EUROPEAN
COMMISSION

Brussels, 15.7.2026
SWD(2026) 234 final

PART 9/11

COMMISSION STAFF WORKING DOCUMENT

EVALUATION

Evaluation of the Nitrates Directive (Council Directive 91/676/EEC)

{SWD(2026) 235 final}

ANNEX XVII. THE LIVESTOCK MANURE APPLICATION LIMIT IN NITRATE VULNERABLE ZONES UNDER THE NITRATES DIRECTIVE

Contents

This Annex to the evaluation of the Nitrates Directive examines the effectiveness and relevance of the livestock manure application limit. In particular, responding to questions and feedback from stakeholders, it examines (1) the origin of the limit, (2) the necessity of setting an application limit, (3) whether the limit of 170 kg N/ha is appropriate and (4) the relevance of a common limit.

The Nitrates Directive sets a specific limit linked to manure application in NVZ

The Nitrates Directive establishes measures to safeguard water quality across Europe by reducing and preventing nitrate pollution from agricultural sources, especially targeting the management of both chemical fertilisers and livestock manure. In particular, the directive sets a limit for the application of livestock manure equivalent to **170 kg of nitrogen per hectare per year at farm level in areas designated as nitrate vulnerable zones (NVZs)**. This limit addresses specific risks associated with livestock manure, due to its organic nature and the need for the farm to dispose of it all year round regardless of crop needs, and indirectly due to the associated ammonia emissions and phosphorus compounds. The limit applies to all forms of manure, including processed manure. The limit is implemented by Member States as part of their nitrates action programmes, in NVZ or for the whole territory when the Member State has an action programme applying to the whole territory.

The directive allows Member States to set different amounts above 170 kg N/ha, provided these amounts are justified based on objective criteria and do not prejudice the achievement of the directive's objectives. Such decisions are approved by the Commission via a comitology procedure, requiring the endorsement of a qualified majority among the Member States (Annex III of the Nitrates Directive).

1. Origin of the manure application limit

The Commission's legislative proposal for the Nitrates Directive in 1989 originally referred to a requirement for Member States to ensure that the amount of livestock manure applied to the soil would not exceed the one produced by two dairy cows or by the equivalent number of other animal types[1]. This was calculated to avoid negative impacts of leaching and run-off. It also reflected the importance attributed to addressing the risks of excessive concentrations of livestock[2]. When the directive was being

[1] OJ No C 54, 3.3.1989, p. 4

[2] The problems connected with the disposal of animal waste have received much attention in recent years, especially in regions with intensive animal agricultural husbandry per hectare. Whereas the production of animal manure land increased strongly, the need for it decreased because of the introduction of cheap inorganic fertilizers which are easier to handle and have a more reliable effect on

negotiated in the Council, the limit was modified to an amount of nitrogen from manure of 170 kg N/ha per year estimated as equivalent to the manure produced by 2 livestock units (LSU) per hectare[3]. The limit was not arbitrary as it reflected field experience, the typical manure N excretion per livestock unit (roughly 80-90 kg N/year) and average crop uptake and soil nitrogen retention capacity for grassland and the main arable crops (30-155 kg N/ha/year)[4]. It was further justified as a safety threshold to avoid that groundwaters would reach 50 mg of nitrates per litre[5]. At that time, it was clear that the limit was sufficiently high for the large majority of the livestock sector in the EU but sufficiently constraining to avoid major water pollution situations. Member State experts further explained that the limit expressed in amounts of nitrogen rather than LSU has ensured that the limit was clearly defined throughout the EU and linked to the objective to limit nitrogen pollution from manure.

It is important to note that the limit was set to minimise risk of water pollution originating from manure, as the negative impact of excessive or inappropriate manure application was clearly recognised[6],[7]. It is not, however, an agro-environmental fertilisation limit, as it applies in addition to the requirement of balanced fertilisation. The Directive requires that Member States and farmers implement 'balanced fertilization' under action programmes in NVZ. This approach involves limiting the application of (nitrogen) fertilisers by applying the optimal amount and type of nutrients to crops based on their specific needs, nitrogen available in the soil, soil characteristics, and environmental conditions, to ensure crop yield and minimize excess nitrogen[8]. The agro-environmental fertilisation limits determined through balanced fertilisation thus vary in function of the crop, the soil, the climate etc. and there is not one common limit. The

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crop growth. As a consequence, many farmers dispose of animal manure as cheaply as possible, whilst avoiding damage to grassland and crops and paying little attention to effective use of the plants nutrients contained in the manure. Present practices of manure handling and application often lead to environmental problems. The rise in awareness of these problems renewed interest in possibilities to improve the utilization of nutrients from animal manure in crop production. [Animal Manure on Grassland and Fodder Crops. Fertilizer or Waste?: Proceedings of an International Symposium of the European Grassland Federation, Wageningen, The Netherlands, 31 August–3 September 1987]

3 As a transitional measure, during the first action programmes, the general limit was set to 210 kg N/ha for all Member States.

4 FAO Statistics - Fertilizer use by crop- Fifth edition-2002. The document lists the average nitrogen fertiliser rates per crop for the years 1999-2000 in the Member States. In the EU at that time in terms of total N demand the most important crops were wheat, grassland and barley. The inputs from the Member States show that fertilisation rates vary between 30 kg N/ha to 155 kg N/ha. Only in the Netherlands the fertilisation rates were higher with 190 kg N/ha for wheat and 240 kg N/ha for grassland. https://openknowledge.fao.org/server/api/core/bitstreams/75cffe68-8760-46d4-8059-a4abe0f017db/content.

5 On the basis of examples of leaching potential on certain soils.

6 The use of excessive amounts of animal manure raises concern about the accumulation and emission of nutrients to the environment through leaching or volatilization.[Schröder and Dilz, 1987, Cattle slurry and farmyard manure as fertilizers for forage maize, in Animal Manure on Grassland and Fodder Crops.Fertilizer or Waste? https://link.springer.com/book/10.1007/978-94-009-3659-1]

7 Undoubtedly, over-application of manure resulting from a too high regional animal density is unacceptable from many points of view including emissions and so is the injudicious handling of even moderate application rates [J. Schröder, 2005, Revisiting the agronomic benefits of manure: a correct assessment and exploitation of its fertilizer value spares the environment, https://doi.org/10.1016/j.biortech.2004.05.015]

8 Balanced fertilisation specifically applies to nitrogen fertilisers, but given the role of phosphorus in eutrophication, it may also be necessary for Member States to enforce balanced fertilisation for phosphorus. See also Annex XII that presents the implementation of phosphorus measures in the Member States.

requirement of balanced fertilisation applies to all crops independently of the type of fertilisers, including manure, which will always be limited to 170 kg N/ha per year. Balanced fertilisation is the main instrument of the directive by which Member States and farmers can adapt fertilisation to the local soil and climatic conditions and the crop needs, thereby limiting the risk of nutrient emissions to water.

In practice, farmers will when available employ a combination of different types of (chemical and manure) fertilisers with complementary attributes and risk profiles, with a total maximum determined by the limits set at national level for balanced fertilisation. While organic fertilisers such as manure have certain risks linked to the slow mineralisation of nitrogen into the soil and the high ratio of phosphorus, for example, chemical nitrate containing fertilisers have other risks due to the high solubility of nitrates, which make them prone to leaching if not immediately taken up by crops. By combining the two types of fertiliser, while respecting overall limits in line with crop needs, such risks can be better managed, resulting in lower losses[9].

2. Necessity of a limit for manure application

Thirty-five years after the adoption of the Nitrates Directive, scientific studies and experience confirm that limiting the amount of manure applied on agricultural land is necessary and justified to control nitrogen and phosphorus emissions from manure and processed manure, including with regard to other EU environmental goals. The manure application limit plays a key role in limiting various forms of polluting nitrogen and phosphorus emissions to the environment by:

- **Limiting nitrogen surplus in the soil and the risk of nitrate leaching and run-off to water**. The disposal of manure on land increases the potential for nitrate leaching and runoff, as manure has a higher leaching and run-off risk than chemical fertilisers, thereby raising the risk of ground and surface water pollution. Among other factors, this is due to a more unpredictable release of nitrogen to the soil[10], a high risk of ammonia emissions[11], and as a result, lower overall nutrient use efficiency[12]. The unpredictable release of nutrients from manure also means that farmers may tend to apply a pessimistic estimate to the fertiliser value of manure when planning their fertiliser use. The fact that livestock manure is continuously available and needs to be disposed of regardless of crop needs further increases the risks. (See also Annex XI on the environmental effect of measures). Without a limit on manure fertilisers and only relying on balanced fertilisation, it would have been very difficult to ensure that intensive livestock production would not pose a risk to water bodies. Without a clear and legally defined limit, total amounts of nitrogen applied to land would certainly be higher, as the calculation of optimal fertilisation rates on farms typically only takes into account the share of nitrogen in manure that is expected to be available for the crops during the current growing season. In most cases, the major part of the nitrogen

[9] de Boer et al (2024) “Lower nitrate leaching from dairy cattle slurry compared to synthetic fertilizer calcium ammonium nitrate applied to grassland” https://doi.org/10.1016/j.envpol.2023.123088

[10] A large share of the nitrogen in manure comes in organic form and is released slowly over several years.

[11] Ammonia emissions to the air later result in the deposition of nitrogen from the air, which can provide a significant additional contribution to the nitrogen balance in agricultural soils. In natural areas, lakes and coastal seas this can result in the eutrophication of natural ecosystems.

[12] Nutrient use efficiency refers to the share of nutrient contained in a fertiliser that is taken up in the crop.

contained in manure will not be considered when planning the fertilisation rates, as it will be considered unavailable[13] for crops, but which risk leach into waters. The manure application limit therefore has the potential to limit excessive nitrogen input and to be one of the determinant factors in the reduction of the N-surplus on agricultural soils. Excess nitrate concentrations in ground waters and eutrophication of surface waters due to nitrates from agriculture are key factors for not reaching good chemical and ecological status in water bodies.

- **Limiting phosphorus surplus in the soil and the risk of phosphorus emissions to water**: manure adds phosphorus to the soil - often in a higher ratio than nitrogen with regard to the crop needs and increases the potential of phosphorus runoff to aquatic environments leading to eutrophication. By limiting nitrogen application from manure, the directive indirectly controls phosphorus emissions. Without a limit, higher amounts of manure application will result in higher risks of over-fertilisation with phosphorus, leading to further phosphorus saturation of soils and higher risks of eutrophication. Eutrophication due to phosphorus from agriculture (from direct run-offs or erosion of saturated soils) is one of the key obstacles to reaching good ecological status in surface waters.
- **Limiting ammonia air emissions from manure production and application**: as manure application is generally responsible for about half of ammonia emissions associated with manure, the manure application limit directly limits ammonia emissions. The limit also contributes to limiting ammonia emissions from manure production and management in stables and storages, especially where the overall livestock density and manure production in a region remains within the boundaries of the amounts that can be applied on land in the same region. Ammonia emissions harm human health, but will also contribute to eutrophication of water, soils and nature. Atmospheric deposition of Ammonia is recognised as an important source of eutrophication of fresh and coastal waters in the EU.
- **Limiting organic matter run-off in water**: The presence of organic matter in drinking water can facilitate the growth of harmful microorganisms, posing risks to human health. The manure livestock limit set by the directive indirectly helps to minimize such risks. By regulating the application and management of manure, the directive contributes to reducing the runoff and seepage of organic material into water bodies.

Therefore, the limit of manure application not only limits nitrates emissions to water but also critically contributes to addressing other pathways and forms of emissions from manure (ammonia and phosphorus), which are key additional factors for eutrophication of surface waters. The multi-purpose role of the limit is intrinsically linked to the policy objective of limiting negative environmental effects of intensive livestock production and also explains why the limit equally applies to processed manure as it generally shares many of the same emission risks to air, water and soil as raw manure. Taking away the limit for the application of processed manure, which has been suggested by some stakeholders, would in effect bypass the limit as a whole and annul its intended effects in addressing the environmental risks of nitrogen pollution from the excessive

[13] In principle, the contribution from manure application in previous years should be considered in the calculations, but this contribution is reduced by losses to air and water and is difficult to assess.

concentrations of livestock, thereby undermining the objectives of the Nitrates Directive. The scientific publications brought together in the European Nitrogen Assessment of 2011[14] have indeed highlighted the cascading effect of nitrogen pollution, as reactive nitrogen released in the environment will transform from one pollutant into another, causing multiple environmental impacts.

The manure application limit not only contributes to the objectives of the Nitrates Directive, but by promoting sustainable agriculture and livestock production, also plays a key role in the achievement of the objectives of other EU legislations and international commitments. By limiting the risks of leaching of nitrates, the run-off of nitrates and phosphorus, the emissions of ammonia and ensuing depositions of nitrogen on waters and limiting run-off of organic matter, the manure application limit contributes to achieve the objectives of the DWD, the WFD, the MSFD, the NECD and the Air quality Directive, among others. Measures to limit ammonia and nitrates emissions from manure under the NECD and IED complement the manure application limit of the Nitrates Directive, but do not replace it. The manure limit is also instrumental in protecting aquatic and terrestrial biodiversity. It also supports key objectives of the CAP[15].

3. Is the limit of 170 kg N/ha per year appropriate?

While there is sufficient consensus that a limit on manure application is necessary to limit environmental impacts of manure and desirable to promote sustainable agricultural models, the ideal value for such a limit is more disputed. As mentioned above, the manure limit 170 kg N/ha is not an agronomic limit for specific crops, but a common precautionary threshold balancing the needs of agriculture and livestock production with environmental and public health concerns. Nevertheless, it reflects livestock excretion rates crop uptake and soil retention capacity for grassland and arable crops, as explained.

Thirty-five years after the adoption of the Directive, the 170 kg N/ha limit for manure application is recognised as generally appropriate for good agricultural practices and supporting sustainable agriculture. The fertilization limit encourages farmers to adopt practices that optimise nutrient use, improve efficiency, and enhance soil health, ultimately making agriculture more sustainable and reducing the need for chemical fertilisers. The limit also incentivises farmers to adopt organic farming methods thereby emphasising natural nutrient cycles and reducing reliance on synthetic fertilisers. This not only aligns with organic agricultural principles but also enhances soil biodiversity and health, contributing to a more resilient and sustainable farming ecosystem. The 170 kg N/ha limit has become the legal fertilisation norm for organic agriculture in the EU.

From an environmental point of view, the relevance of the 170 kg N/ha limit is confirmed by studies indicating that application rates above this threshold significantly increase the risk of nitrates leaching for many crops and soil/climatic conditions[16]. Studies indicate that when looking only at limiting groundwater pollution, manure application rates below or around that limit would be sufficiently safe for high nitrogen demanding crops and

[14] Sutton et al, The European Nitrogen assessment, 2011, CUP.
[15] See also Coherence analysis.
[16] Recommendations for establishing Action Programmes under Directive 91/676/EEC concerning the protection of waters against pollution caused by nitrates from agricultural sources.

many soil types but applications above this threshold significantly increase the risk of nitrate leaching[17].

On the other hand, a limit at 170 kg N/ha for manure application may not always be strict enough to address eutrophication in fresh, coastal and saline waters due to the nitrogen and phosphorous emissions. Maximum nitrogen concentration levels to avoid eutrophication and support good ecological status are much lower than the groundwater drinking water norm of 50 mg/l of nitrates. Therefore, it is essential that all pathways of nitrogen pollution responsible for surface water eutrophication (deposition, surface runoff and ground water connectivity) are sufficiently controlled. Groundwaters with high levels of nitrates concentrations even below 50 mg/l can cause eutrophication when resurfacing to surface water bodies. As mentioned earlier, ammonia emissions from manure can also be responsible for eutrophication through deposition on water bodies.

The phosphorus content in livestock manure varies depending on the animal type and housing systems, but in many cases the 170 kg limit for nitrogen tends to result in an amount of phosphorus that exceeds crop needs, especially in regions with high legacy phosphorus content in agricultural soils. The concentration of phosphorus relative to nitrogen in livestock manure increases further due to the ammonia losses from animal housing and manure storages, which can result in N:P ratios manure ex storage well below 4, or even below 2 depending on the manure type[18] (which means inputs of P varying between 45 kg and 85 kg per ha for 170 kg N). The higher the application rate for total nitrogen, the higher the overall soil phosphorus surplus becomes[19]. In the Baltic Sea region, which is particularly sensitive to P, HELCOM (Baltic Marine Environment Protection Commission) has recommended a maximum application rate of 25 kg P/ha/year for Baltic states as a goal in manure-based applications to agricultural land[20].

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[17] See for example modelling studies in the Netherlands prepared by Wageningen University in 2005 comparing the leaching of nitrates in well managed grassland and maize systems fertilised with manure and chemical fertilisers or a combination of both.[Schröder et al., 2005, Limits to the use of manure and mineral fertilizer in grass and silage maize production in The Netherlands, with special reference to the EU Nitrates Directive]. On the one hand the studies show that on sensitive soils and dry climate, manure inputs above 170 kg N/ha significantly increase the risk of leaching above 50 mg/l. On the other hand the study shows that higher manure inputs up to 300 kg for maize and up to 600 kg N/ha for intensive mowed grassland in dairy farms would lead to average leaching of 50 mg/l at rootzone level in non-sensitive soils. These studies however have important limitations as they focus on a goal of nitrates leaching from a field at 50 mg/l. This is not in compliance with the objectives of the Nitrates Directive in polluted areas, nor does it take into account the risks of eutrophication of surface water. It is also the case that the manure fertilisation rates put forward in the studies, as admitted by the authors, would need to be significantly lowered to take into account real-life management conditions and the over-fertilisation by phosphorus and further lowered when the fertilisation of grassland is partly done through the grazing of animals rather than manure applied from a 100% indoor system. When taking all those factors into account, the manure amounts that would lead to leaching about 50 mg/l would range between 130 kg N/ha – 165 kg N/ha for maize and 170 kg N/ha and 230 kg N/ha for grassland, in mixed farming system with 30% maize.

[18] The ratio is generally higher for cattle and lower for pig and poultry.

[19] "While striving to meet the 170 kgN/ha/year limit, farmers will be applying levels of 60–80 kgP/ha/year. With a crop offtake of 20–40 kgP/ha/year, this would leave a surplus of 20–60 kgP/ha/year." Rosemarin, A.; Ekane, N.; Andersson, K. Phosphorus Flows, Surpluses, and N/P Agronomic Balancing When Using Manure from Pig and Poultry Farms. Agronomy 2021, 11, 2228. https://doi.org/ 10.3390/agronomy11112228. P 21.

[20] https://helcom.fi/about-us/convention/annexes-to-the_convention-2/annex-iii/. Combined with the 170 kgN/ha limit, the result of this requirement would be close to the N:P ratio needs for grain crops.

Moreover, in Member states with intensive livestock production and high manure application for decades, agricultural soils are already overloaded with phosphorus. This would indicate the need to strive to better P balances, taking into account the phosphorus already available in the soil. The JRC study[21] similarly argues that soil health and addressing eutrophication would rather call for a lower P limit than the indirect P limit provided through the 170 kg N/ha.

Whereas local conditions will influence the environmental effects of the manure on air quality and nature conservation, it is argued that overall standard levels of manure production of 170 kg N/ha could lead locally to very high ammonia emissions and N-deposition on nature.[22] Setting higher manure application limits to 200-250 kg N/ha would lead to even higher ammonia emissions and high risk of N-deposition on nature exceeding critical loads[23].

In the situations where the manure limit of 170 kg N/ha is too high for reaching environmental goals, it is open for the Member States to set lower limits adapting to local circumstances. For example, following the HELCOM recommendation to address eutrophication in the Baltic Sea, Sweden and Estonia are limiting phosphorus input from manure below 25 kg P/ha.

On the other hand, there are studies and arguments in favour of a higher manure limit. In specific conditions, such as grasslands with long growing season and sufficient rainfall, more manure could be applied without significant increase of nitrates leaching to groundwater[24]. This is however not a reason to question the 170 kg N/ha limit but rather an argument for flexibility in the application of the limit to cater for special circumstances, which is provided for in Annex III of the Nitrates Directive in the form of derogations from the limit, approved through a special procedure. Such cases substantiated the derogations under the directive. However, the implementation experience shows that these need to be managed cautiously, as the pollution risks increase with time and spatial concentration, and in many cases these derogations had to be brought to an end.

In this respect, following negotiations in the Council on the legal text, a clause was indeed inserted to allow Member States to set a higher manure application limit, subject to approval by the Commission and the Member States via a comitology procedure, where justified based on objective criteria such as long growing seasons, crops with high nitrogen uptake, high net precipitation in the vulnerable zone, or soils with exceptionally

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21 JRC study

22 Position paper, UNECE TFRN. How to define extensive livestock systems in relation to emissions to the environment. 2023. Estimations of nitrogen deposition and critical loads to avoid eutrophication would correspond to emissions of about 10 kg NH3/ha/year emission (as being typical of a representative critical load), whereas 2 LSU/ha UAA (with excretion rates of 80 kg/N per LSU) would corresponds to NH3 emission of 49 kg NH3/ha/year That would lead to very high NH3 concentrations and therefore, N deposition rates locally, which when extended over wider areas is likely to be in excess of critical loads. (This calculation is based on the expectation that livestock are housed for at least part of the year, leading to associated emissions from housing, manure storage and manure spreading, in addition to direct emissions while grazing).

23 Idem. Note that the consequences of ammonia emissions depend also on the wider concentrations of livestock in the region and that/or the proximity of farms to sensitive nature sites.

24 For example, inputs from the Wageningen University argue that higher N application rates (above 170 kg N/ha) would still keep nitrates concentrations in rootzones below 50 mg/l. [ref Wageningen uni input to public consultation]

high denitrification capacity. It should also be demonstrated that derogations do not jeopardise the attainment of the objectives of the Nitrates Directive. The comitology procedure reflects the sensitivity of the derogation with the Member States due to the risk of distortion (level playing field). The first derogations were granted in 2004, and their number has increased and reached 6 Member States in 2013. The amounts of manure authorised under the derogations typically varied between 220 and 250 kg N/ha. After 2013, the number of derogations has been steadily reduced. The European Commission initiated infringement proceedings due to declining water quality and ineffective measures in Germany (2013), Italy (2018), and Belgium-Flanders (2023), leading to the cessation of derogations in these countries. Denmark chose not to renew its derogation in 2024 due to water quality concerns. The Netherlands was in 2022 granted a "phasing-out" derogation until the end of 2025, agreed upon due to water pollution challenges.

While derogations should in principle be designed in a way that avoids negative environmental effects, there is increasing concern that the higher livestock concentration and manure production allowed by derogations have contributed to negative effects on water, soil, air quality and protected habitats in the Member States concerned. Whereas experience and studies in the Member States concerned have confirmed that more manure on grasslands on non-sensitive soils would not generally lead to significant increase of nitrates leaching to groundwater, this view does not sufficiently take into account the effects on eutrophication nor the cumulative effect of many derogations in the same region, with the ensuing higher concentration of livestock and levels of ammonia. The environmental impacts of allowing manure limits above 170 kg N/ha on a large scale in certain Member States have come under increasing scrutiny, due to the possible effects on the objectives of the WFD and Habitats and Birds Directives. A 2023 report from the European Court of Auditors (ECA)[25] concluded that derogations provided an opportunity for farmers to increase herd sizes and limited the achievement of the Nitrates Directive's objectives and recommended that the Commission should limit the use of derogations and review conflicting objectives in other policy areas.

4. A common limit throughout the EU

Another question around the manure limit is whether it is appropriate to have one common limit defined at EU level, rather than allowing Member States to set limits adapted to the crops and local circumstances.

As explained earlier, the manure limit is separate from the balanced fertilisation requirement. Through the balanced fertilisation requirement, farmers in NVZ must adapt the amount of fertilisers to the need of the crop, the available nitrogen in the soil, the expected yields and the local soil and climate conditions. Therefore, it is not the purpose of the manure limit to be an agronomic limit. Rather it provides a common threshold as part of the minimum common basis for all farmers in the EU (in NVZ) to mitigate environmental and health risks related to intensive livestock production. It provides a common legally binding value promoting a level playing field among farmers across the EU. It has acted as common minimum standard to comply with at EU level, allowing Member States to decide whether to use lower levels or to apply for derogations when they wanted to apply higher ones.

[25] Special report: EU efforts for sustainable soil management – Unambitious standards and limited targeting 19/2023. European Court of Auditors.

The common limit and the derogation process also involving the Member States through the Nitrates Committee help to maintain a common baseline and avoid distortions of competition in the internal market, which is also an important objective of the common agricultural policy. The comitology procedure has the added benefit of improving transparency and peer review among the Member States, which can contribute to greater attention to mitigating environmental effects, better trust in the rules and hence compliance throughout the EU. The common limit is also essential as a basis for organic farming and allows organic farms, where only manure is allowed as a fertiliser, to compete with other farms. Without a common limit for the EU, there is an additional risk of undermining the competitive position of organic farming, while the EU is promoting its expansion as one of the paths to increase sustainability of EU agriculture. In short, to achieve its goals the directive provides a share of responsibility between the Commission and the Member States in regulating and controlling the excess of fertilisers. By setting a common EU limit for manure which entails the highest risks and giving to Member States the responsibility to set the overall fertilisation limits (and thus limits on chemical fertiliser use) the directive has defined this crucial balance of responsibility and flexibility associated with the manure and chemical fertilisers.

If the Directive had let Member States set their own manure application limits, the pollution risks from manure may have been higher, as the Commission would not have had the opportunity to monitor and assess the impacts of higher limits through the derogation process[26]. Without a common legally binding limit and the specific derogation process, distortion and competition between livestock sectors in different Member States would lead to a "race to the bottom". As an illustration for comparison, Annex XII describes the approaches taken by Member States in applying balanced fertilisation, where experience shows that Member States find it difficult to regulate the fertilisation in relation to environmental concerns, and that the actual rates applied most often are calculated to maximise yields rather than minimise emissions. In Member States or regions with very high manure production, there would be a real risk that the limits are set to accommodate excess manure production levels rather than environmental concerns[27]. The risk of excessive flexibility is even higher for the manure limit than for the broader fertilisation limits. The latter have an economic upper limit in the form of the optimal economic rate (for the farmer) of fertiliser application. The corresponding optimal economic rate limit for manure application would far exceed the environmentally sustainable level. This is confirmed by the cases in which derogation requests have been addressed to the Commission from the national level, which were not supported by the situation on the ground and the water quality data. Without a common limit, it would have been very difficult to compare compliance efforts among Member States and to determine the risk posed to water bodies.

It is important to point out that the manure limit includes a number of flexibilities, *apart from the derogations*. These include the fact that the limit is applied at farm level, not at field level, which allows for excess manure production at the farm, thereby promoting circulation of nutrients between farms and recycling of nutrients. Therefore, it is not

[26] Derogation decisions typically come with a requirement of annual reporting of application and effects of the derogations, in addition to the four-yearly general implementation reports.

[27] Some farmers' organisations in those Member States and regions are calling for letting Member States set the manure limit.

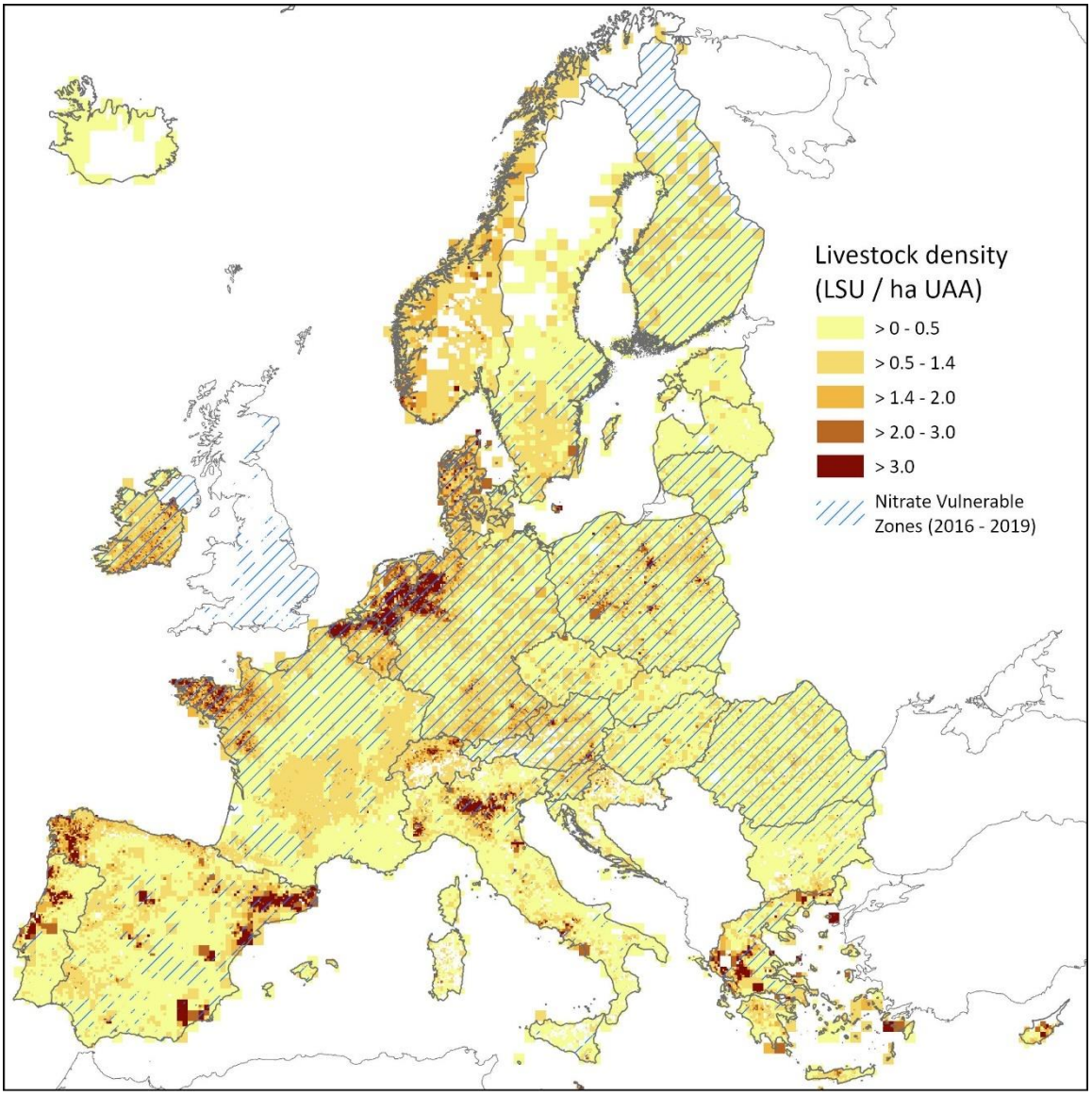
correct to state that the manure limit increases the use of chemical fertilisers (and associated GHG emissions)[28]. On the contrary the excess manure on one farm will be used on another farm (as raw or processed manure) and thus reduces the chemical fertiliser use by an equivalent amount on this other farm. So that there is no significant difference in GHG emissions as long as the manure or processed manure is reused on another farm[29]. This is rather an argument to accelerate the circulation of nutrients on the internal market as promoted under the Fertiliser Products Regulation. Annex XII further explains the inherent flexibilities of the manure application limit and how Member States have used these flexibilities. Annex XIX explains the role of the Nitrates Directive in promoting the recycling of nutrients, particularly from biogas digestates.

Overall, the large majority of Member State experts considered the limit effective, relevant and appropriate. However, some Member States continue to struggle with very high levels of manure production concentrated in a few regions, which makes it difficult to comply with the limit. This reflected - and still reflects - the agricultural sectors in the Member States where livestock density can in certain cases be much higher than the number of livestock units per hectare corresponding to the manure limit, even when looking at whole regions, let alone individual farms. Such high densities make it more challenging for livestock farms to comply with the limit on livestock manure application, as it may involve processing and exporting manure over larger distances and is an incentive for fraud. While this concerns only a small part of the entire territory of the EU, these regions account for a major share of total livestock production.

Figure 1 Livestock density (Livestock units / ha agricultural area) based on gridded Farm Structure Survey data for the year 2020 and Nitrate Vulnerable Zones.

[28] In consultations, farmers often point out that the manure limit is bad for climate goals because they have to use more chemical fertilisers.

[29] In cases where the reactive nitrogen is is transformed in atmospheric N2 to get rid of the excess manure, the manure would not replace chemical fertilisers. Such techniques are used in some regions with very high excess of manure.



Source: JRC analysis, 2025.

These very high-density areas also correspond to nutrient pollution hotspots, where the nutrient pollution in soil, air and water have negative impacts on human health and economic sectors, including tourism and fisheries, and make compliance with the Nitrates Directive and other EU environment legislation very challenging. One reason for this situation is that economic pressures for livestock concentration have largely prevailed over environmental considerations, and that it remained beneficial to increase livestock concentration in a few areas despite increasing costs for farms to dispose excess manure[30].

Therefore, the manure application limit, as a common minimum standard with inbuilt flexibilities, is not always sufficient on its own to reduce or maintain livestock concentrations below harmful levels, and it has thus not been sufficiently able to control the levels of nutrient pollution from manure in certain areas. It is for the Commission and the Member States in the comitology procedure to pay sufficient attention to these factors when granting derogations, but it remains the responsibility of the Member States to

[30] See also cost-benefit analysis.

enforce limits on livestock concentrations which are compatible with the environmental limits for specific areas and the requirements of EU law. In those areas, it may not be enough to limit the livestock manure application per farm but could be necessary to take into consideration the cumulative effects of the manure production by all farms in a region so as to ensure that there is coherence between the overall livestock density and the manure (including processed manure) that can be applied in the area without exacerbating the negative impacts on the environment.

A recent study[31] based on modelling concludes that reducing overall livestock density below two livestock units per hectare (i.e. 1.4 LSU/ha) could significantly reduce nitrates leaching and runoff. This is especially relevant in hotspot regions with the highest livestock densities, where reductions in the nitrogen surpluses and nitrogen leaching and run-off could reach 50%. Note that this does not mean that each farm would have to reduce its stocking rate to 1.4 LSU/ha, but that this level would be reached on average over a wider area, which could also be attained by promoting arable and mixed farming alongside farms specialised in livestock production. In its Vision for agriculture and food[32], the Commission highlighted that "special attention needs to be paid to improving nutrients management at farm level and increasing nutrients circularity. Priority should be given to addressing nutrient pollution hotspots and promoting integrated territorial approaches. A key aspect of this would be the management and control of nutrients from livestock farming to limit negative externalities, support extensification in regions with high livestock concentrations, and promote circularity which can help reduce the use of synthetic fertilisers".

5. Conclusions

Thirty-five years after the adoption of the Nitrates Directive, there is little doubt that limiting the amount of manure applied on agriculture land is necessary and justified to control nitrogen and phosphorus emissions from manure and processed manure, including with regard to other EU environmental goals. Setting a common limit for the application of nitrogen from manure has served as a pivotal benchmark in curbing different pathways of nutrient pollution from manure, contributing positively to limiting nitrates pollution and eutrophication. The multi-pathway role of the limit is intrinsically linked to the cascading effect of nitrogen pollution and the policy objective to limit negative environmental effects of intensive livestock production. This also explains why the limit equally applies to processed manure as it generally shares a number of similar risks of emissions to air, water and soil as raw manure. The manure application limit not only contributes to the objectives of the Nitrates Directive, but by promoting sustainable agriculture and livestock production, specifically plays a key role in the achievement of the objectives of other EU legislation and international commitments.

The manure limit of 170 kg N/ha was set not as an agronomic limit for specific crops, but as a common precautionary threshold balancing the needs of agriculture and livestock production with environmental and public health concerns. It applies in addition to the requirement of balanced fertilisation. It was seen as sufficiently high for the large majority of the livestock sector in the EU but sufficiently constraining to avoid major

[31] Assessing the effectiveness of the Nitrates Directive: implications for agriculture and for water, soil and air quality. JRC, 2025 (in review).

[32] COM/2025/75 final

water pollution situations. It provides a common legally binding value promoting a level playing field among farmers across the EU. The manure application limit is recognised as generally appropriate for good agricultural practices and has become the reference point for sustainable agricultural practices. By promoting the responsible (re)use of manure, limiting key pollutants and enhancing ecosystem protection, it has been integrated as the legal norm for fertilisation in the organic farming regulation. Without a common legally binding limit and the specific derogation process, distortion of competition between livestock sectors in different Member States would have a much higher risk of leading to a "race to the bottom".

On the other hand, environmental and human health protection as well as EU law requirements would often call for a precautionary approach. Applying up to 170 kg N/ha on agriculture land may not be appropriate in all situations as it may not sufficiently limit the soil, water and air pollution by nitrogen and phosphorus, nor the negative impacts on biodiversity. The necessity to address eutrophication and the experience gained from the cumulative and long-term environmental effects of high levels of manure application (including due to derogations) could rather point to a necessity of lowering the manure application limit in some polluted areas. A lower limit may also be warranted for certain types of crops or soil types. In the situations where the manure limit of 170 kg N/ha is too high for reaching environmental goals, it will be for the Member States to set lower limits adapting to local circumstances.

Member States can apply for derogations to apply manure above the 170 kg N/ha limit under specific conditions. The common limit and the derogation process through the comitology committee help to maintain a common baseline and avoid distortion of competition, which is also an important objective of the common agricultural policy. However, derogations to the manure limit have come under increased scrutiny as there is increasing concern that the higher livestock concentration and manure production allowed by derogations have contributed to negative effects on water, soil, air quality and protected habitats in the Member States concerned.

The manure limit still includes a number of flexibilities, apart from the derogation. These include the fact that the limit is at farm level and that the limit does allow for excess manure production at the farm, thereby promoting circulation of nutrients between farms and recycling of nutrients. By enforcing a maximum of 170 kg of nitrogen per hectare annually, Member States are incentivised to adopt improved nutrient management practices encouraging farmer accountability and promoting innovation in fertiliser use and livestock management, thereby advancing both ecological and economic objectives across the EU. The Directive allows for updates as new scientific data and agricultural practices emerge, helping ensure that the limit remains relevant and effective. The Commission has amended the directive to allow some forms of recycled nitrogen compounds from manure (RENURE) to be used above the limit.

While the large majority of Member State experts considered the limit effective, relevant and appropriate, the manure application limit, as a common minimum standard, is not always sufficient on its own to reduce or maintain livestock concentrations below harmful levels. As economic factors for livestock concentration have prevailed over environmental considerations, the limit on its own has not been sufficiently able to control the levels of nutrient pollution from manure in certain areas, making compliance with the Nitrates Directive and other EU environment legislation very challenging. In its

Vision for agriculture and food, the Commission highlighted that priority should be given to addressing nutrient pollution hotspots.

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