PROTEIN POSSIBLE

PROTEIN SUSTAINABILITY EXPERT **HENK HOOGENKAMP** SAYS THAT AS DEMAND FOR PROTEIN INCREASES, ALL SOURCES — ANIMAL, PLANT OR LAB- GROWN — WILL PLAY IMPORTANT ROLES IN GLOBAL FOOD SECURITY AND NUTRITION.

by **Julie Larson Bricher, science and technical editor**

Henk Hoogenkamp doesn't consider himself a scientist *per se*, but the internationally recognized protein technology and sustainability specialist has long taken a scientific approach to innovation in the field.

"To be honest, I never planned to become a protein specialist," Hoogenkamp says, noting that he has always been driven by curiosity and a general unwillingness to accept the status quo that "more often than not drove management up the wall."

"I have always challenged existing systems as well as looked for new protein applications, even though there was no indication or scientific proof about possible success rates," Hoogenkamp chuckles.

Shedding the shackles of a formal education after studying economics for a year at the University of Manchester in the U.K., Hoogenkamp opted for the University of Life, jumping into an apprentice job in the German cooperative meat industry. There, he gained practical experience from the slaughterhouse to the production floor. After a year or so, the company sent him to Iowa State University where he bolstered his knowledge of protein applications under the father of ISU's meat science short courses, Robert Rust, with whom Hoogenkamp still corresponds.

Later, the company moved him from the meat unit to the dairy side of the business, where he developed milk-based protein solutions for the meat industry, among other sectors of the food supply chain. Today, he consults with companies the world over on the latest protein applications used in hybrid and alternative meat products, including a range of plant-based sources such as rice, pea, chickpea, soy and mung beans.

One can call it intuition or simply good luck, he adds, but throughout his career Hoogenkamp has been the first to uncover new protein applications, several of which have been hugely successful on a global scale: positioning milk protein as a stabilizer in Bailey's Irish Cream; developing and initiating dietary protein (milk and soy) supplements as a gold-standard nutrition strategy for elite athletes at four Olympic Games; and

Protein-powered ascent: Henk Hoogenkamp on Arizona's Camelback Mountain.

creating the world's first hybrid meat-soy protein product for McDonald's Philippines.

Meatingplace caught up with Hoogenkamp to find out more about how innovations in the protein space are affecting the way the meat industry goes about feeding a hungry world in new ways.

Meatingplace: What are some of the protein innovations with which you've been involved over the years?

HOOGENKAMP: One is uncovering the need of elite sportsmen for dietary protein supplementation. For that I created a total milk protein (Refit) in 1978 and initiated research at the Radboud University and the Romanian Olympic Institute of Sports Medicine. A lot of these studies became the basis of a worldwide following by elite athletes — especially explosive and power-type sports like female gymnastics and rowing.

After much reluctance by management of DuPont Protein (previously Ralston Purina), I finally got clearance to do the same thing for positioning soy protein isolate as a dietary protein supplementation for elite quality sportsmen. I was actively involved in providing Olympic teams with protein supplementation starting in Los Angeles in 1984 and continuing in Seoul, Barcelona and Sydney. Fast forward and protein nutrition has now become one of the most lucrative businesses for the protein industry.

Also noteworthy is my early involvement using either milk protein or soy protein in vegetarian hot dogs. This brings me back to 1986 when I met by sheer accident Yves Potvin , who is generally credited as the pioneer of vegan hot dogs. Yves started his first plant-based meat alternative company, Yves Veggie Cuisine, in downtown Vancouver, BC.

Yves didn't know about fat/water emulsification, and I taught him how to successfully do it. Of course, at that time lots of people thought we were crazy. And perhaps we were, but history has shown that we were light years ahead of the curve.

SCIENCE CRED

NAME
HENK HOOGENKAMP

POSITION
SUSTAINABLE PROTEIN TECHNOLOGIST AND CONSULTANT FOR ANIMAL AND PLANT-BASED PROTEIN COMPANIES, INCLUDING RICEBRAN TECHNOLOGIES

EXPERTISE
GLOBE-TROTTING ANIMAL AND PLANT PROTEIN TECHNOLOGY EXPERT; PIONEER IN USING TRANSITIONAL PROTEIN SOLUTIONS IN STRUCTURED MEAT ANALOGUE FOODS; COMMUNICATOR, SUSTAINABLE PROTEIN

FIRSTS
POSITIONED MILK PROTEIN AS A STABILIZER IN BAILEY'S IRISH CREAM; PROVIDED FOUR OLYMPIC TEAMS WITH PROTEIN DIETARY SUPPLEMENTATION; PIONEERED THE WORLD'S FIRST HYBRID MEAT PRODUCT FOR MCDONALD'S PHILIPPINES.

AUTHOR
25 BOOKS, INCLUDING "GLOBAL TRANSITION" (2019) AND "PROTEIN TRANSITION" (2018)

EDUCATION
STUDIED ECONOMICS AT MANCHESTER UNIVERSITY, U.K.; STUDIED PROTEIN SCIENCE AND APPLICATIONS, IOWA STATE UNIVERSITY

LEISURE
CYCLING, RUNNING, TRAVEL

FAVORITE QUOTE
EVEN IF YOU ARE ON THE RIGHT TRACK, IF YOU SIT STILL, YOU WILL BE RUN OVER!

Anyway, Yves Cuisine was sold to Hain Celestial and two years later history repeated itself when he started Gardein (now a Conagra brand). I influenced Yves' thinking to start meat-free production by using a technology that is known as HME, or high moisture extrusion.

Meatingplace: Weren't you also involved with the development of hybrid meat products?

HOOGENKAMP: Yes, and perhaps the most compelling protein development that I pioneered was the introduction of the Burger McDo. 'McDo' is the Philippine slang for McDonald's. In 1996, the [franchise] owner of McDonald's Philippines asked me to develop a burger that could be sold as a much cheaper version of the 'pure beef' burgers McDonald's was championing across the globe. When I discussed this idea with McDonald's corporate management, they were not amused to say the least.

Anyway, with the backing of the Philippine McDonald's franchise owner we pushed through and created probably the world's first hybrid meat product. At that time the blend was 50% beef and

HENK'S HOT LIST:

TOP PLANT-BASED PROTEIN SOURCES

Protein tech specialist Henk Hoogenkamp expects to see a number of plant- and dairy-based protein sources enjoy greater market growth and application, especially in meat products. Here are his top picks:

Rice. Rice protein and rice bran have great potential in formulated plant-based foods. The ingredient is hypoallergenic, which is a major advantage, and has a favorable name association on labels. The ingredient has a clean-and-green label status and is a great replacer for corn syrup and sugar because of its light, sweet honey taste.

Pea. This protein has become the poster child of the plant-based meat alternatives. Pea protein had a slow start but we now all know what a great position pea protein has obtained. It has a neutral taste and is an understandable, clean and green label term.

Soy. There is no question that the world cannot survive without soy. It is a strong source of protein and edible oil. A functional ingredient for water/fat emulsification, protein contribution and one of the cheapest forms of plant protein. The biggest drawback of soy is its negative name reputation due to the use of genetically modified organism technology and the use of hexane when isolating the protein fraction.

Chickpea. This is a trending ingredient with lots of potential as a back-up solution. Most probably the chickpea will best be positioned as an "all natural" ingredient that is made using fractioning as a way to concentrate the protein. Of course, it has a great positive name association.

Mung bean. Mung bean has traditionally been used as a processed meat emulsifier of fat and water in Asia for many years. Similar to the chickpea, the mung bean has a positive sound to its name, although most consumers have no clue what it looks like. I believe the future for mung bean is strongest when the protein is concentrated using fractioning.

Milk. In strict vegan foods, milk proteins have no place. However, that might change soon when Perfect Day — a Silicon Valley startup — will introduce their "cowless milk protein" as a functional ingredient. Using biotechnology, modulated yeasts and age-old fermentation — not unlike beer brewing — will allow the production of high-quality milk proteins such as whey protein isolate. I believe that these new forms of protein will eventually be used in vegan foods.

Other. Come to think of it, I also believe that slowly but surely the world will see the arrival of a new category of protein in addition to animal and plant protein ingredients: "flora protein." Also, look for oat, hemp, potato, wheat and canola to come on strong.

LET'S BE CLEAR THAT FROM A GLOBAL VIEWPOINT, THERE IS **NO BETTER BUSINESS** THAN THE ANIMAL MEAT BUSINESS.

50% soy protein. Almost from Day 1 after introduction on the menu board the Burger McDo became hugely successful, which lasts until today. I have been told numerous times that the Burger McDo is world's best-selling hamburger within the McDonald's organization, calculated on the number of stores and the number of people ordering.

Actually, a few years after its introduction, McDonald's embraced the hybrid technology and created an umbrella name, Prosperity. Throughout Asia under the Prosperity label McDonald's sells hybrid foods made from beef, pork, chicken and fish.

Meatingplace: On that topic, what kind of opportunities do blended meat/plant-based products present to conventional meat and poultry processors?

HOOGENKAMP: First, it is important to distinguish between food security and affordability. In the Western world — and in the U.S. in particular — food is taken for granted. In developing countries, food is every day's existence. Hybrid foods in the U.S. are based on marketing strategies to make people eat less meat in order to apply variables such as CO_2 reduction, health, flexitarian lifestyles and other [consumer preference] factors. In developing countries, hybrid foods are solely made to reduce the food costs to allow people to have at least something to eat that resembles meat.

Stated in another way, in our Western society, we have the luxury of eating pure meat or pure food. However, by 2050, which is only 30 years from now, the population of India, China and Indonesia will number 3.3 billion. So, if we think we have a problem now, wait until we go forward. It's Western arrogance to tell people in the developing world who are beginning to have more money in their pockets to afford meat and dairy, 'Hey, you cannot eat meat because it's not good for the planet.' It's the worst possible message we can give. People deserve the luxury to eat meat.

I've been part of missions showing food companies in less affluent countries how to make meat cheaper, and how to stretch it from 1 pound of lean meat to make 5 pounds of sausage. So, that's hybrid. You use plant components and starches to stretch the meat as far as possible. Again, when I developed the Burger McDo in the Philippines, at that time it was 50% beef and 50% soy. Now,

20 years later, it's only 28% beef and 72% soy and has expanded throughout Asia and the Middle East.

Meatingplace: In terms of protein sustainability, why do you think we are in a state of "global transition," as you put forward in your new book on this topic? What impact is the "plant-forward" movement having on the conventional animal protein industry?

HOOGENKAMP: Let us keep this "plant-meat movement" in perspective. Of course, the current protein trends are a welcome addition to the dietary choices of well-informed consumers. Having said that, let's be clear that from a global viewpoint, there is no better business than the animal meat business. Despite all warnings about sustainability and ecological damage to the planet by the FAO, WHO, FDA and other influential organizations, meat production will increase by some 2% per year at least until 2050. In effect, this means that by 2050, current global meat production will double.

However, it is clear that in the affluent Western world, meat consumption is steady at best, and in many cases is slowly shrinking. The real growth for meat and dairy consumption will be in the developing countries of today, such as sub-Saharan Africa and Asia. The population of these continents is growing exceptionally fast and has been devoid of meat and dairy for generations. Now that they finally have more disposable income, the first thing on their mind is eating meat and drinking milk. What ethical rejection can we have in the 'obese' West to tell the less fortunate on planet Earth that they cannot eat meat? All in all, world meat consumption will see a major shift from affluent to poor.

I should also state that the legacy meat companies across the globe have done everything in their power to stop the arrival of plant-based meat alternatives. They didn't want to recognize the emerging alternative dietary patterns. And to be honest, they looked down on the entrepreneurial movers and shakers of the startups such as Yves Potvin of Yves Veg-

THE REAL GROWTH FOR MEAT AND DAIRY CONSUMPTION WILL BE IN THE DEVELOPING COUNTRIES OF TODAY, SUCH AS **SUB-SAHARAN AFRICA AND ASIA.**

gie Gardein, Ethan Brown of Beyond Meat and Patrick Brown of Impossible Foods.

And yes, I also got quite a bit of early skepticism that I was wasting my time with foods that no one would eat. Now that we near the year 2020, many [meat companies] are or are trying to jump on the bandwagon, not to mention nearly all U.S. fast food restaurants. So far, McDonald's U.S. is the only holdout. In Europe, McDonald's has quite a range of plant-meat or cheese-meat options already.

Meatingplace: What would you say are the top factors that are driving the growth of and demand for plant-based proteins, and why?

HOOGENKAMP: Perhaps I stand alone in my observation but in my book, the top factor in the huge drive for plant-based proteins can be explained by two words: social media. Of course, cases can be made that ecology, sustainability, environment and a fast-rising global population are important issues, but to my mind, these are all of secondary psychological importance. I believe that social media should be credited for the huge shift to plant protein that we witness today.

What I mean to say is that in the past children had little or no recourse to doubt or influence dietary patterns, which for generations traditionally were passed on from mother to daughter. The arrival of social media has changed all that and resulted in peer groups outside of the family becoming the main beacon of information. Within social media groups there are subgroups that focus on lifestyle, and eating is a big part of it.

I see that especially young girls are the ones who question the dogmatic beliefs of their parents, and as such, that of the legacy food and meat industry. Girls will start to question eating meat. Parents can talk intelligently to their daughter and stress the importance of animal protein, choline, iron and B_{12} vitamin, but when the girl plays the card, 'I feel sorry for the animals being killed,' it is the end of discussion. We all know that it is next

to impossible to argue with emotion. The funny thing is that the mother of the young girl, in order not to lose bonding, often spontaneously decides to reduce or limit meat intake to show solidarity.

Meatingplace: In your opinion, is this due to a generational shift in thinking?

HOOGENKAMP: The millennials especially are the drivers of change. Born between 1984 and 2004, this group and their children have grown up with smart phones and instant communication. They know how to fast track information.

As a side observation I'd also like to say that I have started to term behavior as "schizophrenic millennials." Go figure. The millennials are the ones who most object to eating GMO foods, yet if the product tastes great and it fits their social media agenda, all preconceived objections fly out of the door. For example, consider the hugely successful Impossible Burger. This product contains not one but two forms of GMO: leghemoglobin and textured soy protein. Obviously, when consumers see a real benefit — in this case, a great tasting plant-formulated burger — they quickly ignore their initial reluctance to eating GM-containing foods.

Meatingplace: What protein (animal or plant-based) technologies or production challenges will require the most research or focus by meat and poultry processors in the next five or 10 years?

HOOGENKAMP: In the next five to 10 years, we will see the arrival of cell-cultured meat. For plant-based protein ingredients, I predict that consumers will become more interested and want to know what chemicals, if any, are used in the concentration and isolation of the plant proteins that are used to formulate plant-based foods such as meat alternatives, mayonnaise, plant milks and health bars. To keep an all-natural status, I believe that protein fractioning will become the norm. Protein fractioning is a method in which simple air streams are used to separate the components of a plant: protein, fiber, starch.

But it's going to happen. And if the legacy food industry, including the legacy meat industry, is not taking this seriously and underestimates the change in market dynamics like they did with the plant-based meat industry, the pharmaceutical industry will overrun them.

If you look at the entrepreneurial spirits who started Memphis Meat and Mosa Meats, they're all medical doctors. Now, there's probably 30 to 35 companies all over the world, including in China, Singapore, Malaysia, Australia, New Zealand and Israel. And many of these people have a medical background.

Right now, you have two basically defined circles. One is the pharmaceutical or medical industry and one is the legacy or classical food industry. There is a new circle developing that is right in the middle with input from the pharmaceutical industry. So, the classical food industry needs to wake up, otherwise the pharmaceutical industry will completely [take over] this new circle with new biotechnologies, and cultured meat is part of that.

Meatingplace: With increased consumer demand for all-natural and clean-labeled foods, how can conventional meat and poultry producers and processors remain competitive?

HOOGENKAMP: The 'clean and green' label drive may have unintended consequences for quality and health. Removing age-old proven ingredients and additives from the formulas just to please the consumer may have potentially dangerous long-term effects.

The opposite is also true. For the food and meat processing industry, this is a major challenge with no easy answer. Writing labels has become an art on its own. There are many roads that lead to Rome and today it is still possible to conveniently forget to mention certain processing aids on a food label. Also, using different names when a certain additive has a negative sound in the mind of the consumer. For example, the FDA/USDA has been petitioned to change the name of potassium chloride into potassium salt.

Meatingplace: What do you think about labeling controversies in the U.S. and around the world about whether plant-based products should or should not be able to use standard identifiers such as "burger" or "steak"?

HOOGENKAMP: It is quite logical that there is pushback from the processed meat industry now that the plant-based meat alternative companies are "stealing" their product names. Actually, it is not a matter of what I think but rather the fact that consumers have already made up their minds: They don't mind what it is called as long as it resembles their perceived expectations of appearance, taste, texture and flavor.

I am a big believer of 'perception is reality.' Now that France has blocked the use of traditional names, I believe that the alt-meat companies will find a way around it. In the U.S., the influence of the USDA/FDA is not as big as EFSA [European Food Safety Authority] is in the EU, which at best will give a new food or ingredient first a novel food status before it is officially allowed.