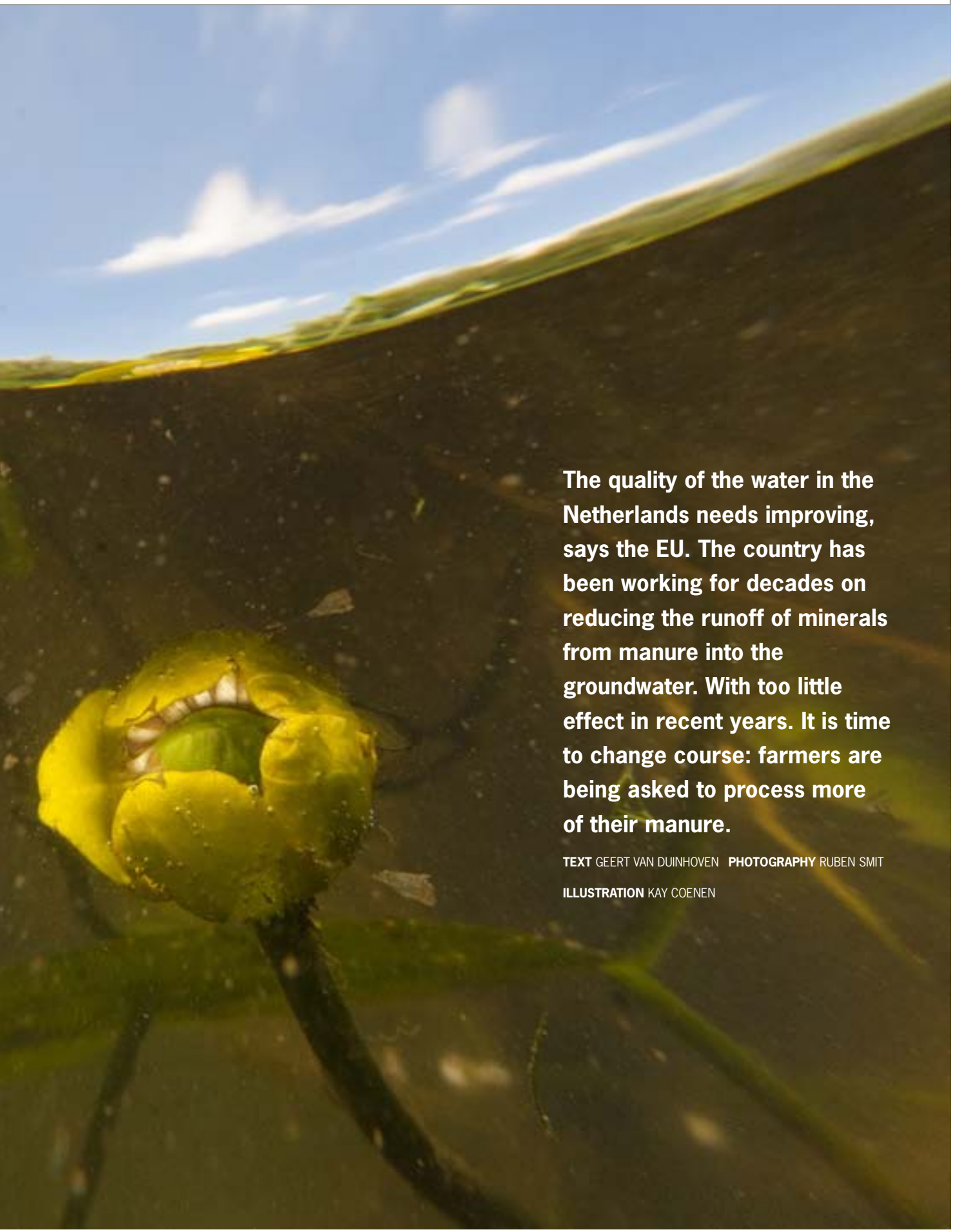
PLAN TO IMPROVE WATER QUALITY BY PROCESSING MANURE

Manure and the water supply



The quality of the water in the Netherlands needs improving, says the EU. The country has been working for decades on reducing the runoff of minerals from manure into the groundwater. With too little effect in recent years. It is time to change course: farmers are being asked to process more of their manure.

TEXT GEERT VAN DUINHOVEN **PHOTOGRAPHY** RUBEN SMIT

ILLUSTRATION KAY COENEN

This year the Netherlands will be resuming consultations with the European Commission about the Nitrate Directive. This set of EU guidelines was drawn up in an attempt to reduce water pollution from nitrates. Every four years the member states are required to present a plan of action outlining what they are going to do to bring down the nitrate concentrations in their water.

Pollution with nitrate can have a serious negative impact on the quality of drinking water. The main source of nitrates in drinking water is the runoff of nitrogen compounds from manure or artificial fertilizer. Phosphate ends up in the water from the same source. Both substances disturb the organic balance of the water.

The problem is that nitrogen and phosphate are both indispensable nutrients for agricultural crops. They only become problem substances when applied to the land in the form of fertilizer in larger quantities than the crop can absorb. Because the Netherlands adds more of these minerals to the land, through animal feeds and artificial fertilizers, than it extracts in the form of crops and animal products, the country has suffered from an overload of manure and minerals ever since the 1960s. With runoff of nitrogen and phosphates into the groundwater and the soil as a result. The government has been working on the problem since the 1980s.

A key question on the agenda for the coming talks in Brussels concerns the approach taken in recent years: has the Netherlands make enough progress?

EFFECTS OF THE MANURE POLICY

Researchers at Alterra Wageningen UR, Deltares, LEI Wageningen UR, RIVM and the Spatial Planning Bureau completed a number of studies this year on the effects of the manure policy in the Netherlands for the Evaluation of the Manure Law 2012 by the Ministry of Economic Affairs, Agriculture and Innovation (EL&I). These studies indicated that the water quality had improved over the last few decades but that the rate of improvement has slackened since 2006, whereas the targets have not been achieved everywhere. For instance, concentrations in about half the locations assessed in the Netherlands were still above the norm, and there are big differences between the various regions (see infographic) and between different types of farm.

Among the scientists from Alterra investigating water quality in relation to the manure policy were Frank van der Bolt and Piet Groenendijk. Van der Bolt: 'The manure policy contributed to improving water quality in the period 1990 to 2006 especially. This is mainly because farmers started spreading manure more evenly over the country. Intensive livestock farmers brought their excess manure to arable areas in the north and west of the Netherlands. In the preceding years, the manure was simply spread on their own fields or other local ones, leading to massive environmental pollution in areas which produced a lot of manure.'

Groenendijk: 'The fact that water quality has hardly improved since 2006 is related to the build-up of phosphate and nitrogen compounds in the soils as a result of past fertilization. These build-ups affect the quality of the surface water of the surface water due to run-off, and they will go on doing so for the decades ahead of us too. But the fact remains that peak pollution levels of the surface water have come down considerably. And those are critical junctures for the ecosystem.'

LOWER CROP YIELDS

A lay person could be forgiven for thinking that all you have to do to achieve the environmental objectives is to apply less fertilizer, at least in areas where there are already a lot of minerals in the soils making their way towards the groundwater. Groenendijk: 'But at some point you will end up with fertilization levels that give you lower crop yields. Up to now, the manure policy has not affected crop yields but there is a real risk that it will if you move towards a level of fertilization that does not harm the environment at all.'

Wageningen UR was asked by the former

Frank van der Bolt, researcher at Alterra Wageningen UR

Fridtjof de Buisonjé, researcher at Wageningen UR Livestock Research

'Build-ups in the soil go on affecting the water quality'

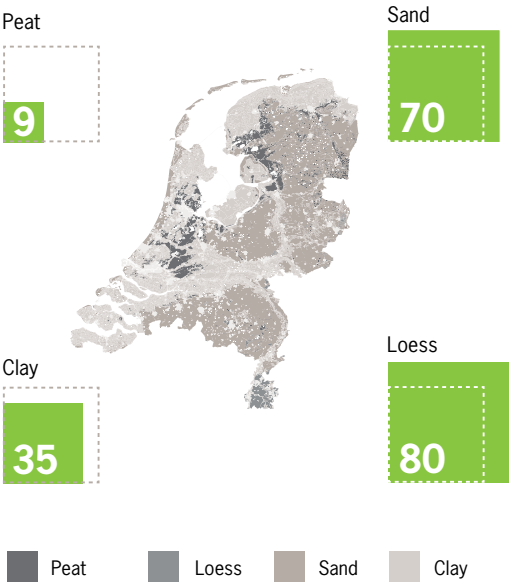
NITRATE STANDARDS

Groundwater is allowed to contain a maximum of 50 milligrams of nitrate per litre.

In clay and peaty soil areas average nitrate levels are within this limit; in sandy and loess soil areas they exceed it.

Limit **50** mg /l

Nitrate concentration per soil type in mg/l



ministry of Agriculture in 2009 to research the technical options for solving the manure surplus. Research topics include the scope for optimizing the composition of feeds so that the animals can absorb nitrogen and phosphate much more efficiently, and smaller amounts of these minerals go to waste, ending up in the manure. Another focus is the possibilities for using the manure more sparingly and efficiently, for example by separating the solids from the liquids so that farmers can dose the fertilizer better. A third avenue of enquiry is the manure processing, forming it into pellets for export for example, or extracting minerals such as phosphate from it. Technically speaking, there seems to be plenty of scope here, but it is not always clear what should be done with the end product. Van der Bolt: 'Sorting manure into solids and liquids seems promising, for example, but we do not know whether and how you can go about this on a farm, not what the environmental impact will be.'

GLASS HALF FULL

A key question is how livestock farmers themselves see the manure issue. Is the current situation, with targets reached at half the locations where measurements are taken, a half-full or a half-empty glass? Mark Heijmans of farmers' organization LTO Nederland is quite clear about it. As far as he's concerned, the glass is half full and the last few decades have proven that efforts in the sector have borne fruit. 'Of course we are not there yet, but at some point you have to ask yourself whether a sector can do any more. Perhaps we should now talk about the question of how much crop farming contributes to nitrate pollution of the highest groundwater, and the question of whether the right measures are being put in place. Apparently these measures are less effective than expected; otherwise we would be a lot further with limiting the environmental damage. Perhaps the talks in Brussels should address the question of whether you should have the same nitrate standards throughout Europe.'

LTO has drawn up a seven-point plan for the minister to take into the negotiations about implementing the Nitrate Directive. Some of the LTO's points for action come down to giving individual arable farmers more space and more responsibility, and some of them call for a different way of looking at the issue of manure.

The price of fertilizer ingredients is going up all the time, which will cause farmers to use them more sparingly. 'What is more, scientific knowledge will enable them to dose the fertilizer better and better according to the specific needs of plants on a particular type of soil. That, together with new codes of practice for agriculture, should make it possible to cut eutrophication further and improve water quality to the maximum possible.', says Heijmans.

COMPULSORY MANURE PROCESSING

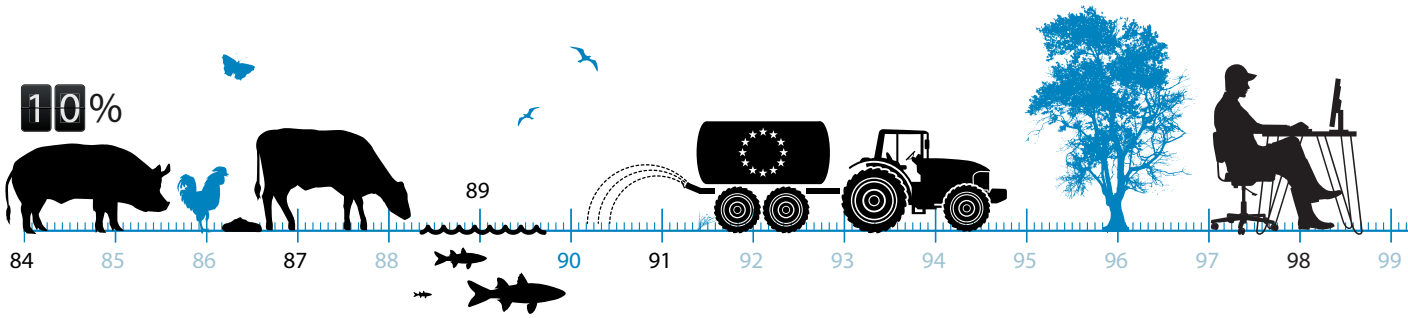
A second line of attack that the LTO considers promising is manure processing. This is entirely in line with the new manure policy proposed by outgoing state secretary Henk Bleker of EL&I, which he presented on 13 June. The crucial element of this policy is compulsory manure processing: from now on crop farmers are obliged to process a certain percentage of manure – which varies per region – into new products such as mineral concentrates. Research going on for some years in Wageningen UR has revealed that technically sound products can be made that contain either concentrated phosphate or concentrated nitrogen. As an example, Kumac, a company in Deurne that is participating in the Mineral Concentrate Pilot Project supported by the ministry of >

PHOTOS GUY ACKERMANS

Piet Groenendijk, researcher at Alterra Wageningen UR

MANURE POLICY SINCE THE NINETEEN EIGHTIES

The Dutch manure policy goes back to the nineteen eighties, when the falling quality of surface water and groundwater and pressure from the nature and environmental movements forced the government to take steps.



1984

An **interim law limiting pig and poultry farms** prohibits the establishment of new pig or poultry farms. Existing farms in high concentration areas are not allowed to expand production by more than 10 percent.
The milk quota is also introduced in 1984, imposing limits on the growth of dairy herds.

1987-1997

The **Soil Protection Law**, the **Manure Law** and the **Resolution on the Use of Animal Manure** aim at regulating the production of manure as well as its use on arable land.

1989

When the first **Environment Policy Plan** comes out, the debate gets tougher. It is increasingly clear that water quality is worsening.

1991

The **European Nitrate Standard** is introduced, based on a nitrate level of maximum 50 mg per litre.

1998

The **MINAS book-keeping system** comes into play, and gives prominence to standards for run-off: only so much phosphate and nitrate is to be allowed to leave the farm through the soil. Farmers are now required to measure exactly how much phosphate and nitrogen comes in and out of the farm. A fine is imposed on anyone exceeding the norms.

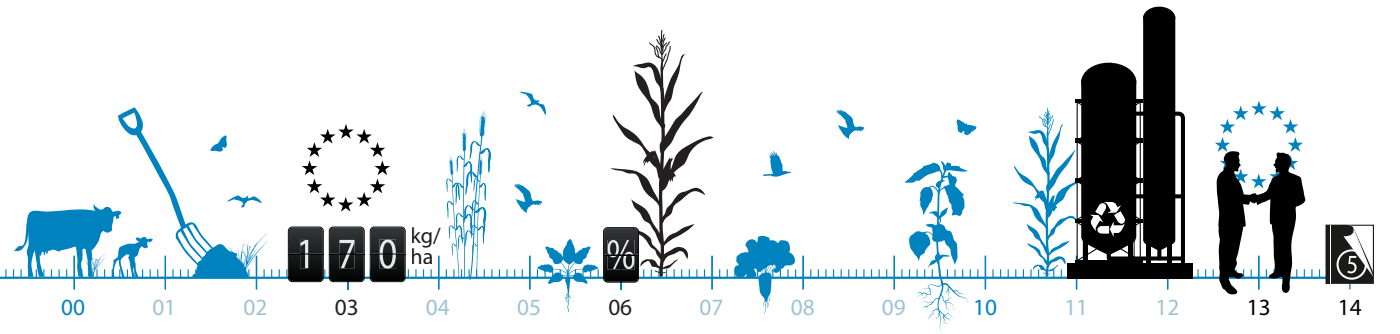
Mark Heijmans,
LTO Netherlands

EL&I, is already making three products from animal manure, one of them being Fertex, made from the solids, which contain a lot of organic matter and phosphate and can be sold to crop farmers or exported. The liquids are purified by reverse osmosis into water pure enough to be discharged. This reverse osmosis also produces the mineral concentrate Fertraat, made up largely of nitrogen and potash. This concentrate has been provisionally accepted by the European Commission for use as artificial fertilizer.

PRICE OF FERTILIZER

The question is, however, whether there is a market for the products of manure processing on a large scale. And will farmers really deliver their manure to the processors or is it cheaper for them just to supply it directly to the crop farmers? Bleker is quite clear on this point in his letter to the Lower House of the Dutch parliament: 'We expect the demand for food to go up in the coming decades, with the result that the demand for and price of fertilizers will rise sharply too. Under these circumstances, farmers will be forced to use nutrients more efficiently. The same goes for animal manure. And if farmers are not stimulated by scarcity and higher prizes to use fertilizers more efficiently, they will increasingly often be asked by parties in the chain to adopt a more sustainable approach to manure and manure processing. The higher prices we are expecting will stimulate

‘Apparently the measures are less effective than expected’



2003
The European Court condemns the Netherlands for failing to comply with the nitrate directive, particularly for not meeting the hard **maximum load** of 170 mg of nitrogen per hectare.

2006
The Netherlands introduces a new **standards system** in which the norm is no longer fixed according to the runoff but according to the amount of nitrogen and phosphate in fertilizer needed for the crops. If a crop can absorb a large amount of nitrogen and phosphate, the farmer is allowed to spread larger amounts on that plot of land.

2013
The European Commission and the Netherlands will **negotiate** on the steps taken by the Netherlands and the plans for the near future aimed at meeting the targets of the Nitrate Directive. The permissible doses for the various crops will also be established.

2014
The **Fifth Nitrate Directive Action Programme** comes into force and runs until 2017.

investments in technology that will make it possible to meet a widespread demand for fertilizer ingredients. And then animal manure will be nothing but a valuable resource, as a byproduct of animal husbandry.’

MARKET FOR FERTILIZER

Yet this optimism about manure processing has yet to catch on at present. LEI Wageningen UR showed in its contribution to the evaluation of the Manure Law 2012 that exports of both processed and unprocessed manure products to Germany have shrunk over recent years due to stricter import regulations. Having monitored the fertilizer market, the LEI has expressed the view that the market for fertilizer from the Netherlands is not likely to grow for the time being. Is there any future, then, in looking for good manure processing techniques? According to Fridtjof de Buisonjé, a technical researcher at Wageningen UR Livestock Research who is involved in the manure processing project, the success of the processing technique depends on other factors as well: ‘Of course we have learned from the past and we know that success is not just a matter of technique. Whether the technique is a success in practice depends on a number of factors. An important one is energy prices. Manure processing always requires energy so if the prices keep on going up, there are fewer options right from the start. As well as that, success depends on the quality of the products and the scope for using them in the Netherlands or exporting them.’

Mark Heijmans of LTO: ‘Precisely by making it compulsory for the sector to process a proportion of the manure, Bleker is creating a guaranteed supply of manure for processing. That is exactly what is needed before you start investing in it. Of course there is still much to be done because there is still far too little processing capacity for pig manure, for example. We are going to stimulate crop farmers, both individually and as a group, to invest in manure processing. So now the crop farmers are also going to be responsible for making sure they have a distribution channel for their manure.’

www.mestverwerken.wur.nl ■