

# WE ARE ETH – Episode 44

## With Nicole Kleger, ETH Alumna, co-founder of the FoodTech startup sallea

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**[00:00:00] Nicole Kleger:** The whole world population is growing heavily, still the demand for meat is not stopping either. So either we just pack more animals on a smaller area and then we have even more ethical concerns in animal welfare or we find other solutions on how we can bring healthy animal derived proteins to the people.

**[00:00:23] Susan Kish:** In this episode, I'm talking with Nicole Kleger, ETH alumni, entrepreneur, and co founder of the startup sallea. Sallea develops unique scaffolds for cellular agriculture, which are used to enable cells to grow into whole cuts of meat or fish. This is the We Are ETH podcast, and I'm Susan Kish, your host. Nicole, good morning. Good afternoon. I'm joining you from Washington, D. C., but where are you?

**[00:00:56] Nicole Kleger:** I'm actually based in Zurich on Höggerberg.

**[00:00:59] Susan Kish:** Excellent. It sounds like you do a lot of sports and also for what I understood you were actually doing today. You're a sports instructor. How did you get into doing sports and how do you find the time?

[00:01:10] **Nicole Kleger:** It's actually a good question and a good start, I think. Yes, sports is a really important part of my life. So I, I teach sports classes, group fitness classes at ASVZ, at the Academic Sports Association at the university. And yeah, I did the education during my master's when I was looking to find some balance in my life.

I've been doing a lot of sports before that. And since about 10 years, I'm teaching classes. It's also a blocker in my day. To, to get the work life balance I need.

[00:01:37] **Susan Kish:** I understand because you also have two kids.

[00:01:40] **Nicole Kleger:** Yes, exactly. Yeah.

[00:01:41] **Susan Kish:** How old are they now?

[00:01:42] **Nicole Kleger:** There are four and six.

[00:01:44] **Susan Kish:** And how do you find enough hours in the day?

[00:01:49] **Nicole Kleger:** Well, I think it's a very well structured, um, day with, uh, just enough sleep, not too much and not too little. Um, and I also have an amazing husband who supports me throughout.

[00:02:01] **Susan Kish:** Excellent. I've always found when I had small kids that I just never was able to find enough hours in the day. It was, I kept on wanting to expand the number of hours, right? 24 just didn't seem to be sufficient.

[00:02:14] **Nicole Kleger:** Absolutely. Um, yeah, if I could wish for something that would be definitely on top of the list.

[00:02:18] **Susan Kish:** I completely agree. Nicole, we connected in 2021, I think in the midst of COVID, we did a virtual vernissage in Atlanta, which was a really cool conversation. And even at that time, you were working on these very interesting salt structures, these sort of matrix like structures, but it was focused on, I think, bones or dental implants.

Was that was a topic for your thesis? Is that what I recall?

[00:02:49] **Nicole Kleger:** Yeah, I mean in a PhD you often do quite fundamental thesis focused on, maybe on the long run, on a specific application, but very much focused on the. scientific details of the

technology and that was the case for me as well. So the long shot goal was definitely bone implants made from magnesium, for example.

But the focus of my thesis was generating such porous structures from different types of materials, which are optimized for cell ingrowth.

[00:03:14] **Susan Kish:** Even at that time, if I recall, when we had coffee on the Limmat, you were interested in the concept of a startup and spinning out and using some of that interesting work you had done around these salt structures. What was the catalyst to have you start sallea?

[00:03:30] **Nicole Kleger:** I think it was different points that added up to, to start sallea. One point was definitely that like in my fourth year of my PhD, I was thinking a lot of where to go after my PhD. So whether academia or going to industry. And at the same time, I was. A bit sad of leaving all the work I did for my PhD and also my master's thesis just locked in in the drawer and probably no one would go through it anymore.

And so I, there was, at the same time, there was a lot of startups being formed out of the group and I thought this is super cool and I want to dive deeper into it. I did the first startup course at Startup Campus, was super impressed by all the energy and drive that people had in the ecosystem. And at the same time, the technology we've been developed had received a lot of attention also from other applications beyond medtech.

And then also my now co founder, Simona, she joined me for her master's thesis. We had a super great time together. We realized that we can work together very efficiently and that's how we got into the journey of salea.

[00:04:32] **Susan Kish:** And the group that you're in was material science. Is that right? Yeah.

[00:04:35] **Nicole Kleger:** Yes, so I did my PhD with Professor André Studart at the Materials Science Department.

[00:04:40] **Susan Kish:** And they actually had a track record of some successful companies that had spun out of that lab. At least that's my recollection.

[00:04:48] **Nicole Kleger:** As I mentioned before, there is a number of successful startups beyond them, for example, Microcaps, Fenex, Spectroplast, Nematics, and now also Aphoros and us. I think it's also a culture that is being built by André of really supporting this knowledge transfer from the fundamental science of a PhD into something which is actually being useful for the general public also.

[00:05:12] **Susan Kish:** So you decided you'd start the company with Simona, who was working in your lab. But if I, if we spoke just earlier, you had three, there were a total of three co founders. How did you find your third co founder?

[00:05:24] **Nicole Kleger:** Yes, so science is cool and amazing, but there is limits to science when it comes to business. So we soon realized that we need a business person on the team and Simona did her Matura actually 10 years ago together with Anna. Anna then went off to University of St. Gallen and studied business economics and finance.

And yeah, they met occasionally in the train and they were talking about entrepreneurship and Anna was super interested in what we were doing. And we were looking for a business co founder and at the time Anna was still at McKinsey, but then she quit and joined us last November when we kicked off the first financing round of sallea.

[00:06:03] **Susan Kish:** Very cool. So you have three female co founders.

[00:06:06] **Nicole Kleger:** Yes, this is correct. Yeah.

[00:06:08] **Susan Kish:** And as we were talking about right before, that is exceptional. Really interesting.

[00:06:13] **Nicole Kleger:** Yeah, there's not too many startups, especially in deep tech that are founded, um, by all women. We do think that balance is important. So our first employee is actually Adrian Sergai which is super cool to get this mixture also in, in the overall team, but yeah, we work together really well and that's the most important.

[00:06:33] **Susan Kish:** And how was doing that first fundraising round? How difficult was that? Or

[00:06:37] **Nicole Kleger:** It's still ongoing, so I cannot tell you yet the outcome of it. We are, I think we are on good track with the fundraising. It's not too easy, the situation, the whole investment climate has cooled

down a lot during the last two years or so. So it's definitely not as easy anymore as it was like 2020, for example.

If you have a good idea and a strong team, there is still money around to get especially early stage investments. So we're on good track to hopefully close sometime this summer.

[00:07:05] **Susan Kish:** No, you're absolutely right. I think food tech was down, VC funding was down like 50 percent year on year. Right? So, you were going into real headwinds in that particular sector.

[00:07:16] **Nicole Kleger:** Yes. Yeah.

[00:07:16] **Susan Kish:** And your parents were lawyers, but your grandfather was a computer scientist?

[00:07:21] **Nicole Kleger:** Yes. He studied at ETH mathematics and computer science. Exactly.

[00:07:25] **Susan Kish:** I read about him building one of these massive computers at the ETH in the 50s or the 60s.

[00:07:32] **Nicole Kleger:** Yeah, he was, uh, responsible or like partially responsible for the new Rechenzentrum at the time. I guess that's also where I have all the, the physics and maths brain cells from.

[00:07:42] **Susan Kish:** I was about to say, did it always feel a predetermined path for you to go to the ETH?

[00:07:48] **Nicole Kleger:** Not really. I think I was super interested in, in maths and physics and all the natural sciences for a long time. I guess I grew up in an environment where already my grandmothers had amazing jobs. So one of them was a translator in Brussels and I grew up in an environment where also as a girl, I had the feeling that I could do anything if I want to do it.

So I was never, um, scared of physics or math, um, and I was just always super curious to find out how the world works. That's why I was drawn to ETH.

[00:08:20] **Susan Kish:** So how did you get from physics and math to material science?

[00:08:23] **Nicole Kleger:** I was interested in science in general. I could never make up my mind what I actually wanted to study. So I looked into different interdisciplinary, um, Science, um, courses. So I was looking for example, at food science and then accidentally came across material science. I thought the people there that presented material science were super cool.

It seems like very broad, so that was very tempting for me. That's a topic that I carried throughout, um, all the way to my PhD to keep it as broad as possible to find then the niche where I can really thrive.

[00:08:56] **Susan Kish:** Could you actually define material science and what, when you say it's very broad, what are the disciplines that it incorporates? I've never quite, you're right. It's really interesting, especially it feels like now, and especially with things like AI and modeling, but what is material science?

[00:09:13] **Nicole Kleger:** We see ourselves really at the interface of the different disciplines. So we have a lot of chemistry, physics, biology, maths, um, but then also to a certain extent, food science, for example, which all come together at material science. So we, we touch on all these topics. We are not like super deep in any of them, but it allows us to, to speak the language of all the different worlds.

So we're a connector between the disciplines. We have people going, as I said, for example, to food science, but also to med tech or to the automotive industry. So it's very broad on, on where people end up.

[00:09:50] **Susan Kish:** It sounds very interdisciplinary that you have to be able to connect the dots.

[00:09:54] **Nicole Kleger:** Absolutely. And I think that's also the way a lot of people in the department work. So we are very open minded social people, I would say, to connect to all the different, different people. Yeah, that's as you nicely mentioned.

[00:10:09] **Susan Kish:** What made you think that entrepreneurship or starting companies during these studies, what made you think that was the path for you as opposed to industry or as opposed to academia?

[00:10:22] **Nicole Kleger:** Um, I think I was always a person who worked best if I could identify myself with the work. So if I really felt that something. Which drives me as a person. And then I could basically

work day and night. Then I, it really didn't feel like work, but just feeling like doing something with a lot of meaning.

And then at the same time, I'm a very much of a team player. So I don't, I was always looking for to partner up to, to do something together. I'm not the type of person to just work all by myself while as a, in academia, you do have the possibility to really build. Your own research and your own group. And as a startup, it really felt that it comes together.

It allows me to really, I think, be the best I can to drive, to work with an amazing team and to do something very meaningful.

[00:11:14] **Susan Kish:** You think the ETH prepared you well for a, for that choice to be an entrepreneur, to start things?

[00:11:22] **Nicole Kleger:** I think what ETH does is that, that it makes you independent and responsible for whatever you do. ETH is a very tough school of life, I would say. It's a lot of studying, a lot of stuff you have to organize. You have to learn a lot of things in a short amount of time and deliver on spot. And I think this really prepared me well.

Also studying material science with all the interconnections that you need to. Figure out to really get a step forward. I think that was super helpful as well. And then what was really pivotal for me was that, that there was a lot of groups or startups in, in the research group that I did my PhD for me, that was really insightful here at ETH.

I don't know if I would have had that anywhere else, but then at the same time, if I had done my PhD in another group, maybe I wouldn't have come across. These amazing startups and seeing that this is also a career path.

[00:12:16] **Susan Kish:** Let's talk about sallea for a moment. I guess I would have thought that you would have pursued company in the medical area, given the topic of your PhD. Why did you choose not medicine, but more like food tech?

[00:12:29] **Nicole Kleger:** So when we started with sallea, we did a big market research. We went out, we talked to a lot of people, which is actually something very good if you do material science, because if you have a material, you need to figure out which market you can put your material best. So you need to do your market analysis really early on, and that helps you to, to strengthen your business plan afterwards. Long story short, we went out, we talked to a lot of people. We got a lot of

interest from MedTech as well, but MedTech is also very tough. So if you think of a startup, you need investments, especially as a deep tech startup and these investments for the investor, and it needs to add up in the end, right?

Which means if you are a MedTech startup, you need a lot of investment to reach market. So the market in the end needs to be huge. In order for the investor to get a return on his or her investment. So if you're not, and I'm maybe a bit very specific, but if you're not curing cancer, it can be sometimes very difficult to find a market, which is large enough to be attractive for an investor.

At the same time, bone repair is always a bit of a tricky topic. There is already a lot of solutions out there. So unless you, you can be more attractive, for example, in price, it's often. Challenging to bring a new product to market. So that was one side. And then on the other side, we were approached by a lot of cultivated meat companies.

Also, for example, from the Cultured Hub, which is a joint venture from Givaudan, Bühler and Migros. And they came to us and said, Hey, like scaffolding is a huge problem in cultivated meat. At the moment, we can only do processed meats and there is no good solution out there to make a whole cut meat or fish.

Yeah, and then we did a deep dive in that direction. We did all the financial calculations. If it's feasible, did a lot of market analysis also there, talked to a lot of companies and then decided that this is absolutely the market. We see the highest economical, but also ecological impact. We still have like MedTech and pharma at the side as a second pillars, or if a pivot at some point is needed or desired, but as a startup, we need to focus on one ecosystem and that's a food ecosystem.

[00:14:40] **Susan Kish:** You mentioned the word scaffolding. Can you explain exactly what that means? What is it that this is? Scaffolding, I think of those frameworks outside of my old apartment building in New York City when they used to redo the windows. But I don't think that's what you mean here.

[00:14:56] **Nicole Kleger:** Yeah, exactly. Also, if you Google scaffold, that's the picture you will get. A scaffold, it's how we use it. It's actually very similar. So it's a grid like structure. It's a porous structure where cells can grow into, hold onto that grid structure, onto that scaffold to



grow into a three dimensional tissue. So it has absolutely some relation to the scaffold from the U. S.,

[00:15:19] **Susan Kish:** And do you do 3D printing or how do you create them? Or molds or how does that happen?

[00:15:24] **Nicole Kleger:** A combination of the two. So we use an indirect additive manufacturing technology.

[00:15:30] **Susan Kish:** I'm sorry, say that again.

[00:15:31] **Nicole Kleger:** An indirect additive manufacturing technology.

[00:15:34] **Susan Kish:** Okay. Which means what?

[00:15:38] **Nicole Kleger:** We are using plain kitchen salt, and we 3D print that into negative templates, so a mold. These molds are then casted with edible proteins, for example, or polysaccharides, yeah, food, solidified, and once the material is solidified, the salt is simply washed out by water.

And wherever there was salt initially, there will be a pore afterwards. So we can structure materials which are very difficult to print directly without having to print a material directly.

[00:16:10] **Susan Kish:** And have you been able to, is the right verb to print or to grow a whole cut yet in the lab? Where, where are you on that path?

[00:16:23] **Nicole Kleger:** Yeah. We are printing the scaffolds and afterwards we are growing the tissue or the cells. We do collaborate also with ZHAW to grow the cells. We have successful cell tests, so the cells, they adhere nicely, they proliferate and differentiate. So they're really like making nice tissue. At the moment we are kickstarting collaborations across the globe to test our scaffolds with the relevant cell lines. So for example, with fat, fish or muscle cell types. And yeah. That's it. Digging deep into these partnerships to get the next steps done.

[00:16:56] **Susan Kish:** So the other big weight is plant based, right? How do you contrast those two ways of addressing this challenge? What is the real differences between those two methods?

[00:17:09] **Nicole Kleger:** So in, in plant based it's really based on plant based materials only. So for example, on plant based proteins can also

be, for example, certain starches added, but there is no animal based protein in there for cultivated meat. It contains a certain amount of real cells. So it's cells which are initially.

Taken from a, from an animal. These are then multiplied in a bioreactor and afterwards grown into some sort of a, of tissue of meat or fish. You have real animal proteins in cultivated meat.

[00:17:43] **Susan Kish:** You mentioned early on the sort of ecological impact of this. What are the aspects of that ecological impact?

[00:17:50] **Nicole Kleger:** So for cultivated meat, there is no huge factory where you can actually measure what the impact is at the moment. However, there is a lot of forecast analysis, techno economical reports out there that do the maths and on how good it is. It has a huge impact in terms of land use. So this is drastically reduced also water use and, um, CO2 emissions. With the CO2 emissions you might have seen some news articles, which said it's, it's not actually so good as all these reports say um, this is simply because it depends on how the energy is created that is being used for the cultivation of the cells. Cultivation of cells requires quite some energy.

You need to keep them nice and warm as inside a cow, for example. But if this energy comes from green energy, obviously, then we have a huge positive impact on CO2 emissions. If it comes from coal or so, then the CO2 emissions are obviously not as good.

[00:18:48] **Susan Kish:** Which are the same issues that come up with EVs, right? You have to have a real sort of total life view of what the object is for that. Are there, and there are also ethical issues, right? Or that you have to take into account, I assume.

[00:19:07] **Nicole Kleger:** Yes. This adds on top of all the, uh, environmental, uh, questions we, the, the whole world population is growing heavily. Still, um, the demand for meat, um, is not stopping either. So the, it's, it's forecasted that it grows rapidly as well. Uh, and we need to find, um, a solution of how to feed, um, all these people.

So either we just pack more animals on a smaller area and then as you mentioned correctly, we have even more ethical concerns in animal welfare. Or we find other solutions on how we can bring healthy animal derived proteins to the people.

[00:19:42] **Susan Kish:** The ETH Foundation seems to have played an important role in getting this started. If I recall correctly, you were an excellent scholar and you also won a pioneer fellowship to get this started. Can you talk about the role of the ETH now and what you're doing?

[00:20:00] **Nicole Kleger:** Yes, I mean, ETH Foundation was and still is super important for what we're doing. We always had a super good relationship to all the people there. I'm still very grateful that they also picked up on my very first initial idea that I wrote for my master's thesis for the Excellence Scholarship, which was actually the foundation of what we're doing now.

And then, as you mentioned, yes, we got the Pioneer Fellowship, which was a very important first year for us. It gave us the time to do this market analysis, which is helping us now to fundraise our first equity round.

[00:20:32] **Susan Kish:** Nicole, thank you very much. That was a great story. Thank you for sharing sort of your experiences along the road. And I wish you the best of luck with sallea, and thank you for joining us this morning. I'd like to close with some questions we ask all our guests. And I think the first one is, when you were growing up, what did you want to be?

[00:20:53] **Nicole Kleger:** I actually don't remember anymore. I think I was always very curious about science, but it wasn't that I had like this one specific dream where I was, I want to be a doctor or a lawyer or like a nurse or I didn't have that. No. Yeah,

[00:21:09] **Susan Kish:** But it does sound like you were always wanted to be curious and to learn.

[00:21:13] **Nicole Kleger:** Absolutely. Yeah. 100%.

[00:21:15] **Susan Kish:** So what are you curious about and learning today? What, what topics are capturing your curiosity?

[00:21:23] **Nicole Kleger:** It's really broad. I think the whole food science world, alternative protein, I know it sounds a bit cheesy, but really what I do as my job is what I'm very curious in. Yeah.

[00:21:35] **Susan Kish:** That makes total sense, right? And matches with what we were talking about. To the extent that you have any time, what

books are you reading or listening to? What's on your side table at home?

[00:21:49] **Nicole Kleger:** Actually not too much. It's something I really should get more deep into reading. There is some startup books I'm diving into from time to time. But this is really something I, I'm longing for if the kids are a bit older to have some more time to read again, some books. Yeah.

[00:22:07] **Susan Kish:** Or any podcasts that you have a few minutes to listen to that you like to listen?

[00:22:11] **Nicole Kleger:** Yeah. Sometimes I really like to listen to «Kopf voran». It's, it's the science podcast of SRF. I really like it because it's a 30 minute podcast, so it's just enough time for my back right to work or back. And it dives into really different questions and or like topics and it gives me the chance to tune into other super interesting areas of science.

[00:22:34] **Susan Kish:** Fantastic. Nicole, thank you so much. That was a great conversation. And good luck on both of your startups, the four and six year old startup and your sallea startup.

[00:22:46] **Nicole Kleger:** Thanks a lot for having me once again, Susan.

[00:22:48] **Susan Kish:** I'm Susan Kish, host of the We Are ETH podcast, telling the story, the alumni and friends of the ETH Zurich, the Swiss Federal Institute of Technology.

ETH regularly ranks amongst the top universities in the world with cutting edge research, science, and people. The people who were there, the people who are there and the people who will be there. Please subscribe to this podcast wherever you listen and give us a good rating on Spotify or Apple or YouTube if you enjoy today's podcast.

I'd like to thank our producers at ETH alumni and Ellie Media, and especially to thank you, our listeners for joining us today.

### **The podcast mentioned in this episode:**

- [Kopf voran, SRF](#)