Brown Gold?

Agronomists, Fertiliser Advice and Emerging Environmental Awareness in Belgium, 1970-1991

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This article analyses the discourse and opinion of agronomists on the manure problem in Belgium during the years 1970-1991. Based on a careful reading of the Belgian *Landbouwtijdschrift* (*Agricultural Magazine*), supplemented with secondary sources, four conclusions can be drawn. Firstly, already in the 1970s these agricultural experts warned for an injudicious use of pig manure, which caused nuisance to the environment and local residents. Without referring to the concept of 'sustainability', the agronomists did in fact incorporate economic and ecological aspects into their analysis. Secondly, Belgian agricultural experts, inspired by studies and colleagues in other countries, opted for technical solutions. Only seldom did they plea for strong state intervention. Thirdly, the Belgian government intervened only in the course of the 1980s, when the consequences of over-fertilisation threatened to have concrete and recognisable consequences for citizens, and with regard to the quality of drinking water in particular. These legislative initiatives occurred in parallel with a growing environmental awareness within society at large, a deeper understanding of the long-term environmental effects and the introduction of more stringent European environmental legislation. Fourthly, the Manure Decree of 1991 did not bring about a radical revolution in Belgian agriculture. Its primary focus was the supervision and management of the existing manure circuit, rather than on a structural reduction of the surpluses.

Dit artikel analyseert het discours van landbouwkundigen over de mestproblematiek in België in de jaren 1970-1991. Op basis van een zorgvuldige lezing van het *Landbouwtijdschrift*, aangevuld met secundaire bronnen, kunnen vier conclusies worden getrokken. Ten eerste waarschuwden de landbouwdeskundigen reeds in de jaren 1970 voor een onoordeelkundig gebruik van varkensmest,

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met overlast voor milieu en omwonenden tot gevolg. Zonder te verwijzen naar het begrip 'duurzaamheid', namen de agronomen wel degelijk economische en ecologische aspecten mee in hun analyse. Ten tweede kozen Belgische landbouwexperts, geïnspireerd door studies en collega's in andere landen, vooral voor technische oplossingen. Slechts zelden pleitten zij voor overheidsingrijpen. Ten derde reageerde de Belgische overheid pas in de loop van de jaren 1980, toen de gevolgen van de overbemesting concrete gevolgen dreigden te hebben voor de burger, namelijk een daling van de drinkwaterkwaliteit. De eerste wetgevende initiatieven liepen parallel met een groeiend maatschappelijk milieubewustzijn, een beter begrip van de milieueffecten op lange termijn en de invoering van een strengere Europese milieuwetgeving. Tenslotte zorgde het Mestdecreet in 1991 niet voor een radicale omwenteling in de Belgische landbouw. De primaire focus lag immers op het toezicht en beheer van het bestaande mestcircuit, en niet op een structurele vermindering van de overschotten.

Introduction

On 28 January 1991, the 'Decree on the protection of the environment against pollution by fertilisers', better known as the *Mestdecreet* (Manure Decree), was published in the Belgian Official Journal. The intention was to prevent any excessive spreading of fertilisers and to promote the ecological use and processing of animal manure. Especially Flanders, the northern part of the country, was struggling with over-fertilisation.[1] Experts, farmers' unions and environmental organisations alike recognised that the manure problem was causing enormous ecological damage: pollution of the surface and groundwater, the degradation of soil quality, as well as problems for the drinking water supply. At a conference in April 1992, Walter Vandepitte of the *Belgische Boerenbond* (Belgian Farmers' Union) made a clear reference to the negative impact of intensive pig farming, mainly in the form of odour nuisance and 'irresponsible sanitary risks'.[2] Although there was a consensus about the existence of manure surpluses, the size of the problem and, in particular, the best strategy to solve it, were still under discussion.

In this article, I will examine how Belgian agricultural experts viewed the growing manure surpluses and in particular the excessive use of pig slurry in Belgium and Flanders. For centuries, manure was a valuable resource that was necessary in order to maintain and increase soil fertility and productivity. After the Second World War, however, its significance and

1 Guy Dejongh and Peter Van Windekens, *Van kleine landeigendom tot Vlaamse Landmaatschappij. Vijfenzestig jaar werking op het Vlaamse platteland, 1935-2001* (Vlaamse Landmaatschappij 2002) 223.

2 Walter Vandepitte, 'Intensieve veeteelt en het leefmilieu. Standpunt van de Belgische Boerenbond', in L. Knaepen et al., *Intensieve varkenshouderij en milieu* (Centrum voor landbouw-economisch onderzoek 1992) 2.

value changed profoundly. From what point in time was the manure surplus considered a problem in Belgium and why? What discourse took place and what solutions were put forward? How does this case fit into the longer history of sustainability, as explained in the introduction to this special issue?[3] To what extent did the agronomists take into account the economic, social and ecological facets and try to find a balance? I will mainly follow the opinions of Belgian agronomists and other scientists, since they played a crucial role in the modernisation process of Belgian and Western European agriculture. From the 1950s onwards, agronomists and agricultural technicians (with a diverse scientific expertise) were more than ever at the helm of agricultural modernisation, which focused on rationalisation, technological innovation and the feasibility of the agricultural economy and rural society. Scientific experts emerged as key figures in debates about agricultural policy and practices. Their opinion influenced, guided and at the same time legitimised the initiatives and measures pursued by regional and (inter)national governments.[4]

The primary source on which this research is based is *Landbouwtijdschrift* (*Agricultural Magazine*), of which I consulted all issues published between 1970 and 1991, or in other words, from the first article that addressed the manure problem to the publication of the Manure Decree. This magazine first appeared in 1948 and is a publication of the Ministry of Agriculture. The intention at the outset was to stimulate the modernisation of Belgium's agricultural sector. The contributions were aimed not so much at the ordinary farmer, but mainly at researchers, consultants and policymakers. When the ministry launched the magazine *Agricontact* in 1971, which explicitly wanted to reach ordinary farmers and horticulturists, *Landbouwtijdschrift* took on an even more pronounced scientific character with extensive contributions from researchers, associated with the government's own institutions and universities.[5] The majority of these were agricultural engineers specialising in agrochemistry. The articles in the magazine (15 contributions explicitly addressed the pig manure problem) therefore form a mirror of the dominant ideas and visions that were circulating and common among agricultural experts and, by extension, in the agriculture sector. These findings were supplemented and

3 Peter van Dam, 'The Age of Interdependence. Varieties of Sustainability in the Low Countries during the Twentieth Century', *BMGN – LCHR* 137:4 (2022). DOI: https://doi.org/10.18352/bmgn-lchr.11687.

4 Juri Auderset and Peter Moser, *Die Agrarfrage in der Industriegesellschaft. Wissenskulturen, Machtverhältnisse und natürliche Ressourcen in der agrarisch-industriellen Wissensgesellschaft (1850-1950)* (Böhlau Verlag 2018); Yves Segers and Leen Van Molle, 'Introduction. Knowledge and its Networks in Rural Europe: From the Early Eighteenth Century to the Late Twentieth Century', in: Yves Segers and Leen Van Molle (eds.), *Agricultural Knowledge Networks in Rural Europe, 1700-2000* (Boydell Press 2022) 20-25.

5 https://www.odis.be/hercules/search2.php?searchMethod=simple&search=landbouwtijdschrift. Accessed 11 January 2022.

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For centuries, manure was a valuable resource. The caption of this drawing from ca. 1823 underlines this: 'See here the farmer with cart and horse depicted. And how he orders fertility to the barren land'. Drawing entitled 'Mest is "den God van den landbouw"' ['Manure is "the God of agriculture"'] designed by an unknown artist published in Jan Lodewijk Van Aelbroeck, *Werkdadige Landbouw-Konst Der Vlamingen: Verhandeld In Zes Zamenspraken, Tusschen Eenen Grond-Eigenaar En Zijnen Pachter* (Ghent: J. Snoeck-Ducaju, 1823). © Centrum Agrarische Geschiedenis, B00002088. Public domain. https://cagnet.be/item/B00002088.

contextualised with secondary sources in order to better understand the vision of farmers' unions and environmental organisations on the manure problem and the solutions proposed by the agricultural experts.

After all, up to now, little historical research has been done on the relationship between agriculture and the environment in Belgium since World War II. Only a few studies are relevant for this article. Jens Van de Maele studied the reception of Rachel Carson's *Silent Spring* (1962), and Hanne De Winter analysed the circulation of fertilisation advice between 1840 and 1991, taking the Belgische Bodemkundige Dienst (BDB, Belgian Soil Science Service) as a case study.[6] Finally, the implementation and evolution of the Manure Decree was briefly discussed in a number of anniversary publications by public institutions and environmental organisations.[7]

The manure problem could count on more attention in other countries.[8] In the Netherlands, for example, several scholars outlined its roots. In his dissertation, the agricultural sociologist Jaap Frouws concluded that already at the end of the 1960s, agronomists affiliated with research institutions from the Dutch Ministry of Agriculture and Fisheries warned against over-fertilisation.[9] They advocated a fertiliser balance, the reduction of artificial fertilisers and a livestock density standard that should prevent unbridled growth in the number of livestock. In 1972, the *Stichting Natuur en Milieu* (Nature and Environment Foundation) pointed at the increasing soil and

6 Jens Van de Maele, 'De resonantie van een stille lente. Nederlandse en Vlaamse persstemmen over Rachel Carsons 'Silent Spring' (1962-1963)', *Jaarboek voor Ecologische Geschiedenis* (2014) 97-117; Hanne De Winter, *Kennisnetwerken in de landbouw. Circulatie van bemestingskennis en -advies in België, 1840-1991* (Dissertation KU Leuven) 2015.

7 Erik Buyst, Kristof Lowyck and Antoon Soete, *Al 20 jaar voor het milieu van morgen. Kroniek van de Vlaamse Milieumaatschappij, 1991-2011* (Vlaamse Milieumaatschappij 2011); Dejongh and Van Windekens, *Van kleine landeigendom*; Torsten Feys, *30 jaar OVAM. De Openbare Vlaamse Afvalstoffenmaatschappij in historisch perspectief, 1981-2011* (Academia Press 2011); Marc Hooghe, *De milieukoepel in Vlaanderen. Bond Beter Leefmilieu vzw, 1971-1996* (BBL Vlaanderen 1996); Kristof Vets and Dorien Vanderputten, 'De Bond Beter Leefmilieu als nieuwe sociale beweging', *Brood & Rozen*, 14:3 (2009) 39-53. DOI: https://doi.org/10.21825/br.v14i3.3369; Stefan Walgrave, *Nieuwe sociale bewegingen in Vlaanderen: een sociologische verkenning van de milieubeweging, de derde wereldbeweging en de vredesbeweging* (Dissertation KU Leuven 1994) 2-3.

8 For Germany, see Frank Uekötter, *Die Wahrheit ist auf dem Feld. Eine Wissensgeschichte der deutschen Landwirtschaft* (Vandenhoeck & Ruprecht 2012).

9 Jan Bieleman, 'Van traditionele naar technologische vruchtbaarheid en verder… Het mestprobleem in de Nederlandse landbouw in historisch perspectief', *Tijdschrift voor Ecologische Geschiedenis*, 1:2 (1996) 2-8; Jan Luiten van Zanden and Wybren Verstegen, *Groene geschiedenis van Nederland* (Het Spectrum 1993); Jaap Frouws, *Mest en macht. Een politiek-sociologische studie naar belangenbehartiging en beleidsvorming inzake de mestproblematiek in Nederland vanaf 1970* (Dissertation Wageningen University 1994); Erwin Karel, *Boeren tussen markt en maatschappij. Essays over effecten van de modernisering van het boerenbestaan in Nederland (1945-2012)*. Historia Agriculturae 44 (Stichting NAHI 2013). DOI: https://doi.org/10.21827/5e70c0f263a85.

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After World War II the size of livestock in Belgium increased profoundly. The average number of cattle per farm rose from 10 in 1950 to 56 in 1990. Picture taken by Fotoatelier *Belgische Boerenbond*, 1970 – 1979. © *Boerenbond*, KADOC KU Leuven, Image archive *Boerenbond*, negatiefnr. 1019; 125D, https://cagnet.be/item/B00001279.

water pollution caused by the uncontrolled spreading of animal manure and the growth of intensive livestock farming. The report immediately sharpened the relationship between the so-called Green Front (the close collaboration between the ministry and the agricultural sector) and environmental organisations and formed the basis for parliamentary debate. In the same year, the newly established Dutch Ministry of Housing and Environmental Hygiene acknowledged in its *Urgentienota Milieuhygiëne* (Urgent Memorandum on Environmental Hygiene) the existence of local manure surpluses, but it said a solution was in the making, for instance through the planned establishment of manure banks. In addition, the Dutch agricultural sector remained convinced that technical solutions would solve any problem.

In the years that followed, the problem was frequently discussed and proposals to limit the livestock per farm were suggested. However, no concrete action was taken by the Dutch government, because the farmers were able to defend their interests efficiently through lobbying, and because of the power struggle between the departments of Health and Environmental Hygiene on the one hand, and Agriculture on the other. It was not until 1987, with the *Besluit Dierlijke Meststoffen* (Animal Fertilisers Decree) and in 1989 with the first *Nationaal Milieubeleidsplan* (National Environmental Policy Plan, NMP1) that a manure policy was launched in the Netherlands. So, for two decades, Dutch policymakers were reluctant to actually intervene.[10] The question arises whether this finding also applies to the Belgian case and what the causes were.

Post-war livestock: rapid growth and concentration

After the Second World War, agriculture in Western Europe underwent a rapid and profound transformation, characterised by upscaling and specialisation, internationalisation and a growing use of inputs such as plant protection products, animal feed and fertilisers. This resulted in important benefits: increased yields and (labour) productivity, diminishing costs for farmers and cheaper food for consumers. Until about 1960, most mixed family farms, which combined arable farming with stockbreeding, had a closed mineral cycle. This implied that the export of these nutrients via crops and the loss to the environment was relatively small. Farmers still largely produced their own fodder and spread the farmyard manure on their own fields and pastures. The post-war trend towards specialisation and the switch to non-land based livestock farming – which meant that to a large extent farmers had to buy the necessary fodder mainly from overseas regions – disturbed this age-old mixed farming system.[11]

10 E.M. Hees, C.W Rougoor and F.C. van der Schans, *Van mestbeleid naar bemestingsbeleid. Relaas van een ontdekkingsreis* (CLM 2012) 1-6.

11 Yves Segers and Erwin Karel, 'The Low Countries 1750-2000', in Erik Thoen and Tim Soens (eds.), *Struggling with the Environment: Land Use and Productivity*. Rural economy and society in north-western Europe, 500-2000 (Brepols 2015) 261-306. DOI: https://doi.org/10.1484/M.RES-EB.5.108040.

Between 1950 and 1990, the total cattle population in Belgium grew by approximately 50 percent. In the same period, the poultry and pig population increased fivefold. This upward trend was accompanied by a double concentration: geographically and at farm level. The average number of cattle per farmer rose from 10 in 1950 to 56 in 1990. Between 1970 and 1990, the number of broiler chickens per farm increased from approximately 900 to 6100. The number of pigs rose from an average of 10 in 1950 to 332 per farm in 1990. Parallel to this, a geographical concentration occurred. The pig population increased in all Flemish provinces. The Walloon provinces, on the other hand, with the exception of Hainaut, experienced a sharp decline. In Flanders, it was mainly the provinces of West Flanders and to a lesser extent East Flanders that recorded a strong increase. In 1992, West Flanders housed no less than half of all Belgian pigs (circa 3,5 million animals). The highest density was concentrated in the districts of Tielt and Roeselare, and in the Noorderkempen area of Antwerp province. In a region characterised by scarce and expensive agricultural land, it was an interesting survival strategy for small family farms to embrace intensive livestock farming.[12]

This geographical concentration did not only occur in Belgium, but also in the Netherlands (Eastern and Southern Netherlands), Germany (North-Rhine Westphalia, Lower Saxony and Schleswig-Holstein) and France (Basse-Normandie and Ouest). It is striking that this trend coincided with the start of the Common Agricultural Policy (CAP) in 1962. In order to shield its internal grain market from foreign competition, the European Economic Community (EEC) opted for high import tariffs. To get this internationally accepted, Europe agreed during the General Agreement on Tariffs and Trade (GATT) negotiations to release imports of other fodder crops. The overseas imports of cheap animal feed (soy and maize flour) quickly increased via the harbours of Rotterdam, Antwerp and Hamburg. It is no coincidence that the regions with the highest concentration of cattle are located close to the coast or easily accessible via motorways and major rivers such as the Rhine and Scheldt.[13]

Agricultural experts and over-fertilisation

Since the interwar period, agronomists and consultants from the Belgian government and agricultural organisations have warned against the excessive and injudicious use of artificial and organic fertilisers and manure by farmers. Until the early 1970s, the underlying motives were to reduce costs and monitor product quality. The majority of the experts' attention and advice focused on the use of artificial fertilisers. This was not solely due to the fact

12 Yves Segers and Leen Van Molle (eds.), *Leven van het land. Boeren in België, 1750-2000* (Uitgeverij Davidsfonds Leuven 2004) 138-140.

13 Vandepitte, 'Intensieve veeteelt en het leefmilieu', 1-7.

that there were different types of fertiliser on the market, each with their own specific characteristics and composition, but mainly because fertiliser had to be purchased and implied a significant cost for the farmers. Manure was for free and increasingly available on the farm as livestock increased. A smarter and more balanced use of artificial and animal fertilisers would save costs and have a positive impact on productivity.[14] Ecological motives and objectives were missing from the discourse. Even when institutions such as the BDB started with plot-related fertiliser advice from the late 1940s onwards, which made it possible to fertilise much more accurately per plot, economic and financial aspects took precedence.[15]

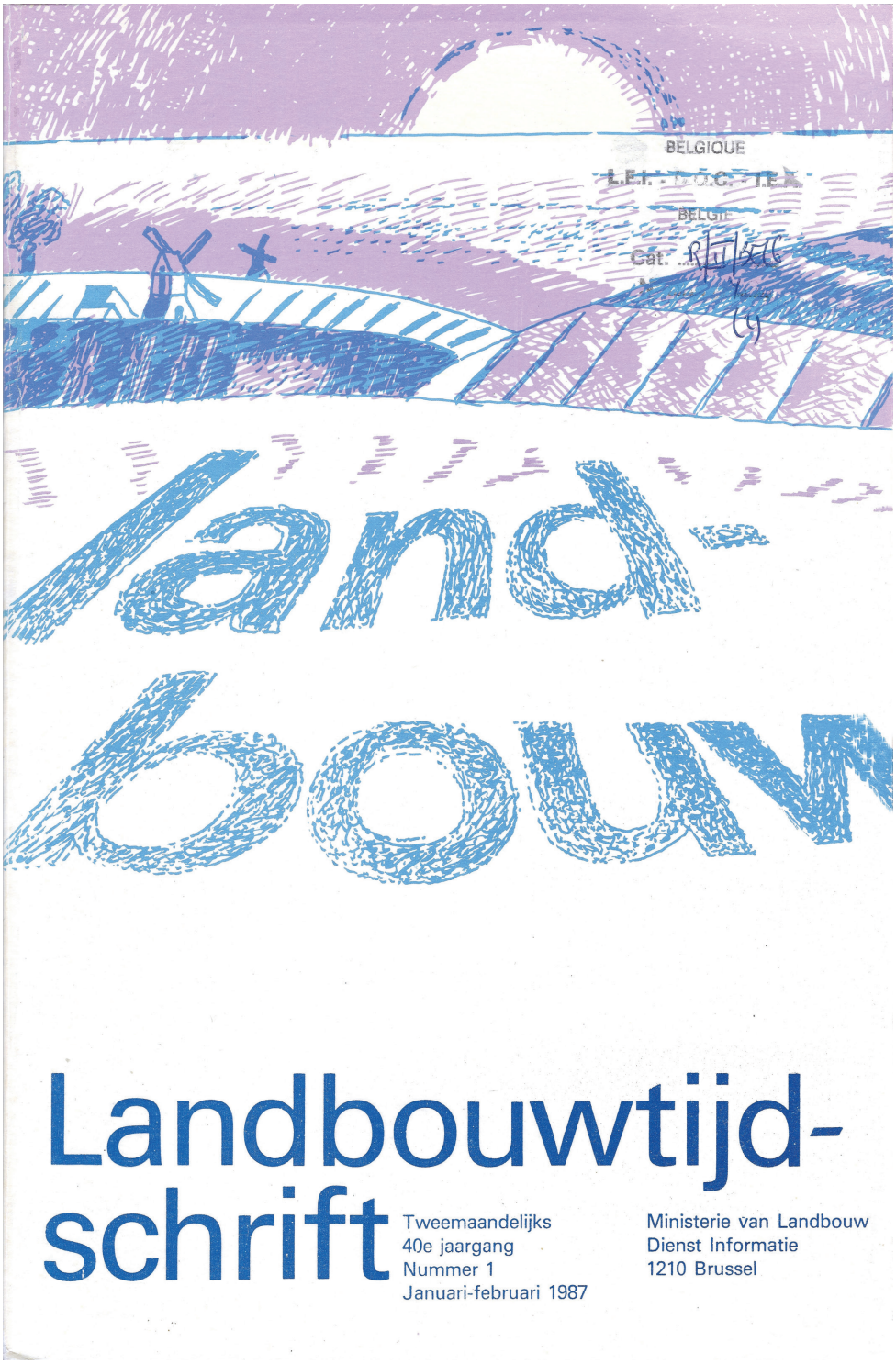
Around 1970, as the analysis of *Landbouwtijdschrift* shows, Belgian agronomists became more aware of the impact of agricultural activities on the environment and rural communities, and in particular of the increasing use of liquid manure. Undoubtedly, this happened under influence of citizen protests: local residents increasingly protested against the use of pig slurry, the related odour nuisance and discharge into surface waters. In 1973, M. De Waele, affiliated to the *Rijksstation voor Landbouwscheikunde en -natuurkunde* (State Laboratory for Agricultural Chemistry and Physics) in Gembloux, warned in *Landbouwtijdschrift* about the negative impact of eutrophication on the drinking water quality. Furthermore, eutrophication can lead to a shortage of oxygen in the water, the development of algal blooms, decrease of biodiversity and odor nuisance. According to De Waele, animal husbandry was an important source of pollution due to the excessive use of organic and mineral fertilisers. The excess livestock manure could not be commercialised because transport was expensive. In addition, many farmers did not have enough land, which led to irresponsible practices. For example, De Waele stated: 'In areas with intensive livestock farming, it is constantly being observed that the principle of "everything in the river" is applied with a smile'. The agronomist therefore argued for action: it was necessary to investigate how the commercialisation of animal excrement could be stimulated. Furthermore, he expected politicians to intervene since a short-term solution would not come from a new scientific discovery.[16] It was a striking and rare call from a scientist to policymakers for urgent action. Over the next two decades, authors would adopt a more neutral stance and focused on technical solutions.

In the 1970s, *Landbouwtijdschrift* published various articles that zoomed in on the manure problem and, in particular, discussed the options for processing pig slurry. In 1975, K. Vlassak and C.M. Verheyden, based at the

14 De Winter, *Kennisnetwerken*, 363-374.

15 Hanne De Winter and Yves Segers, 'Oorlog als motor van vernieuwing. Het bodemvruchtbaarheidsonderzoek en de bemestingsadvisering in België, jaren 1930-1945', in: *Jaarboek voor Ecologische Geschiedenis* (2014) 69-95.

16 M. De Waele, 'De eutrofisatie van het water door de landbouw', *Landbouwtijdschrift* 26:1 (1973) 43-62.



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Cover of *Landbouwtijdschrift* from 1987, the journal published by the Belgian Ministry of Agriculture. © Unknown designer, *Landbouwtijdschrift*, 40:1 (1987). Ministerie van Landbouw. Dienst informatie, Brussel. Centrum Agrarische Geschiedenis (CAG), https://cagnet.be/item/B00015433.

Laboratorium voor Bodemvruchtbaarheid en Bodembiologie (Soil Fertility and Soil Biology Laboratory) of the University of Leuven, argued that the 'clean-up' of animal fertilisers through soil deposition was the simplest and cheapest way to process manure. Other methods, such as dumping on fallow land, in inland water courses or at sea, in manure ponds or direct discharge into surface waters, were ecologically nor economically sound. The explicit reference to these methods shows that this must have been a very common practice at that time. The authors therefore suggested alternatives, such as drying the manure, but this required expensive installations.[17]

Finding an affordable solution for the abundant slurry was not easy, but it was urgently needed, argued the agricultural chemists and microbiologists Verstraete, Neukermans and Debruckere (Ghent University) in 1973. They had calculated the 'total pollution power of the Belgian livestock' and came to the conclusion that at the time of publication, it exceeded the Belgian population's pollution power three times and would exceed it five times in 1980. It was therefore necessary, they argued, that Belgium, like other European countries and the United States, accelerated the search for new processing methods, 'both for agricultural reasons and for the protection of public health and the environment'.[18] For the first time in *Landbouwtijdschrift*, experts so clearly referred to the health aspect. Moreover, it was also one of the first contributions in which the (over)production of animal manure was presented to the reader in a quantitative way and its impact was compared with that of other polluters. In addition, the authors also presented an estimate of manure production in the following years, further underlining the seriousness of the situation. Quantifying the manure surplus and integrating a future prognosis gave their research a veneer of scientific rigour, though it was not denied that quantifying the manure nutrient content was difficult, and therefore also the impact on the environment.[19]

However, not all experts evaluated the situation so negatively. R. Priem of the *Rijkscentrum voor Landbouwkundig Onderzoek* (State Centre for Agricultural Research) and the *Rijkscentrum voor Landbouwtechniek* (State Centre for Agricultural Technology) wrote in 1974: 'Environmental problems are undoubtedly the centre of attention and rightly so, although one should beware of the frequent exaggeration in this regard.' According to Priem, livestock farming contributed to the beautification and vitalisation of the rural landscape. It was mainly intensive pig farming that caused nuisance, especially in a densely populated country like Belgium. A solution to the

17 K. Vlassak and C.M. Verheyden, 'Omzetting van drijfmest in de bodem', *Landbouwtijdschrift* 28:1 (1975) 363-375.

18 W. Verstraete, G. Neukermans and M. Debruyckere, 'Overzicht betreffende de problematiek van de verwerking van dierlijke meststoffen in België', *Landbouwtijdschrift* 26:6 (1973) 1191-1230.

19 Frank Uekötter, 'Why Panaceas Work: Recasting Science, Knowledge, and Fertilizer Interests in German Agriculture', *Agricultural History* 88:1 (2014) 76-77. DOI: https://doi.org/10.3098/ah.2014.88.1.68.

manure problem was to work with a manure bank, just like in the Dutch province of North Brabant, although he also had to admit that pig manure in this system, unlike poultry manure, was not in demand, mainly because of the expensive transport.[20] It is no coincidence that Priem referred to the Netherlands. Belgian agronomists liked to be inspired by solutions developed abroad. Information was exchanged and discussed via transnational scientific networks. Because of the common language and the similar structure of livestock farming, the Netherlands was in many cases the prime example. Paradoxically enough, the problems were no less serious and a decisive approach was lacking as well.[21]

Finding feasible solutions for the manure surpluses was therefore not easy, concluded F. Van de Maele in 1975. The construction of purification stations, incinerators and drying installations was expensive and the technology was not yet fully developed. The creation of sufficiently large manure cellars implied high costs as well, which was not realisable for the vast majority of smaller family farms. In other words, it was highly complex to come up with a solution that was not only technologically and economically, but also socially achievable. Van de Maele added: 'Furthermore, potential buyers of animal manure often preferred mineral fertilisers that allow easier spreading and dosing than organic fertilisers, of which the composition is usually unknown'. And he called for immediate action: 'Urgent technical, economic and organisational measures have to be taken with regard to the storage, possible transformation, transport and distribution of animal waste. If not, there is a danger that in the near future a number of highly productive agricultural lands will evolve into an unfavourable condition that would only be recoverable over a longer period of time.' [22] Without using the term 'sustainability', Van de Maele referred to the long-term consequences of over-fertilisation for agricultural soils. He was the first to integrate this perspective so clearly in *Landbouwtijdschrift*.

Long-term effects were also mentioned by W. Verstraete a few years later when he proposed new processing techniques such as aerobic and methane fermentation. Verstraete warned against the excessive and improper

20 R. Priem, 'Moderne mogelijkheden voor de verwerking van varkensmengmest', *Landbouwtijdschrift* 27:5 (1974) 1277-1291.

21 Interview Willy Verstraete, 15 July 2022.

22 F. Van de Maele, 'Bemestingspraktijken op bio-industriële bedrijven', *Landbouwtijdschrift* 28:3 (1975) 1469-1476. 'Verder geven de eventuele afnemers van dierlijke mest veelal liever hun voorkeur aan minerale meststoffen die een gemakkelijker verspreiding en dosering toelaten dan organische waarvan de samenstelling meestal niet gekend is (…) Er dienen dringend technische, ekonomische en organisatorische maatregelen getroffen te worden voor wat betreft de stockage, de eventuele transformatie, het transport en de uitspreiding van dierlijke afvalstoffen. Zoniet bestaat het gevaar dat in de nabije toekomst een aantal hoogproduktieve landbouwgronden evolueren naar een ongunstige toestand die slechts over een langere periode terug te herstellen zou zijn'. (English translation by the author, YS).

use of pig slurry: it caused a reduction of crop quality and soil fertility and contaminated surface and groundwater. He also referred to the high tolerance of maize for over-fertilisation, but also added: 'There is only one question here, namely what is the cost price of these high fertiliser doses for the environment in the long term?'[23]

So gradually, the long-term ecological effects dawned on the experts, but it is clear that economic, and indirectly also social, considerations continued to prevail over ecological concerns. Experts continued to look for answers in technological innovation, such as the use of pig manure as a raw material to produce biogas. The size of the herd, which was in the 1970s and 1980s still growing, was not questioned in *Landbouwtijdschrift*.[24] Other researchers, such as Luc Vanacker, who estimated in 1974 the manure saturation level (to be understood as the maximum amount of manure that may be produced in relation to the available agricultural area), did not question the growth of intensive livestock farming either, although the manure surpluses, the odour nuisance and the integration into the landscape were important handicaps, according to him. Only in his PhD thesis dedicated to the problem of animal manure in Belgium, published in 1981, would Vanacker cautiously suggest to stop further expansion of livestock in regions with a manure surplus.[25]

Growing environmental awareness

Despite the frequent warnings and even cautious calls of alarm from agricultural experts, the problem of over-fertilisation does not seem to have been high on the agenda of political parties, farmers' unions and environmental associations in Belgium in the 1970s. Yet, environmental awareness in general did gradually increase during that decade, influenced, among others, by Rachel Carson's *Silent Spring* of 1962 and the report *Limits to Growth: A Global Challenge*, published in 1972 by the Club of Rome. Both wake-up calls stimulated the foundation of new environmental organisations in Western Europe, for instance *Stichting Milieu en Natuur* in the Netherlands, *Bundesverband der Bürgerinitiativen Umweltschutz* in West Germany and the French *Les Amis de la Terre*.[26]

23 W. Verstraete, 'Het verwerken van bio-industriële afvalstoffen: balans na tien jaar onderzoek', *Landbouwtijdschrift* 32:1 (1979) 93-103.

24 J. Poels, W. Verstraete, G. Neukermans and M. Debruyckere, 'Biogas uit varkensmengmest. Eerste praktijkresultaten van een grootschalige installatie', *Landbouwtijdschrift* 37:1 (1984) 17-27.

25 Luc Vanacker, *Veredelingslandbouw en milieu: mestverzadiging*. CLEO-Schriften 1 (Centrum voor Landbouw-Economisch Onderzoek 1974) 1; Luc Vanacker, *Dierlijke mest: afval of grondstof?* (Dissertation Ghent University 1981) 383-385.

26 Gary Haq and Alistair Paul, *Environmentalism since 1945* (Routledge 2011) 9-13. DOI: https://doi.org/10.4324/9780203803875; Frank Uekötter, *The Greenest Nation? A New History of German Environmentalism* (The MIT Press 2014) 74-86.

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From the 1980s onwards, awareness of the manure problem increased and, unlike in the past, it was not allowed to spread manure at any time of the year. This photograph taken in 1976 depicts a Massey Ferguson 175 tractor with Cavero manure tank. © Photographer unknown, collection Maarten Martens and Davy Tandt, Landbouw en Machines.be, https://cagnet.be/item/B00007617.

Environmental awareness increased in Belgium too, albeit slowly and often around local actions concerning the construction of motorways and industrial pollution. In this context, the *Bond Beter Leefmilieu* (BBL), established in September 1971, aimed to combine existing initiatives and thereby to form a strong, national pressure group. BBL was active in several domains, ranging from nature conservation and spatial planning to nuclear energy. Gradually, it paid more attention to environmental hygiene, especially the growing mountain of waste, lead poisoning and the use of hormones in fattening.[27]

While the environmental movement in Belgium, including BBL, was only moderately interested in the manure problem in the 1970s, agronomists and scientific experts were slightly more alert. At Ghent University, the *Interfacultair Centrum voor de Studie van Lucht-, Bodem- en Waterverontreiniging* (Interfaculty Centre for the Study of Air, Soil and Water Pollution) was established in 1971. Four years later, an environmental working group was set up within the Ministry of Agriculture, attached to the *Instituut voor Scheikundig Onderzoek* (Institute for Chemical Research) in Tervuren, with the aim of mapping and studying the contamination in agriculture. From the 1970s onwards, this institute increasingly focused on environmental issues, within which plant nutrition and fertilisation formed central themes.[28] In 1978, this working group published the first results of a study into the sulphur balance of agricultural soils, showing that the observed increase in groundwater sulphate levels was mainly due to acid rain and the overuse of livestock manure, rather than to mineral fertilisers and pesticides.[29]

At the end of the 1970s, the *Boerenbond* also became aware of environmental issues. For example, an episode of the television programme 'Voor Boer en Tuinder' in 1977 devoted attention to 'environmentally conscious agriculture'. In the following years, more reports dealt with the responsible use and the technological possibilities for processing animal manure. In the early 1980s, the agricultural organisation introduced the theme 'Responsible fertilisation' in its vocational training. A striking feature of all these activities was once again the emphasis on the economic dimension of the manure surpluses. The ecological aspects were clearly less of a priority.[30]

In the meantime, agronomists continued to look for technical solutions to get rid of the manure surpluses, stimulated from the early 1980s by higher energy prices and the large world demand for nitrogen

27 Vets and Vanderputten, 'De Bond Beter Leefmilieu als nieuwe sociale beweging', 46-47.

28 *As time goes by. 75 years Veterinary and agrochemical centre* (CODA-CERVA 2005).

29 De Winter, *Kennisnetwerken*, 453-454.

30 See the database on moving images about Belgian agriculture: https://cagnet.be/page/cinema-rural-filmdatabank; 'Beroepsbijscholing 1980-1981', *De boer en de tuinder* 46 (14 November 1980) 3.

fertilisers. As a result, animal manure was once again regarded as a valuable raw material. Agronomists from the BDB and the *Rijksstation voor Landbouwscheikunde en –natuurkunde* in Gembloux emphasised that the use of expensive, mineral fertilisers could be limited by using more slurry. However, the Belgian Groundwater Decree of 27 March 1985 stated that slurry was no longer allowed to be applied during the winter months. During this period, the soil was subject to extreme weather conditions (much precipitation, frost and snow), which caused the nutrients to leach out easily and increased the risk of groundwater pollution. Manure therefore had to be stored in a responsible way.[31] Not surprisingly, agronomists paid attention to the construction of new manure barns in *Landbouwtijdschrift*. A. Dobbelaere concluded in 1987 that the storage capacity of many farms was too small, which resulted in the illegal dumping of excess manure on farmland.[32] Dobbelaere expected new fertiliser legislation which would require additional storage capacity. He therefore asked for guidelines 'so that the advisory bodies from outside the agricultural sector are less reluctant to accept slurry storage methods that are affordable for the farmer'. This interesting quote subtly refers to the different views that existed within the administration. Compared to the federal Ministry of Agriculture, the Flemish Environment Administration viewed the manure surpluses as much more problematic. This was not only the case in Belgium: similar tensions existed within public administrations in the Netherlands as well.[33]

Aditionally, in the 1980s, the impact of agricultural practices on the environment was higher than ever on the agenda of agricultural and environmental organisations as well as the general public. The *Boerenbond* acknowledged that there were regional manure surpluses and came up with its own proposal as early as 1983. First, a manure bank had to be built, following the Dutch example. It also sought solace in the production of biogas from the anaerobic fermentation of slurry and the introduction of more environmentally friendly fodder. It is no coincidence that these proposals were in line with the solutions the agronomists presented in *Landbouwtijdschrift*. In 1985, the Day of Agriculture, an initiative of the *Boerenbond*, was themed 'Agriculture and the environment'. Two years later the agricultural organisation set up an environmental staff, which produced several publications in the run-up to the Manure Decree. In these publications, the contribution of agriculture to, for example, the pollution of ground and surface water was minimised and reference was made to the role of industry, households and the limited sewerage facilities. However, this did not prevent the *Boerenbond* from referring to the concept of 'sustainable

31 Buyst, Lowyck and Soete, *Al 20 jaar*, 20-33.

32 A. Dobbelaere, 'Mengmestopslag buiten de stal', *Landbouwtijdschrift* 40:6 (1987) 1549-1562.

33 A. Dobbelaere, 'Mengmestopslag binnen en buiten de melkveestal', *Landbouwtijdschrift* 41:3 (1988) 659-678.

agriculture' in publications from 1990-1991 onwards, following BBL and other environmental associations.[34]

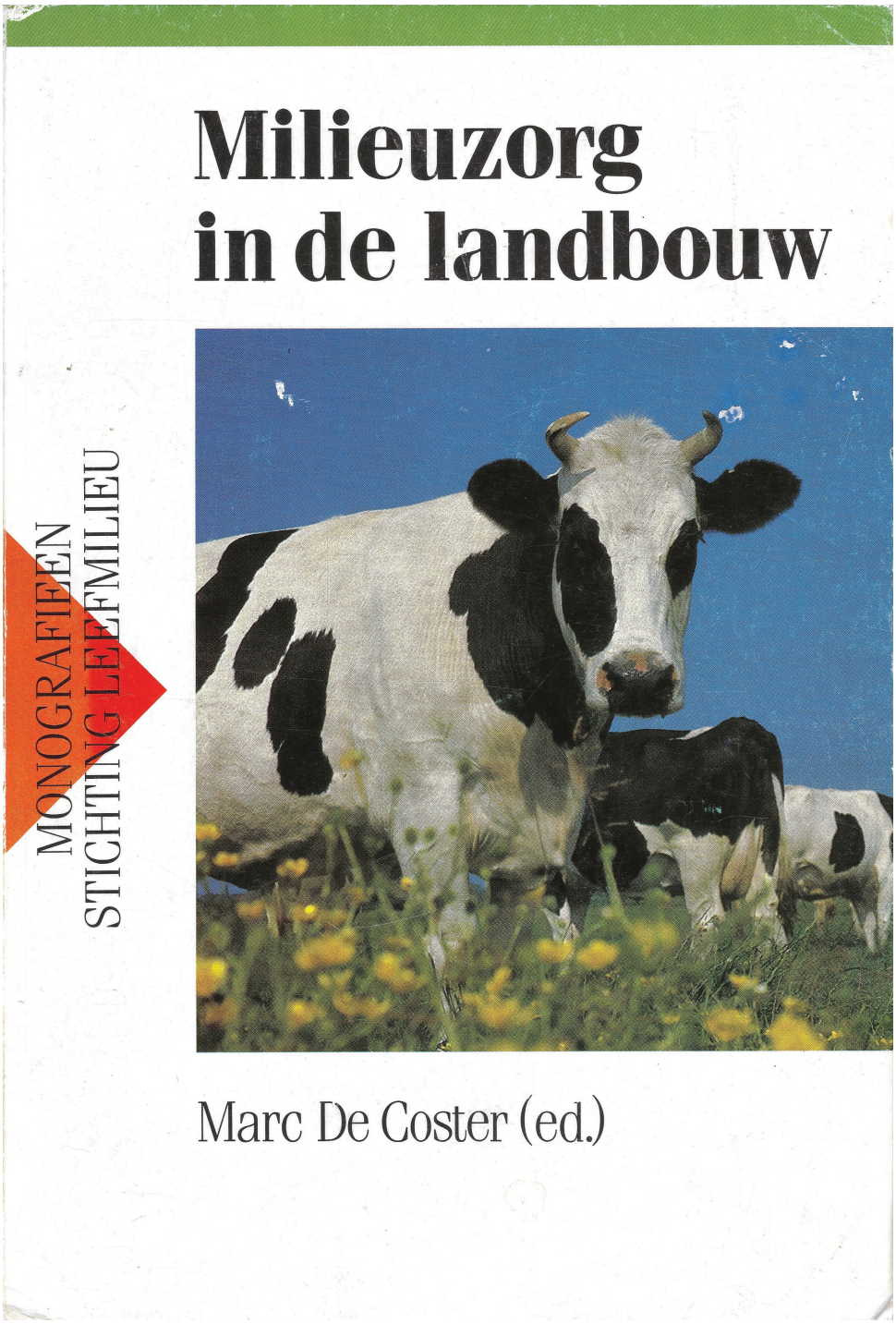
Meanwhile, the manure problem had also attracted the attention of the environmental movement. In 1986, BBL started an Agriculture & Environment Working Group, which in the following years published several extensive brochures and studies. BBL's vision can be summarised as follows: first of all, BBL believed that the manure surplus was underestimated, because agricultural fertilisation standards were employed and not the more stringent environmental standards. It also argued for an integrated approach, more environmentally friendly production processes such as modified animal feed, a manure bank and, what was especially new in comparison with the vision of the agricultural sector, a limited and socially responsible reduction of the livestock, to be achieved via a ban on expansion. Finally, BBL also wanted greater say in agricultural policy.[35]

This increased attention and concern was also fuelled by new scientific research and insights into the emission of ammonia from animal waste and soil pollution by trace elements, which was carried out, among others, by the environmental working group of the Ministry of Agriculture. The additives in purchased animal feed, which was used in intensive livestock farming, increased the copper and zinc content in the pig manure. These metals remained in the topsoil layer and were consequently absorbed by plants, which could result in copper poisoning.[36] The same group of researchers also looked at the overproduction of nitrogen in areas where the soil conditions were unfavourable, especially in the Zandstreek and the Kempen. This situation led to the pollution of surface and phreatic water and contributed to soil acidification. In view of the high price of fertilisers, it was necessary, according to K. Meeus-Verdinne and colleagues, to reuse animal manure as much as possible, with maximum recycling of the nitrogen present. This could be achieved most effectively by transporting the manure to areas where land was still available, or by rationalising production in accordance with the

34 G. Janssen, 'Mengmest en milieu', *De boer en de tuinder* 34 (22 August 1986) 15; KADOC, Archief Organisatiediensten van de Belgische Boerenbond (1911-2007), 'Dossier inzake mengmest, mestoverschotten en de Mestbank (1986-1990)', BE/942855/483/825; Belgische Boerenbond, 'Dossier inzake de ATRO-uitzending (19) van 28 februari 1985 "Op vaste grond – Mest, een pest? – Europese landbouw in de knel"'; 'Biogas uit mengmest', *De boer en de tuinder* 35 (28 August 1981) 16; Leo De Wael, 'Dierlijke mest en biogas', *De boer en de tuinder* 41 (9 October 1981) 17; G. Janssen, R. Tijsken and J. Snaet, *Streven naar duurzaamheid. Landbouw, milieu, natuur* (Boerenbond 1991); Luc Goeteyn (ed.), *Landbouw en milieu. Naar een duurzame landbouw? Een basisdokument voor landbouwers en milieuverenigingen* (BBL 1988).

35 Bond Beter Leefmilieu, *Mestoverschotten in Vlaanderen* (Bond Beter Leefmilieu 1988) 8 and 17-18; Luc Goeteyn, *Omgaan met mineralen. Vermesting en verzuring in Vlaanderen* (Bond Beter Leefmilieu 1989) 3 and 9.

36 Dejongh and Van Windekens, *Van Kleine landeigendom*, 222-224.



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Cover of the book *Milieuzorg in de landbouw*, edited by Marc De Coster and published by vzw Stichting Leefmilieu in 1989. © Photo taken by Misjel Decleer, cover designed by Studio DNB. Marc De Coster (ed.), *Milieuzorg in de landbouw* (Uitgeverij Pelckmans 1989).

local pedological characteristics. Although the economic rationale resounds loudly in this reasoning, it was the first time that experts in *Landbouwtijdschrift* alluded, albeit in a veiled way, to the re-organisation of the pig herd and did not pin all of their hopes on technical solutions.[37]

The government intervened

It was not until the late 1980s that the Belgian and Flemish governments started to implement a structural manure policy. This happened also remarkably late in neighbouring countries, especially if one takes into account that scientists had been warning for several decades of the economic disadvantages of over-fertilisation and the risks to the environment and public health.[38] In 1987, the Public Waste Company of Flanders (OVAM) provided the initial impetus for a concrete manure policy; it proposed to move the manure surpluses from saturation areas to regions with market opportunities by establishing a Manure Bank. That plan was not executed, however. In the same year, Minister Jan Lenssens (Christian Democratic Party, CVP) proposed a draft manure decree, which was quickly approved by the Flemish government, but which received a negative recommendation from the Council of State due to the fact that the proposed measures did not go far enough. Not surprisingly, the BBL shared that opinion. As an explanation for the slow decision-making process, reference is made several times in the literature to the opposition of the Belgian Farmers' Union, which had close ties with CVP, a party that had supplied the Minister of Agriculture for decades. But the weakness of the environmental and nature associations is also put forward as an explanation for the government's lack of decisiveness. However, further research should clarify this.[39]

In any case, by the late 1980s, it was clear that legislative action had to follow. Several factors played a role in this. First of all, the increasing amount of attention being given to environmental problems needs to be pointed out. Agalev, the Flemish green political party, and the BBL, among others, succeeded in getting environmental hygiene topics, including water and soil pollution, on the societal and political agenda.[40] Secondly, there was the

37 K. Meeus-Verdinne, P.P. Scokart and M. Guns, 'De emissie van ammoniak door dierlijke afval en de luchtverontreiniging', *Landbouwtijdschrift* 38:2 (1985) 237-249.

38 Friedrich Becks, 'Die räumliche Entwicklung der Landwirtschaft in Westfalen seit den siebziger Jahren des 20. Jahrhunderts – Gründe und ökologische Folgen', in: Karl Ditt, Rita Gudermann and Norwich Rüsse (eds.), *Agrarmodernisierung und ökologische Folgen. Westfalen vom 18. bis zum 20. Jahrhundert* (Schoening 2001) 471-477. Uekötter, *The Greenest Nation?*, 120-121; Frouws, *Mest en macht*, 107 and 170.

39 Dejongh and Van Windekens, *Van kleine landeigendom*, 220-227.

40 Vets and Vanderputten, 'De Bond Beter Leefmilieu', 48-49.

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Belgian farmers protest on the Oudenaarde market against the Manure Decree and the policy of Paul De Keersmaeker, State Secretary for European Affairs and Agriculture. Picture taken around 1991-1992 by an unknown photographer. © Algemeen Boerensyndicaat (ABS), B00014091, https://cagnet.be/item/B00014091.

example of neighbouring countries. In the Netherlands, the government had already taken the first regulatory measures in the mid-1980s. That prompted Belgian politicians to take action, if only due to the fact that the more stringent legislation in the Netherlands led to livestock farmers trying to get rid of their surplus manure in Flanders illegally or otherwise. Thirdly, the second Belgian state reform also stimulated the start of a fertiliser policy. Through the special law of 8 August 1980, most of the competences regarding environmental topics and nature conservation were transferred from the federal government to the regions. Following the entry into force of the so-called Waste Decree of 2 July 1981, OVAM was authorised to draw up a waste plan and to organise waste processing, which included manure surpluses. Fourthly, an increasing amount of new knowledge about the environmental effects of over-fertilisation was becoming available. Numerous scientific studies showed that chemical soil fertility became even more problematic. For example, in the Kempen and the Flemish Zandstreek, where intensive livestock farming was concentrated, no less than 60 percent of the soils were too acidic. Signs of that type increased the pressure to finally launch an effective manure policy. This was reinforced by a new generation of scientists who built their careers on research on the environmental consequences of modern agriculture, although this did not always lead to a scientific consensus. Agronomists and ecologists barely exchanged knowledge and experiences. Each stayed within their own scientific community and followed their own line of reasoning.

Fifthly, it was mainly the concerns about the quality of drinking water that prompted Flemish politicians to take action, which had also been the case in the Netherlands, as illustrated by Sanders and Van de Grift in this special issue. [41] During the 1980s, drinking water companies reported on several occasions about the high amounts of phosphates and nitrates in drinking water and this directly affected the interests of all citizens and consumers. As in many other Western European countries, Belgian politicians only took action when the manure problem could no longer be ignored. [42]

Ultimately, it were international agreements that obliged the Flemish government to tackle the problem of manure surpluses. This is indicative of the growing importance of transnational governing coalitions in the 'age of interdependence'. The riparian states of the North Sea committed themselves to demarcate the entire drainage basin as an ecologically sensitive area. Furthermore, on 12 December 1991, the European Nitrates Directive was adopted. It aimed to protect water quality across Europe by preventing nitrates from agricultural sources polluting ground and surface waters. This growing environmental attention pressurised Flemish politicians to finally implement specific measures, which resulted in the first Manure Decree of

41 Daan Sanders and Liesbeth van de Grift, '"The Rhine as One River": Rhine Pollution and Multilevel Governance, 1950s to 1970s, *BMGN – LCHR* 137:4 (2022). DOI: https://doi.org/10.18352/bmgn-lchr.11694.

42 Feys, *30 jaar OVAM*.

1991. The short-term objective was to reduce the emission of nitrate and phosphate into the groundwater. The fertilisation standards set in the first phase had to be regarded as a transition. Stricter fertilisation standards, differentiated per cultivation group, would later be introduced. Moreover, Flemish manure production was not allowed to increase further for as long as insufficient structural solutions were in place. Finally, manure surpluses that existed at farm level had to be transported in an efficient manner via a Manure Bank. The first steps towards a manure policy had thus been taken, but it soon became apparent that the measures were not sufficient, due to a lack of support from farmers' organisations and because farmers were looking for loopholes in the law and found them too.[43]

Why many farmers refused to change their behaviour remains a difficult question, but perhaps the German environmental historian Frank Uekötter offers part of the answer. It was not easy, Uekötter argues, to measure the manure nutrients and therefore to dose their use. At a time when agriculture was confronted with major changes and numerous problems, farmers ignored the manure problem for as long as possible: because it was too complex, because they had other concerns, and also because its impact on the environment was not immediately apparent. Moreover, the farmers' organisations and the government did not really sound the alarm.[44]

Conclusions

In this article I analysed the discourse and opinion of agronomists on the fertiliser and manure problem in Belgium during the years 1970-1991. Based on a careful reading of *Landbouwtijdschrift*, supplemented with secondary sources, a number of conclusions can be drawn. Firstly, the agronomists initially pointed to the economic and financial consequences of over-fertilisation. Around 1970, the first concerns and articles about the little judicious use of animal manure, especially pig slurry, and of a manure surplus were published. The experts referred to its negative impact, such as odour nuisance, and later also to the consequences with regard to the quality of groundwater, drinking water and public health. As early as the mid-1970s, some experts were warning of long-term ecological consequences as well. Without referring to the concept of 'sustainability', the agronomists did in fact incorporate economic and ecological aspects into their analysis and advice. A social dimension was usually implicit, because it was clear to agronomists, but also to farmers' organisations and environmental associations, that for

43 Buyst, Lowyck and Soete, *Al 20 jaar*, 71-73; Dejongh and Van Windekens, *Van kleine landeigendom*, 220-227.

44 Uekötter, 'Why Panaceas work Work', 81.

the many small-scale livestock farmers the new, expensive techniques were financially unfeasible. In other words, it was not easy to find a balance between economic, social and ecological considerations. However, this case does show that Belgian agronomists have been concerned about the sustainability of agricultural practice since the 1970s.

Secondly, it is clear that the Belgian agricultural experts opted for technical solutions to tackle the manure problem. They were inspired by studies and colleagues in other countries, with whom they maintained intense contacts via international networks. Only seldom did the experts plea for immediate action, and for strong intervention by the state. Apparently, they had great faith in the technical possibilities, or believed it was not their task to urge policymakers to act. It was not until the late 1980s that public thought was given to curb slurry production or to restructure intensive livestock. Explicit advice to reduce the (pig) herd was only suggested, in careful terms, by the environmental organisations.

A third important finding is that the Belgian government took the first measures relatively late, long after agricultural experts and others had frequently pointed to the problem, and after foreign governments had taken measures. Only in the course of the 1980s, when the consequences of over-fertilisation threatened to have concrete and recognisable consequences for citizens, did politics intervene. This occurred in parallel with a growing environmental awareness within society at large, a deeper understanding of the long-term environmental effects and the introduction of more stringent European environmental legislation.

Fourthly, the Manure Decree of 1991 did not bring about a radical revolution. Its primary focus was the supervision and management of the existing manure circuit, rather than on a structural reduction of the surpluses. This intransigent policy must be explained by the close relationship that has existed for decades between the Ministry of Agriculture and the farmers' organisations in Belgium. The latter managed to defend their interests more efficiently than environmental and nature organisations. Illustrative is a quote of Jan Hinnekens, the chair of the *Boerenbond*, who stated in 1991 that the agricultural sector should be able to decide for itself how the manure surplus should be tackled: 'The role of the government can be limited to developing appropriate legislation that can count on the support of the agricultural sector.' Initially, the farmers' protest was therefore limited. But when the contours of the first Manure Action Plan, effective in 1996, became visible, and the outline of this plan was stricter than the farmers' organisations had in mind, several years of harsh farmers' protests against the manure policy began.[45]

45 Janssen, Tijskens and Snaet, *Streven naar duurzaamheid*, 9-10.

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