? And so if that is the case that certain athletes could do better on a certain type of diet, for example, then if we're looking at someone who has maybe been on a vegetarian diet their whole life and through their whole training career and they then reach an elite level, it's almost a case…could it possibly be that that has been some sort of a self-selection or so that despite of whatever diet that they just respond well to it, they can perform and train well and they get to a certain level? And so that's one thing to consider. And that may not transfer to someone who, say, has gone through their whole training career on a nonvegetarian diet and then, again, see some sort of headline or someone tells them to try this thing out, and then they make the switch once they're at a certain level and that may not have a benefit for performance and actually decrease performance in that scenario if they're not careful. Have you seen any difference in how the performance response I suppose of an athlete who has been either lifelong or for a long period of time on a vegetarian diet versus one that has just come recently playing around with this vegetarian thing and has got their current level on a nonvegetarian diet and now they're just switching, if any of that makes sense?

Emma McCrudden: Yeah. [Laughs] No, no, I totally understand what you mean and it's, God, it's a really interesting point. I think inevitably someone who's embarking on any dietary change, whether that's dairy or gluten or vegetarian or vegan, there's a learning curve, there's a very steep learning curve there. Someone who's followed a vegetarian diet for their whole lives, they will be aware of what they need to eat and how they need to eat in order to survive their training. And I'm sure we'll have learned and we'll have been coached along the way somehow, but I think someone who's making radical changes in their diet, yeah, very steep learning curve. And if they don't do it properly and I think if they don't allow their body time to adapt to something like that, then yeah, there could be some detrimental changes and we've outlined I think some of them with some of the deficiencies that we talked about earlier.

But you raise a really good point in that we fuel our body in a certain way for X number of years and then suddenly we remove some really important macronutrients and energy sources that our body has been very

used to having and has adapted to having, and we suddenly expect, you know, even down to the gut microbiome, to change overnight. That's not going to happen. There's likely going to be a very steep learning curve for that athlete. And, yeah, I mean, my instinct would be that there's likely to be some detriment to performance, but if they give their body time to adapt and they do it in an appropriate way with appropriate help, then maybe they might see some improvements in their performance.

And I think sometimes kind of these improvements in performance that I talk about, I mean, obviously there are physiological changes that will happen in the body, but sometimes I find that athletes who decide to make dietary choices like these, they just end up paying more attention to their diet.

Danny Lennon: Right.

Emma McCrudden: They've got an interest in it. They have to prepare more because they're traveling or they're competing away from home or they're going to a potluck or a dinner party at a friend's house and they know they can't eat X, Y and Z, and they do just tend to pay more attention to their overall diet and that may be responsible for some of the changes in performance that they feel or some of the changes in their health that they feel as well, when they've gone from not caring what they pick up at a 7-Eleven to actually having to prepare snacks and prepare things to bring with them for whatever activity they have happen in that day.

Danny Lennon: Emma, if we start trying to wrap this thing up, what are the main take-home points for those that are either coaching vegetarian athletes or who are perhaps maybe a vegetarian athlete themselves? What are the main take-home points we can leave them with for today?

Emma McCrudden: I think, definitely, there's a whole host of areas I think that an athlete needs to pay attention to in order to make sure they're maximizing adaptations to training through their diet, and I think if you're not equipped yourself, and most people out there aren't in terms of coaches or athletes, get help from someone who can actually look at your dietary intake, can actually do your blood work, can actually make some assumptions about what you may be lacking and what you may need in order to maximize your athletic performance. So make sure you're asking experts and make sure you're asking a few as well because this is a really new emerging area, I think, in terms of the athletic performance side, so I think people will have different ideas on what works and what doesn't and where you

need to get information from. So ask around, ask the right people as well, and then make sure you're making an informed decision about any changes that you're going to make to your diet.

And I think for coaches out there in particular, I think just being aware and being very open with your athletes about some of the dietary choices that they're making, it's really important that they have a role and they are often the gatekeeper to a lot of good information for athletes. So make sure that you're having those conversations with athletes around some of the food choices that they're making in a nonjudgmental fashion as well and point out maybe some of the advantages that they may come across if they do go and see someone with expert advice in this area, so to just keep that dialogue really open.

Danny Lennon: Emma, where can people catch more stuff online, ResearchGate profile or social media, Twitter, Instagram, anything like that?

Emma McCrudden: I'm like a hermit when it comes to those kinds of things. [Laughs]

Danny Lennon: Probably best off, to be honest.

Emma McCrudden: It's a scary world out there, but I mean, I'm very happy to take any questions to my email account. So it's my full name at ubc.ca and I would love to hear from people who have expertise in this area, who are working with athletes in this area or people who just have questions about it as well. So yeah, I'm more than willing to, yeah, to answer anything or to just have a dialogue with someone as well about it.

Danny Lennon: Perfect, and I'll put that email address in the show notes for people listening if you do want to send Emma an email.

Emma McCrudden: Perfect.

Danny Lennon: Emma, that brings us to the final question that we always end the show on and it's simply if you could advise people to do one thing each day that would have some positive impact on some area of their life, what would that one thing be?

Emma McCrudden: So I think I've listened to quite a few of the podcasts and I think you have some incredible gems of wisdom from other speakers about being mindful and taking time out and trying to manage your stress and things, and I think all of those are excellent pieces. From my perspective, I think I'm quite passionate about just being careful about some of the dietary messages that people are giving out there. I think you may have come

across a piece of information that might work for you but that doesn't necessarily mean it's going to work for everybody, and just be mindful that the messages that you're given can be very much perceived by people in different ways just to be considerate of other people, considerate of their views and maybe listen as much as you're giving advice, try to listen and be open-minded to other people's viewpoints and to other people's opinions on things as well. And just always be curious, I suppose. I mean, I know this topic is an area that traditionally I think some sport nutritionists are a little bit quick to really say veganism and vegetarianism and plant-based diets are just not for high-performance athletes but, as you alluded to, we have proof that some athletes can perform in a very high level, so just be open-minded and be aware of differences in opinions and different things that work for different people as well.

Danny Lennon: Emma, this has been really good conversation. I want to say thank you so much first for your time but also for great information, and it's been an absolute pleasure to chat with you today.

So there we have it. That was our episode for this week. I hope you took something useful from it and either learned something new or just was reminded of something important and this has helped you in some way in not only your knowledge but maybe your ongoing practice as well.

So remember the show notes are at SigmaNutrition.com/episode133, and if you do want to support the show, which is always greatly appreciated, you can either leave a review over on iTunes or you can support the show officially on the Patreon platform, which is at Patreon.com/sigmanutrition, and that will be linked in the show notes as well. And if you go there, it's a $1 patronage for the episodes that you download just as a way of supporting the show. And for everyone doing that so far, I really do appreciate it so much. It's an honor to have you guys supporting the show in that manner, so thank you for that. And thank you for everyone who just continues to put supportive messages out online and spread the show on social media and to mention it at places or to tag people on it and just let more people know about it. It really does help tremendously and it helps us spread evidence-based information in a field where I think it's needed quite a lot to get more of this stuff out and hopefully make more people aware of evidence-based information and therefore help more people. So thank you for everyone doing that.

I will talk to you in the next episode, and until then have a great week.