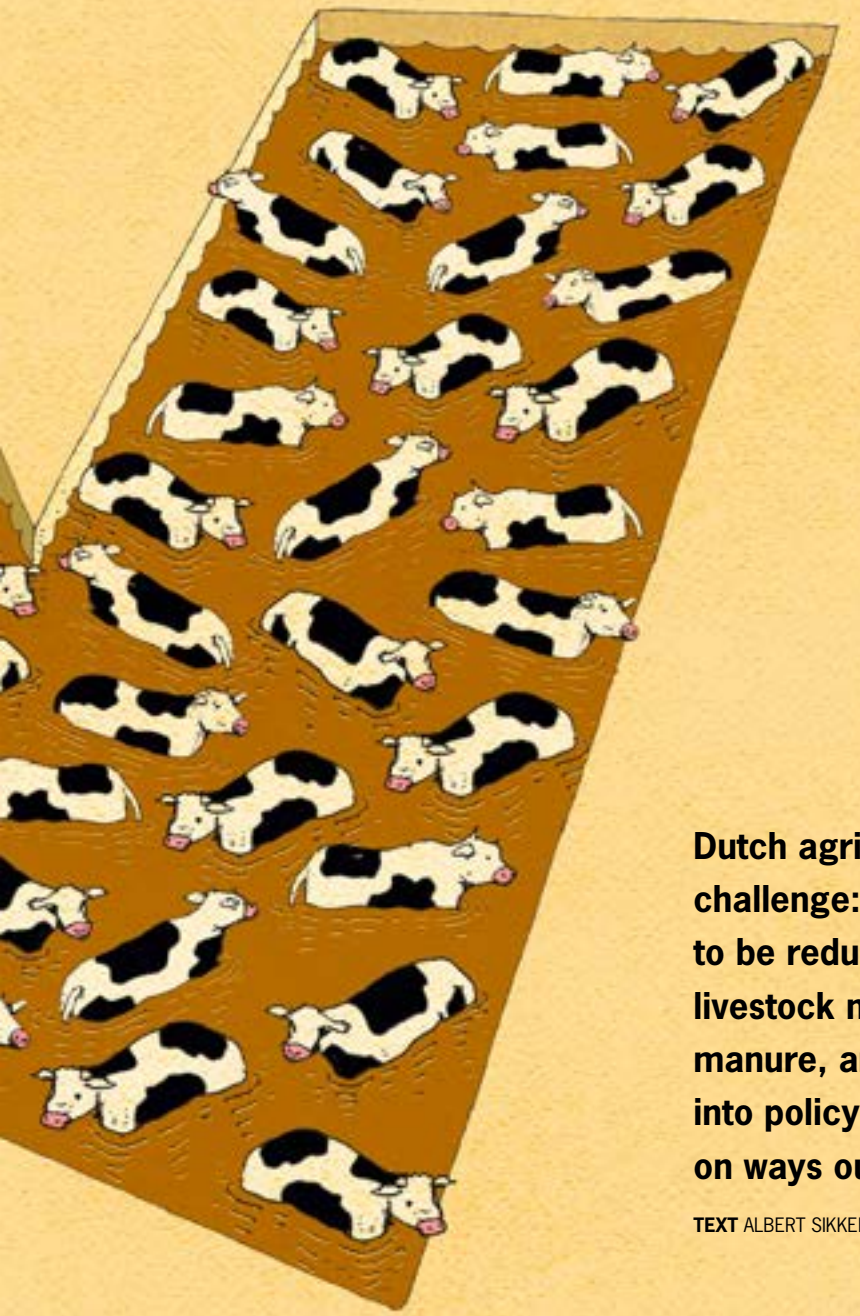
How do we solve the nitrogen crisis?



Dutch agriculture is facing a serious challenge: its nitrogen emissions have got to be reduced. What does that mean for livestock numbers and housing systems, manure, and feed? And how do you turn it into policy? Three Wageningen scientists on ways out of the nitrogen quagmire.

TEXT ALBERT SIKKEMA **ILLUSTRATIONS** RHONALD BLOMMESTIJN

‘The government is in a hurry and farmers are digging their heels in’

Creating clarity was the aim when Minister of Nature and Nitrogen, Christianne van der Wal published a map of the Netherlands just before the summer holidays, showing the target nitrogen reduction percentages for each region of the Netherlands by 2030. But that was not the kind of clarity Dutch farmers wanted, says researcher Edo Gies, regional development specialist at Wageningen Environmental Research. In the farmers’ eyes, the high reduction percentages on the map spelled the end of agriculture and therefore sparked protests. ‘Farmers want to know what they have to comply with to be able to continue farming, and they are asking for supportive policies that will help them,’ says Gies. ‘There is currently no clear prospect of that.’

EDO GIES
regional development specialist at Wageningen Environmental Research

‘The farmers want to know what they’ve got to comply with’

CONSTRUCTION HALTED

The Netherlands is not achieving its nature objectives, based on European regulations, because farmers emit too much ammonia and companies and traffic too much harmful nitrogen oxide pollution. The policy pursued so far has not led to a reduction in nitrogen emissions. In response, in 2019, the highest Dutch court banned all construction activities that could cause more nitrogen emissions.
So now the government wants to halve the ammonia emissions from the Dutch livestock sector. But nitrogen is volatile and invisible, so what does this target mean for livestock numbers and housing systems, manure and feed at the farm level?
Gies thinks that the Ministry of Agriculture, Nature and Food Quality should draw up benchmarks that farms must meet by 2030. For example: the Ministry of Agriculture sees ‘extensification’ as the way for farmers to meet the nitrogen and climate requirements. Gies: ‘But what does that mean at the farm level? Fewer animals per hectare or reduced emissions per hectare? That is what farmers want the Ministry to tell them. In the first case, the farmer must maintain his income with fewer cows or buy more land; in the second case, he can reduce emissions using technical measures and the right management.’

CLIMATE AND WATER

The idea now is for the provinces to elaborate the government’s nitrogen targets in ‘area-specific policy’. They are expected not only to meet the nitrogen targets but also to observe climate and water directives. The Netherlands does not currently comply with the EU directive on water quality because too much nitrate leaches into the groundwater. And its agriculture produces too many greenhouse gases, partly because cows emit methane, and because a lot of nitrous oxide and CO_2 is released from the soil in the peatland areas. The cabinet will present further climate guidelines for agriculture this autumn.
Nitrogen professor Wim de Vries at the Environmental Systems Analysis chair group has just completed a study on how farmers can meet the government’s nitrogen and climate targets. His research group has developed a model that calculates all the nitrogen compound and greenhouse gas emissions from agriculture, and has catalogued the measures farmers can take. They reviewed many technical measures such as reducing the nitrogen in livestock feeds, manure separation, low-emission barns, and putting a stop to ploughing. The result was a table of emissions reduction figures, and De Vries also assessed the interactions between different measures. As an example: putting more cows out to grass cuts ammonia emissions, but increases greenhouse gases.
His first scenario, called ‘Everything possible’, makes it clear that farmers cannot achieve their nitrogen and climate targets with technical measures alone. While these would indeed halve nitrogen emissions, their contribution to the climate targets are disappointing: around 25 per cent. That is ample for the climate target for 2030, but is only half the agreed reduction of 50 per cent by 2050. Moreover, De Vries bases this scenario on optimistic estimates from the suppliers of the technologies. In practice, the professor says, the equipment doesn’t work quite so well and not all farmers will be investing

in low-emission techniques before 2030, certainly not if they are expensive. So he also developed a second scenario with more realistic figures. In this scenario, he estimates that technical measures can reduce nitrogen emissions by about 30 per cent, and greenhouse gases by only 15 per cent.

THE TJEERD DE GROOT VARIANT

So the model calculations show that the livestock numbers must be reduced, but that this measure would not make as much difference as its proponents expect. In the 'Tjeerd de Groot variant' – named after the MP from the D66 party who advocated it – the livestock population is halved, which only results in a 35 per cent reduction in nitrogen and a 21 per cent reduction in greenhouse gases. This is partly because the Netherlands exports manure. If the national herd is halved, this will no longer happen, which means that the reduction in manure and the nitrogen advantage for the Netherlands will be smaller too. Secondly, with fewer dairy cows, the emission of greenhouse gases in areas with peaty soils will continue, as the peat in the soil goes on oxidizing. And thirdly, halving livestock numbers would change the land use: pasture land would become arable land and crop cultivation would increase CO_2 emissions. De Vries's favourite scenario is the combination of feasible technical measures and a 25 per cent reduction in livestock. 'I think this is the most realistic combination, and it's what the Ministry of Agriculture has in mind too.' This variant cuts ammonia emissions by 50 per cent and greenhouse gases by 25 per cent. That brings agriculture close to the ammonia target and achieves the climate target for 2030, but is only halfway to the 50 per cent climate challenge for 2050. Even if we halve livestock numbers in combination with technical measures, we will not achieve the 50 per cent reduction in greenhouse gases in 2050, thinks De Vries.

De Vries did not calculate how the government can reach the goals for water quality as well. His colleague Edo Gies has been doing that over recent months. Gies investigated for the Ministry of Agriculture which packages of measures would enable the provinces to achieve the water targets as well as those for nitrogen and the climate. He cannot go into detail yet, but he agrees with De Vries's overall conclusions. With a package of technical measures, farmers can reduce nitrogen emissions by about a quarter. If the livestock population is reduced by a quarter as well, the target of halving nitrogen emissions comes within reach. But the climate challenge is trickier.

Gies: 'Our study gives an idea of the options and their feasibility for the provinces, but the next question is: how are we going to put this policy into effect?' Farmers can limit nitrogen losses by having new low-emission barns built, but they will only do so if the Ministry adjusts the emissions >

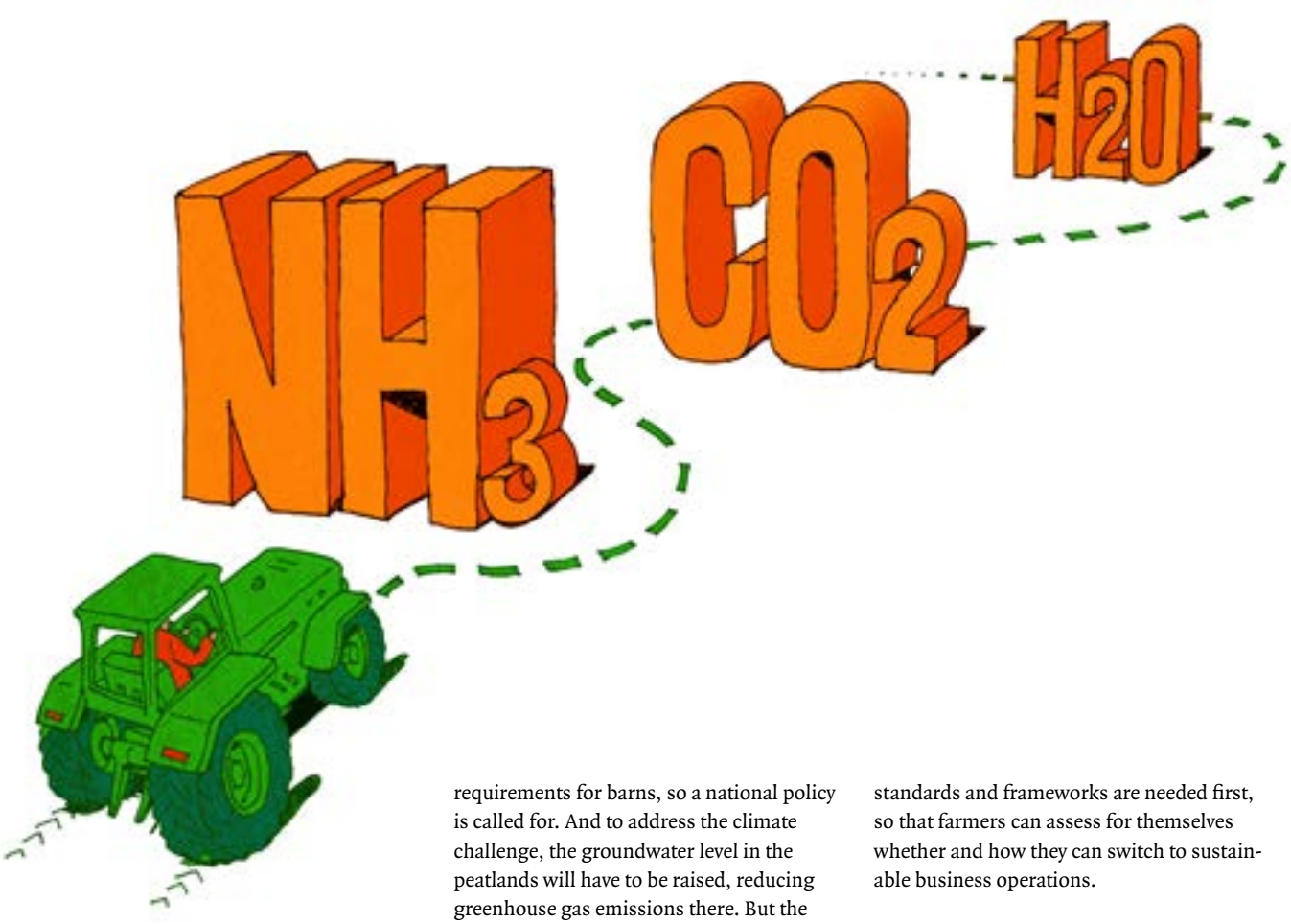


PHOTO CHRSTIAAN KROUWELS

KATRIEN TERMEER
professor of Business Administration

‘Polarization is making the transition to sustainable agriculture increasingly difficult’

requirements for barns, so a national policy is called for. And to address the climate challenge, the groundwater level in the peatlands will have to be raised, reducing greenhouse gas emissions there. But the power to do that lies with the provinces and water boards. Clearly, national and regional government bodies are going to have to coordinate their policies very well.
If that happens, Gies foresees a varied picture for Dutch livestock farmers. Many farmers on clay soils can meet the targets with technical measures and ‘low nitrogen’ farm management. Dairy farmers in peatland areas will need to switch to more extensive farming too, with fewer animals per hectare. ‘Farmers need to know what standards they are required to meet. For example, we are running a project with farmers in peatland areas who have already extensified their farms, to see if that is enough.’

NO INTENSIVE LIVESTOCK FARMING

The task is hardest for farmers on sandy soils near nature reserves and stream valleys. If they are to meet the nitrogen and water targets, intensive livestock and crop farming are no longer possible there, Gies thinks. Government buy-outs are one option, but standards and frameworks are needed first, so that farmers can assess for themselves whether and how they can switch to sustainable business operations.

STANDARDS AND FRAMEWORKS

Both De Vries and Gies think that standards and frameworks for achieving the goals should be drawn up by the provinces, because conditions – such as soil types and the presence or absence of nature areas – differ per area. The farmers and provinces should discuss this with other stakeholders such as nature organizations and water boards.
Gies also recommends a particular approach to finding solutions, known as reflexive interactive design. This approach was developed by researcher Bram Bos of Wageningen Livestock Research. He brought farmers and critical organizations together to design new barn systems, such as the Rondeel poultry barn. This brought several objectives together: less environmental pollution, better animal welfare, health benefits and a good business model. Gies: ‘The participants in the discussion have to think about how they can combine several competing objectives with new ideas. He believes that the method could also be used in local planning, and

PHOTO HUIBERT VAN ROSSUM

WIM DE VRIES
personal professor of Integral Nitrogen Impact Analysis

'I think a 25 per cent reduction in the livestock population combined with technical measures is the most realistic'

he thinks farmers are capable of doing that. 'They know the area, they know what goes on there, and they are enterprising.'

RESTORING TRUST

Katrien Termeer, professor of Public Administration in Wageningen, is another advocate of meticulous processes, both at national and regional levels. Restoring trust and social dialogue are important preconditions, she says. 'The polarization is making the transition to sustainable agriculture increasingly difficult. The government is in a hurry and farmers are digging their heels in. That is not a good basis for restoring trust.' That is why Termeer advocates a two-stage plan. First, the government must tackle the extremely urgent nitrogen problem, so that houses can be built again, says Termeer. Following Belgium's example, the government can buy up a number of the most polluting farms near nature reserves to bring ammonia emissions down quickly. 'This proposal is included in the plan that the farmers' interest group LTO Nederland made last year with the employers' organization VNO-NCW and the Nature and Environment Foundation. Some provinces had already made good progress with this. That takes some of the pressure off.'
The next stage is for the government to work with all the relevant parties on the transition to future-proof sustainable agriculture. This is not just a question of tackling nitrogen; it is an integral process in which all agricultural entrepreneurs, including farmers and horticulturalists, make their production processes sustainable. This means a largely emission-neutral agriculture with a positive impact on nature, climate, water quality, animal welfare, public health and the farmer's own prosperity. Ultimately, the changes are more far-reaching than the current standards and will take more than a generation to put in place, says Termeer. 'The direction of travel is clear and there are already a great many farmers who are conducting their business in this sustainable manner.'
In this context, it is important that the ambitious nitrogen and climate targets are non-negotiable, in Termeer's view. 'You have to meet those targets, otherwise farmers will continue to face lawsuits and legal restrictions, and that creates uncertainty. Of course, farmers will all have to get their own transitions going, but the government can offer a more coherent policy and more scope for action than it does now. It could for example get rid of restrictive legislation, make new business models possible with funding from the European Agricultural Policy, adjust land use policy and make better use of the competition rules for sustainable entrepreneurship. Supply chain parties such as banks, feed suppliers and supermarkets must also contribute to the transition. We cannot place all the burden on the farmers' shoulders.'

SEVEN TRANSITION PATHS

Last year, Termeer wrote the SER advisory report 'Towards sustainable future perspectives for agriculture', in which she advocates an agriculture agreement focusing on seven transition paths towards sustainable agriculture. These include paths leading to highly productive high-tech agricultural systems that minimize emissions through precision technology, energy generation and recycling principles, as well as a transition path towards further growth in organic farming and routes towards multifunctional farms that provide care, recreation or ecosystem services as well as food. And the last transition path named in the SER advisory report is 'respectful closure'.
To make each transition path feasible and attractive, precise agreements must be made about policy, financing, knowledge, innovation and monitoring, says the professor. 'It needs to be possible to earn a decent living whichever path you take, but they each require support from different parties, varying from banks to energy companies and nature organizations. An emissions-neutral high-tech farmer needs different knowledge and funding from a farmer who wants to become a nature manager on the side. For extensive circular agriculture, for example, the legislation on manure needs adjusting. Such overarching agreements are best made at the national level. The provinces can then determine what is best to do and where, through area consultations.'

TIME IS NEEDED

She also calls for time. 'Really radical changes can't be implemented overnight. A transition cannot be fast, profound and system-wide at the same time. That is why I am in favour of starting with small wins: tangible and meaningful initiatives that make for significant change on a small scale. Take businesses such as the poultry company Kipster or Herenboeren, in which citizens club together to produce sustainable food. Such initiatives have the potential to spread and both broaden their reach and go deeper. The Vegetarian Butcher started out small too. Fortunately, these kinds of initiatives are becoming more visible, including in nationwide debates.' ■

www.wur.eu/nitrogen