



Interview with 2022 Plowright Prize winner Professor Herman Barkema

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Amanda Boag:

Hi, everyone. Welcome to this RCVS Knowledge podcast. I'm Amanda Boag and I'm chair of RCVS Knowledge board of trustees. Today, I'm really delighted to be here with Professor Herman Barkema from the University of Calgary. Herman is the winner of our 2022 Plowright Prize for his incredible research into mastitis, Johnne's disease, and antimicrobial resistance amongst many other things. I noticed as a small animal vet, there was a Neospora paper back somewhere in your past as well, haven't you? You have an incredibly diverse, rich career. But first of all, just congratulations on winning the prize. How do you feel about it?

Professor Herman Barkema:

Incredible. I had not expected this at all. I think it's the biggest prize in veterinary medicine actually in the world, and to get this is just incredible. But I just want to emphasize that this is because of my work with all kind of different teams. So there are very, very many people involved in my research. In my opinion, you get to a lot better research when you get basic scientists involved, economists, people that specialize in policy, so a very diverse group of people and then a huge number of graduate students and post-docs, of course. So it's for the team. It's one for the team.

Amanda Boag:

Yeah. Very good. Were you in Dublin when you found out you'd won and managed to have a pint of Guinness with some of your colleagues?

Professor Herman Barkema:

Well, let's keep it with one pint of Guinness then. Yeah. It was a bit more. Yes, I was really happy and so I invited some friends for a dinner, Guinness, and an Irish whiskey.

Amanda Boag:

Very good. That sounds like a good way to celebrate. Very good. It was so wonderful to meet you back in June in person at the Royal College Day when the awards were made. It's absolutely lovely after the recent years we've had to meet you in person all the way over from Canada. How did you enjoy that day? How did you find that day?

Professor Herman Barkema:

I thought it was very well organised and a very nice combination of more traditional celebration and also really happiness, really joy around it. I learned that high tea in the UK actually. I looked for the tea, couldn't find it, so there's a lot of things that you guys drink at high tea, but not a lot of tea. It was very well done, and yeah, a very happy day.

Amanda Boag:

Good, good. As I said, it was just lovely to have you there in person and be able to have you join the broader celebrations and particularly for RCVS Knowledge to be able to award the Plowright award that day. As I mentioned at the top, the Plowright prize is awarded for research into infectious disease and you've had a broad career covering a range of different diseases. I think probably the

ones that stand out as the biggest areas of your work are, I think, mastitis, Johne's disease, and antimicrobial resistance. Is that a fair reflection of the breadth of your work?

Professor Herman Barkema:

Yeah. Is it a reflection of the breadth of my work? It is the core of what I do. I started with mastitis in my PhD. I started my PhD when I was 32 years old. I finished it when I was 38 and I continued with mastitis. Mastitis actually led me to antimicrobial use and antimicrobial resistance. When I was doing my PhD, my supervisor unfortunately died at the Dutch animal health service and I also then took over, not the official supervision, but really helping the other graduate students with epidemiology, and Johne's disease was one of the areas that one of the grad students was working in. Johne's disease actually then later on led me to Crohn's disease in people. That's where One Health came in. I really like working with people. It doesn't matter whether they're human doctors or veterinarians, but when you tackle diseases like Johne's disease, you need to involve also gastroenterologists if you work on Crohn's disease, and immunologists, and look at the resemblance of these two different diseases.

And I continued. I became a professor in human medicine, also in infectious diseases. I spend a lot of time in that area. At this moment, I lead One Health at UCalgary, where we have a large number of people from all kind of areas involved, and that's science, engineering, nursing, human health, law, and of course also veterinary medicine.

Amanda Boag:

Yeah, no. That's so cool. That is really interesting how careers take twists and turns and you get introduced to different concepts and then adopt them. Are people ever surprised that it's a veterinarian that's leading the kind of work that you do or do you think that's very accepted?

Professor Herman Barkema:

It is accepted, but some people in human medicine look a bit down on veterinarians and that's because they have never worked with veterinarians, and that's the problem that we have in universities, the silos that we have. The veterinary students and the medical students hardly ever see each other. When you want people to work together, there needs to be trust and trust is only generated when you work together and see how well-rounded all veterinarians are. Once they work with you and they get to know you, they see that it's fun and that a lot of good things arise from that.

Amanda Boag:

Yeah. No, that's brilliant. Do you have any examples that you use if you are working particularly with people who come from different healthcare backgrounds than vets, so typically human medicine? Do you have any examples that you like to give them of where the veterinary research has really, really, really supported that One Health agenda?

Professor Herman Barkema:

Antimicrobial resistance is of course a problem that needs to be tackled by a multi- or transdisciplinary group of researchers. So that's the example I would say. We actually are running a antimicrobial use and resistance program for the government of Alberta, and the Alberta Ministry of Health, Ministry of Agriculture and Forestry, and Ministry of Environment all work together. We have an executive team from all these areas and we as One Health at UCalgary run it, but with people from all kinds of backgrounds in there.

Amanda Boag:

Certainly, looking at your CV and how you progress that kind of theme of a transdisciplinary or multidisciplinary approach is one that really comes through and is not something that everybody does. So, at what point of your career did you start to think about the benefits that transdisciplinary approach brings?

Professor Herman Barkema:

It was actually during my PhD. When I entered the dairy farm, I got the impression that I already knew what the bulk tank somatic cell count was when I just entered the farm yard and spoke shortly with the farmer. But then when I mentioned that to my supervisor, Ynte Schukken, and he said, "Yeah, Herman, it's all nice, but you really need to measure it." So, I went to Wageningen University to Jan Douwe van der Ploeg, who is an agriculture sociologist. And there, we started working on that. Actually, then I found out that the best predictors of the bulk tank somatic cell account was not whether they use dry cow treatment or the post-milking teat dipping, the really known risk factors for contagious mastitis, but it was more whether they were "Clean and Accurate" versus "Quick and Dirty". We measured that with all kind of variables. That explained about 75% of the difference in bulk tank somatic cell account, so that was a very good experience with a sociologist.

Amanda Boag:

So really, almost right from the very beginning of your research career, that benefit of that, eyes-wide, bigger picture.

Professor Herman Barkema:

One of my grad students worked on retained placenta in Friesian horses. We saw some differences there with the management of those horses, but then we wanted to look also at the genetics, and then we found that inbreeding really was a problem. But then what in inbreeding that caused that problem? So, we went to an immunologist and we looked at the immunology of it. Then we saw that when the foal and the mare are actually genetically quite close, that the placenta is actually not expelled because it's not seen as a foreign body. That is so rich. It means you can then work as an epidemiologist, but then when you then really find out what causes it, then you can start doing something about it. So then thereafter, we started with the Friesian horses organization to avoid it.

Amanda Boag:

Brilliant, the breadth of knowledge that is out there and then bringing it all together and joining up. It's amazing. If you look back on your career, who do you think are maybe the most surprising people you've collaborated with, where if I'd said to you, the 20-year-old Herman, you'd end up working with an expert in X, you'd go, "No way"?

Professor Herman Barkema:

No, the 20-year-old Herman was a veterinary student who partied a lot and didn't think about these things yet. I really had to grow and mature. I went to Costa Rica first when I was 28 and I became manager of a large dairy and beef herd there. It was only when I was 32 that I started my research career with my PhD. I would say the most surprising ones were farmers. I learned a lot from farmers. I had 300 farmers in my PhD and their observations actually taught me a lot. I've met so many great people. When you then come close to them, and practitioners, veterinary practitioners will know that, being invited for weddings and funerals and becoming part of the family nearly.

Amanda Boag:

Yeah. Make friends as well as colleagues.

Professor Herman Barkema:

... it's so rich.

Amanda Boag:

Yeah. You mentioned you were in Costa Rica very early in your career before you started focusing on research. I was going to ask about that. You've obviously worked in the Netherlands and you're now based in Canada. I think it looks like you are a guest professor at Ghent in Belgium. Is that right? So you got a-

Professor Herman Barkema:

I stopped it, but-

Amanda Boag:

You've stopped that, okay.

Professor Herman Barkema:

Yeah, and then also in Beijing.

Amanda Boag:

Okay. Wow.

Professor Herman Barkema:

I worked in Zimbabwe also for a while. That's what you can do as a veterinarian.

Amanda Boag:

Yeah.

Professor Herman Barkema:

Already when I was a student and I hitchhiked everywhere, if I got stranded somewhere, I looked up where the veterinarian lived and then I knocked at the door and they were always happy to take you in. Then the next day, you go with them in the practice, which is great when you are traveling around.

Amanda Boag:

Power of people, power of people.

Professor Herman Barkema:

Yeah. It's all about people.

Amanda Boag:

Yeah, it is. It is. I guess returning to research then looking through your CV, I think you've got over 370 papers that you've published over your career, which is a phenomenal number involving, as you've mentioned, huge numbers of graduate students, no doubt, over that time. Can you pick between them maybe the project that you remember as being most special to you, whether that's hardest to get off the ground or one that really... Across all of that amazing publication record, what really stands out to you as being a special one and why?

Professor Herman Barkema:

I'm still very satisfied with what I could do during my PhD and we used the data thereafter for a lot of graduate students. We published 32 papers out of my PhD research and just because thereafter, a geneticist looked at it. So, we had all kind of different people looking-

Amanda Boag:

At the same data set.

Professor Herman Barkema:

Yeah. I really like the Johne's disease research that we have done together, Jeroen de Buck, a bacteriologist and myself, at the role of calves in the transmission of Johne's disease, of *Mycobacterium paratuberculosis* infection. Calves are often actually ignored because they are seen as very difficult to test, but if you ignore the calves in the control of Johne's disease, you will never be able to eradicate it. So that's what we are working on right now and we're building all the time those trials where we had different ages infected the calves and looked what happened. Then we did a trial where we looked at what the transmission was of calves when you house them together, and yes, one calf could infect three other calves.

So we're now looking on farms what we can do with it. Because I think that you generate hypotheses for what you see on the farms, then you, under controlled circumstances, look what is actually

happening. Then you think about what you could do on farms and then you test that again on farms to see whether it holds true, and then you often need to tweak it. So yeah, the Johne's disease research was pretty still frustrating and satisfying both because that is one difficult disease to tackle.

Amanda Boag:

Yes, it is. So, you've really seen the disease, you say, through from the practicalities on a farm, through to the really almost laboratory science of that, which is, I think, probably quite unusual for a researcher. Is that something that you-

Professor Herman Barkema:

Yeah. I think it's unfortunately unusual because great research happens when people work together and people from different backgrounds. I always, with my grad students, I make sure that I have a co-supervisor with complementary knowledge there. Me as a more clinician epidemiologist and then a bacteriologist or an immunologist do the co-supervision, then you see how they look at diseases quite differently and from different angles and then you really build something very-

Amanda Boag:

Build something special. I don't know, but your reflections on this would be interesting that I think research can often, and quite right, it is often about following process and there has to be a lot of detail, but actually, it can be an extraordinary creative initiative as well. What do you feel about that balance between process and structure and creativity in a research career?

Professor Herman Barkema:

You need to keep your eyes open for what's happening and you need to listen to farmers and their observations and to veterinary practitioners also because they see a lot of farms. Then you start thinking. I don't take a lot of time for that, but when I listen to music or when I go for a walk, at the moments that you least expect it, then you get an idea. Or the graduate students get an idea because PhD students, they're smart, young people, and they also come with great ideas and then we try to make that happen.

Amanda Boag:

Yeah, then put that creative idea that comes from joining up dots into a process to test it.

Professor Herman Barkema:

Yeah. Then you put it on paper and talk with people about it and then you make it happen. When you are enthusiastic about something that is important, it is not that difficult to convince farmer organisations and funding agencies to come with some money on the table to really make it happen.

Amanda Boag:

You can communicate that passion for the project.

Professor Herman Barkema:

Yeah, and the importance of the potential outcome.

Amanda Boag:

I guess in terms of the impact that your research has had in the real world, where do you think you've had the biggest impact so far?

Professor Herman Barkema:

That's difficult to say, but I think it is important to look at the big picture of why this needs to be done. I try to help them to make their cows healthier, happier, whatever, like I said, whatever that may be. I'm also working on things like outdoor access. How can we, under the circumstances here in Alberta where we have very short summer, a very short growing season, still have the cows outside and what effect does that have on disease? I'm currently working on that as well. So, I try to tackle issues that make the product, milk or beef, even more wanted by consumers-

Amanda Boag:

By consumers.

Professor Herman Barkema:

... because these are great products, but I also do that because I love farmers and I want farmers to still be there in 20, 25 years and that they can give their farm to their children and-

Amanda Boag:

Yeah, continue that community and farming will need to evolve, but want to help it.

Professor Herman Barkema:

Yeah.

Amanda Boag:

Excellent. With the Plowright award, obviously there was a sum of money for doing research. Can you tell us a little bit about what you're planning to use that award for?

Professor Herman Barkema:

It will be part of a project where we look at first the prevalence of infectious diseases in dairy cattle and then control of these infectious diseases with the farmers and the veterinarians. When you do that, there's a lot of travel involved. Canada is a huge country. Alberta is huge, so there's a lot of travel cost, but also laboratory cost. I also have a great graduate student who works on that. He's from Pakistan, Waseem Shaukat, and he has worked already 10 years in the dairy industry. He is very good with farmers, with people, so he will be also funded by this award.

Amanda Boag:

Is that kicking off straight away?

Professor Herman Barkema:

Yeah. It is already happening.

Amanda Boag:

Fantastic. Do you think that will contribute to that broader One Health picture as well?

Professor Herman Barkema:

Yeah. Not with all the diseases, but-

Amanda Boag:

With some of them.

Professor Herman Barkema:

Yeah. The diseases that we pick are important diseases or they're important economically. So, we look at mastitis and mastitis pathogens, particularly Staph aureus and Mycoplasma actually. We look at Neospora because it's the most important reason for abortions in cattle. We look at Salmonella Dublin because that's a disease where the incidence is really increasing in Canada and it's also a zoonotic disease. Then, of course, Johne's disease, which still has its potential zoonotic effect, but also has quite an economic effect on the dairy farms. Then we look at leukosis. We still have quite a lot of leukosis here in Canada, and leptospirosis. In Alberta, we don't have hardjo like we see in most countries, so we have other species of lepto that we look at. So, we cannot copy the control of Western Europe with lepto here. We really need to look what it is. And we don't have rats in Alberta. Alberta's rat free. I, at first, didn't want to believe that, but it's really true.

Amanda Boag:

Really?

Professor Herman Barkema:

Yeah. The Rocky Mountains stopped the rats at the Western border and at the Eastern border, they have a rat patrol and they check all the farms close to the border and make sure that rats don't enter Alberta. Because of that, the grain production is not affected by rats in Alberta. They've told me it's a difference of 10% that it makes.

Amanda Boag:

Makes. Wow. That's amazing. I did not know that.

Professor Herman Barkema:

Yeah.

Amanda Boag:

There's lots of things I don't know, but that's really absolutely fascinating. Wow. With all the diseases you mentioned, there's quite a number of them that have that One Health dimension to them. When you are recruiting graduate students these days, is it predominantly vets that you get as graduate students or do you have graduate students from across the different disciplines?

Professor Herman Barkema:

I have quite a number of vets from all over the world, but also agricultural engineers. I had an anthropologist who finished now, but then became so interested in veterinary medicine that she is now studying veterinary medicine at Cornell.

Amanda Boag:

Okay.

Professor Herman Barkema:

An anthropologist is really interesting. They look at disease control from quite a different angle.

Amanda Boag:

Perspective.

Professor Herman Barkema:

It's so important when you want to implement disease control programs, you need to know how farmers think and what maybe the bottlenecks will be for adoption of these disease control programs.

Professor Herman Barkema:

So there, an anthropologist and also the supervisors, the supervisory committee members that we had with it; it was very interesting to work with them.

Amanda Boag:

Yeah. With the vets coming in, is it primarily that they want to have that broader One Health impact, you think? Do you think that's something that drives a lot of the vets that work with you or do you think it's more of the more specific, I guess, animal health focus that they approach the problem with?

Professor Herman Barkema:

They come in with an animal health focus and they typically have worked a couple of years in practice and then get interested in certain diseases and then look up where they could do it and then find me. But during the whole process, because we have quite a team, at this moment, I have 13 graduate students and a postdoc and they're all part of a multidisciplinary research group and also One Health at UCalgary where we have a grad student chapter, they become more and more interested in One Health. What I then often try to do is I talk with my human colleagues and they often come to me with a disease where they are interested in, where they have data for, where they don't have the epidemiological and biostatistical knowledge to really look at that. Then I team them

up with human, typically infectious disease specialist or gastroenterologist, and they also do projects in that area.

They participate in a summer institute. We just did a two-week summer institute where we also had a day where four Indigenous Knowledge Keepers came to talk about health from their perspective. It's amazing how close that actually is to One Health. They brought four drummers with them and it was just great. Then you see when those grad students at first absolutely didn't think about it, also because they're from different parts of the world and they didn't have any contact with the Indigenous Peoples here, how they start to see the big picture.

Amanda Boag:

Yeah. That's amazing. I guess looking ahead, we've talked about your past research a bit and the research you're doing with the Plowright money, but what other areas do you feel passionate that you'd like to explore and have your grad students work with you to explore?

Professor Herman Barkema:

Oh, it's different for every graduate student, because with every graduate student, I try to find out what makes their clock tick and then create experiences for them with them on what they do, where they want to go, because it's an educational process for them for four or five years. People is what really drives me and seeing those graduate students going in different directions, I find that most interesting, but yes, with One Health, things like climate change and the effect that it has on everything that we do. I have three daughters and I will want to leave an earth for them that they can live on and have the same experiences, similar experiences that I had growing up. Then also, the effect of global warming on disease incidence, because we see all kind of diseases coming to Canada from the US, but also from other countries because of travel. Bugs don't stop at borders. Global warming is something that I'm passionate about.

Amanda Boag:

Yeah, and no shortage of things to look at there. We're expecting another 375 papers.

Professor Herman Barkema:

Yes, it is nice to see it and people read it, but really, it is tackling those questions. It's part of knowledge transfer. It's not just the manuscripts, it's also the talks. I had a great experience when I was in the UK about seven years ago, I believe, to talk about mastitis with dairy farmers and veterinarians on farm. They had a great way of doing it, first giving a presentation. It was typically in the waiting room of the milking parlor and then everybody sat on straw bales. Then I gave a presentation on mastitis and then we did a tour to the farm with the farmer and the veterinarian and about 50 people. That knowledge transfer and how to do that is really, really important. I actually have a project right now on communication between veterinarians and farmers. It's in Belgium that we do it in.

We look at different ways of communicating, try to look what kind of communicator is a veterinarian and then try to help them to improve their communication with the farmers. Then we also interviewed the farmers. We also then want to look at what the effect is of the improved communication with the satisfaction of the farmers. So, I work with a graduate student on that. She's a veterinarian, a Dutch veterinarian. She now found a job also at Utrecht University, but continues her PhD on this. We work together with Merck and also with Ghent University on this.

Amanda Boag:

Yeah. No. That's just another lovely example of that collaboration across different fields. We can know as much as we like as vets, but if we can't communicate with the people who are caring for the animals, then we're not going to be as effective as we might be.

Professor Herman Barkema:

Yeah. When I studied veterinary medicine, there was not a lot of teaching about communication.

Amanda Boag:

Yeah, I know, and it is changing and continues to change, but still so much to learn.

Professor Herman Barkema:

Yeah.

Amanda Boag:

Well, I think we're probably coming towards the end of our chat. It's actually been really, really lovely to chat to you and explore your career and just, I think the diversity of projects that you've worked on and collaborators you've had, I think is just absolutely, absolutely inspirational. Then to hear about what you're still doing and will continue to do is amazing. I guess just as a final question, if you were talking to the 20 or the 32-year-old Herman now starting out on a career in research and infectious disease, what would your top words of advice be?

Professor Herman Barkema:

Oh, keep your eyes open for opportunities. Don't think of what your CV will be and have fun with working and think it's all about people. I never thought about building networks or anything like that, but when you love working with people, that automatically happens. Work with people around you. When you are in a practice, go to the GP, the family practitioner and have a chat about what diseases they see and get to know each other. When you are in academia, don't be afraid to go as a veterinarian to people in human health. They love it. They love working with you. And also, talk with people in the lab. So have fun, keep your eyes open for opportunity, and take risks. Don't be too careful, just-

Amanda Boag:

Wise words. Communicate and collaborate.

Professor Herman Barkema:

Yeah. Exactly, Amanda. That's well put.

Amanda Boag:

And enjoy it. Enjoy it.

Professor Herman Barkema:

Yeah, and enjoy it. Because in my position, I am so privileged. They gave me all the freedom to do all these things. When I see other people working and they think of when the heck they can retire, and whatever, I don't want to retire. Why?

Amanda Boag:

Well, we don't want you to retire either. Well, thank you so much. It's been absolutely inspirational talking to you. Many congratulations on your career and all you have achieved. Congratulations again on winning our Plowright award as an inspirational recipient that you are. It's been absolutely lovely chatting with you. Thank you, Herman.

Professor Herman Barkema:

Well, thank you very much and also your organization for giving me this acknowledgement of actually multidisciplinary research. I think that is inspirational for a lot of people that are in my position. It's not just the inventions in the lab, but it's really working together. So, thank you very much for that. It has been a pleasure meeting all of you in London, actually.

Amanda Boag:

Thank you, and thanks for listening, everybody.

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