



New options for flexitarians

For millions of people in the Netherlands it has become perfectly normal to go without meat once a week. Meat consumption can be only reduced further by improving meat substitutes and changing the prevalent carnivorous mindset. TEXT ASTRID SMIT ILLUSTRATION IEN VAN LAANEN AND SCHWANDT INFOGRAPHIC

Stepping into the Vegetarian Butcher in The Hague, you feel as though you have entered a real butcher's shop. Complete with white tiles and a big mirror on the wall. The fridge is full of products that look exactly like meatballs, bacon or chicken. And behind the counter stand people in white jackets and blue and white striped aprons, at your service. A tall grey-haired man comes in, just out of interest. 'Um, what are you selling here, actually? It isn't really meat is it?' 'No sir, it's not. We only slaughter soya and lupin here', says shop manager Paul Bom jovially. A young woman who has just entered has been here before. She takes some yakitori out of the fridge and heads for the till. 'This stuff is delicious. I can hardly tell it apart from real chicken.' She calls herself a 'meat-reducer'. It was a film on the internet about how animals are treated in the bio-industry that led her to decide to reduce her meat consumption drastically. The Vegetarian Butcher, which opened in October 2010, caters mainly for this group of people. 'We particularly want to tempt meat eaters. That is why we try to make our

products look as much like meat as possible and the shop looks like a butcher's, says Bom. The formula seems to be a success. There is a constant coming and going of customers and curious passers-by on this ordinary Friday afternoon.

EXPANDING RANGE

The market for meat substitutes is small but growing. Between 2000 and 2009, the turnover in meat substitutes rose from 27 to 62 million euros, says the LEI, part of Wageningen UR, in a report published last year. Meat-lovers, meat-reducers and meat-avoiders. The range available in supermarkets and organic stores is expanding. You can choose from Tivall, Quorn, Valess, Alpro Soya, Vivera, GoodBite and numerous other brands with ever more varied assortments. 'The producers are very active', says Hans Dagevos, who wrote the LEI report together with Erik de Bakker. 'They see a future in this market.' According to the LEI researchers, there is indeed plenty of potential. Their research shows that there is a small group of vegetarians (4 percent), a much larger group of confirmed carnivores (27 percent) and a very big

group (69 percent) of people who choose to go without meat for at least one day a week. 'So for millions of people in the Netherlands it is already the most normal thing in the world to go without meat at least once a week', says Dagevos. And that is a development that is welcomed by the Ministry of Economic Affairs, Agriculture and Innovation (EL&I). The Ministry would like to see consumers eating more plant-based food and less animal protein by 2025, for the sake of the environment and the growing world population. Livestock farming already accounts for a huge proportion of human land use and eight percent of global water consumption (90 percent of which goes into the irrigation of livestock feed crops). It also causes deforestation and higher greenhouse gas emissions than the transport sector. And this consumption is only expected to increase. In 2030, the consumption of meat, fish and dairy in wealthy countries will have gone up by 10 percent, predicts the Netherlands Environmental Assessment Agency in its environmental audit report of 2009. And global consumption will have gone up by as much as 60 percent, thanks to the growth in the >



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world population and the rising standard of living in countries such as China, India, Brazil and Russia. If the consumption of animal proteins in these countries rises to western levels, then an even greater demand for animal protein can be expected. A global 'protein transition' – from animal to plant sources – is therefore urgently needed. And the Netherlands wants to be in the lead. Sustainable food production is a big priority for the Ministry of EL&I.

But a lot has to happen before such a 'protein transition' will be achievable. Meat substitutes still have a miniscule share in the total market. It is true that the Dutch spent 62 million euros on meat substitutes in 2009. But they also spent five and a half billion euros on meat and fish. And the most striking thing is that the turnover in meat and fish has not diminished in recent years. Dagevos: 'Maybe people make up for their vegetarian day by eating even more meat the next day.'

CROSSING THE LINE

So the group of meat eaters must be tempted to cross the line too, if the Ministry of EL&I's wish is to come true. But how?

Certainly not by talking about the environment, doctoral research by Annet Hoek and Hanneke Elzerman made clear. They did research at Wageningen University (part of Wageningen UR) between 2001 and 2006, looking at consumer acceptance of meat substitutes. For meat eaters, they found, sustainability is no reason to forego their steaks. The taste and texture of meat substitutes did make a difference, however: they should resemble real meat as closely as possible if they are to get the meat eater on board. And meat substitutes do not manage that yet, according to consumers. They rated the products low on 'sensory appeal'. Moreover, meat eaters did not find the meat substitutes filling enough, which makes sense: the protein level, which is what gives a feeling of fullness, is much higher in meat than in meat substitutes.

When meat substitutes are mixed into a sauce or blend well into the rest of the meal, the taste does not matter quite so much. 'It is the meal as a whole that must taste nice', says Elzerman. 'Product developers should focus not just on meat substitutes in themselves, but on how they fit into

the whole meal. They can help consumers by developing ready meals based on meat substitutes or selling a sauce along with the product.'

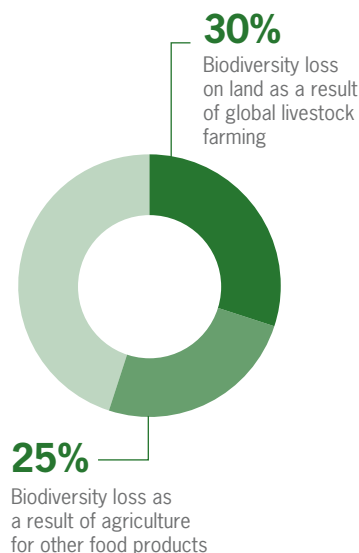
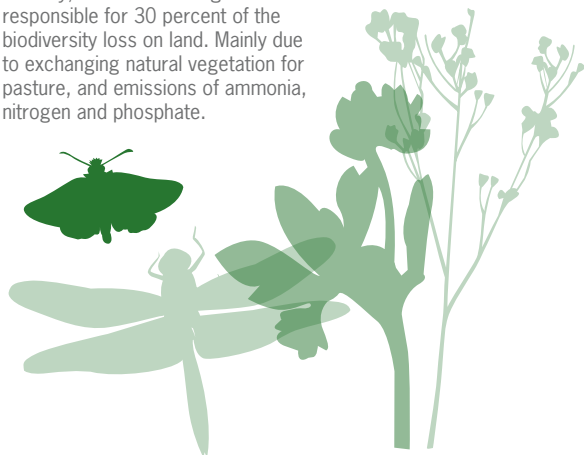
Hoek and Elzerman did their research more than five years ago and a lot has happened in the meat substitute market since then. The producers have improved their products and new producers are coming onto the scene. Currently they are forming a 'platform for alternative protein sources', which is to work in a similar way to the Dutch meat and eggs marketing board. Twenty five of the forty Dutch producers have already expressed their support for the new board.

Among them is the company Ojah, which was established by three ex-staff members at Wageningen UR Food & Biobased Research and the Wageningen innovation company TOP. Frank Giezen, director of Ojah, invented a 'smart' technique for giving plant-based proteins the fibrous structure of meat by mixing them with water at high pressure and temperature. Ojah calls its product Beeter and is marketing it as 'a plant-based delicacy with a strong 'bite'

ENVIRONMENTAL IMPACT OF LIVESTOCK FARMING

Loss of biodiversity

Globally, livestock farming is responsible for 30 percent of the biodiversity loss on land. Mainly due to exchanging natural vegetation for pasture, and emissions of ammonia, nitrogen and phosphate.



MEAT FROM THE LAB

Meat can also be bred without involving any animals. Theoretically, if muscle stem cells get the right nutrients and the right growth environment, muscle tissue should grow. Meat professor Henk Haagsman at the University of Utrecht is researching this possibility. He wants to make meat out of these muscle fibres, but he would be content with minced meat, he told Resource, the magazine of Wageningen UR. Haagsman is doing his research in collaboration with Wageningen UR. Utrecht is looking into the technical feasibility

of the idea, while 'Wageningen', the coordinator of the projects, takes care of the social and ethical sides of the issue. Philosopher Cor van der Weele at the LEI, part of Wageningen UR, is examining the ethical issues. Sociologist Gerben Bekker at the Marketing and Consumer Behaviour chair group at Wageningen University, part of Wageningen UR, will do research on people's attitudes to cultured meat. Because however much more animal- and environment-friendly cultured meat may be than real meat, you won't get far with it without consumers who want and dare to eat lab-bred meat.

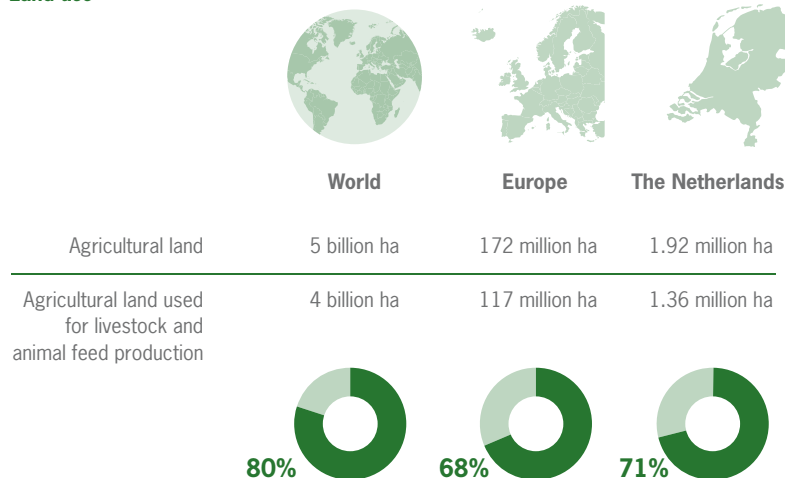
that reminds you of meat.' This meat substitute is currently only for sale at the Vegetarian Butcher but from the autumn it will be available at various outlets in the Netherlands, after Ojah opens its new factory in Ochten in Gelderland.

SPINNING FIBRES

We can expect more developments to come out of Wageningen. Process technologist Atze Jan van der Goot from the Food Process Engineering chair group at Wageningen University embarked this year on a project aiming to imitate the struc- >



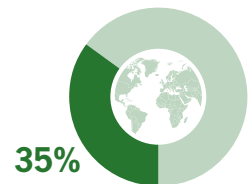
Land use



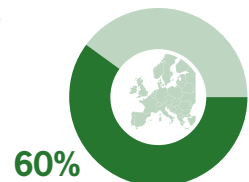
Grain production

Percentage of the grain production that is used for animal feeds

World



Europe

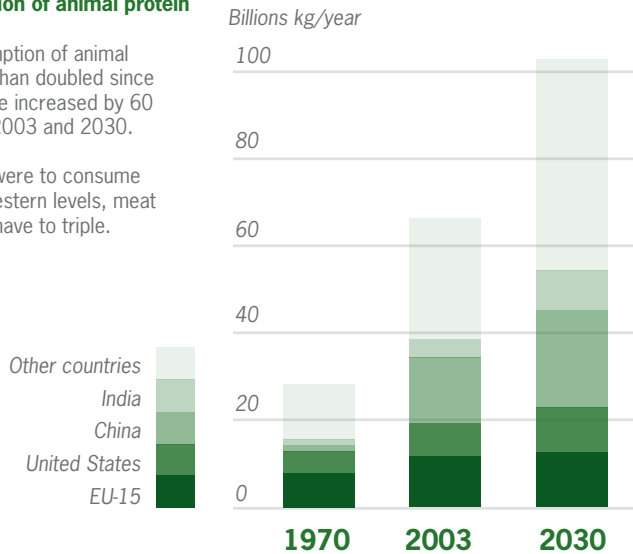


PROTEIN CONSUMPTION

Global consumption of animal protein

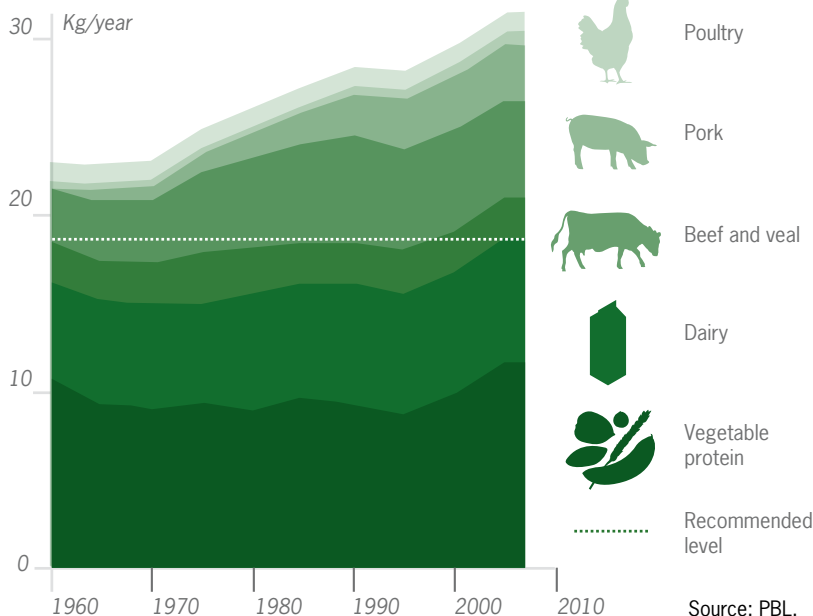
The global consumption of animal protein has more than doubled since 1970, and will have increased by 60 percent between 2003 and 2030.

If 9 billion people were to consume meat at current western levels, meat production would have to triple.



Protein consumption per person in the Netherlands

Since 1960, the consumption of animal protein has gone up by more than 60 percent. Taken together with the consumption of plant protein, the protein consumption is 70 percent higher than recommended levels.



- Eggs
 - Fish
 - Poultry
 - Pork
 - Beef and veal
 - Dairy
 - Vegetable protein
 - Recommended level
- Source: PBL.

ture of meat, with the aid of four doctoral researchers and funding to the tune of three million euros. He is using the 'shear cell', an apparatus with which separate proteins can be linked together with the help of enzymes, to form long fibres.

'With milk proteins, we succeeded several years ago in using this machine to make fibres of just 100 to 200 nanometres. That brings you very close to the size of the fibres from which muscle – the basic material of meat – is made', says Van der Groot. Now he wants to find out if you can do the same trick with proteins from soya and lupin; after all, milk protein is an animal product. 'It won't be easy; separating the plant proteins from the carbohydrates in the bean is especially tricky. But if we manage, we will have a product that is more similar to meat: in its structure, in its protein content and hopefully in its taste too.'

'Above all, we must have patience; replacing meat with meat substitutes is a slow process', says Annet Hoek, who now teaches at the University of South Australia in Adelaide. 'You can compare it with the development of margarine. The first margarine came onto the market in 1869. Nobody wanted to buy it then, and it was not very nice. Now margarine accounts for 95 percent of the butter market. In those 140 years, margarine has been continually developed to improve the texture and the composition, and our ideas about butter – what is healthy or unhealthy – have changed. You can expect to see similar developments in relation to meat substitutes.'

ADAPTING THE FOOD CULTURE

Dagevos and De Bakker, from the LEI, think that we should not be blinkered about meat substitutes. They think that to bring about change it is also important that the carnivorous Dutch food culture gradually changes. Dagevos: 'The holy trinity of the Dutch meal – meat, potatoes, and vegetables – promotes meat

‘You don’t have to hate meat to eat vegetarian’

consumption really. Replacing the meat with ‘fake meat’ is a logical solution but rather a primitive one. You could also opt for a more inventive approach and stimulate an eating culture in which meat plays a less prominent role and you can replace it or do without it more easily.’ According to the LEI researchers, neither the Ministry of EL&I nor Wageningen UR have taken enough notice of the dominant eating culture. ‘In Wageningen, hardly anyone is looking at this. Whereas there is a lot of scope here for finding ways to change patterns of protein consumption.’

Dagevos and De Bakker therefore advocate setting up an intervention group on ‘eating culture and protein transition’. This would be a team of experts who would bring about changes in the eating culture in the Netherlands. The researchers are also in favour of solid information campaigns about the health benefits of eating less meat. ‘Many consumers think that they will lack nutrients if they do not eat meat a couple of times a week’, says Dagevos. The ‘meat reducers’ could do with a bit of a nudge in the right direction too. They have a role to play as front-runners. ‘The meat reducers prove that you don’t have to hate meat to eat vegetarian at times, and they can help a lot to normalize meat-free or low-meat eating habits’, says Dagevos. The Vegetarian Butcher wants to lend the meat eater a helping hand too. Bom: ‘In the long run we want to supply real butchers with our products. Not all butchers are very keen on that, but they can see it as a service product. So that a grandma can pick up something for her vegetarian granddaughter at the butcher’s. Who knows, next time she might buy a meat substitute to try herself.’ ■



CROWD FUNDING FOR CHAIR OF MEAT SUBSTITUTES

There is already a chair of dairy science funded by the dairy industry and a chair of wildlife management funded by the hunters' association. So why don't we try to fund a chair of meat substitutes, thought the members- of The Peas Foundation, an organization that seeks to promote the consumption of plant protein. The foundation got in touch with Wageningen UR and the Technical University of Delft. And they were interested in such a chair. But the Peas Foundation first has to raise the money, and is doing that by means of ‘crowd funding’: people who sympathize with the research on meat substitutes can partially adopt the chair. The donors then have the right to comment once a year on the research of the Peas Professor. Not that the professor is obliged to take any notice, since it is vital that the research be entirely independent. Remco Boom, professor of Food Process Engineering at Wageningen UR, is holding the fort for the future professor for the time being.