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Practical and regulatory barriers for better manure handling in Norway, Spain and Italy

Stakeholder interview report in The PROENV Project

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SAMMENDRAG:

Denne rapporten, en del av PROENV-prosjektet, undersøker praktiske og regulatoriske barrierer for bærekraftig håndtering av husdyrgjødsel i Italia, Spania og Norge, basert på intervjuer med bondeorganisasjoner og myndigheter. Målet er å supplere de abstrakte statistiske modellene som brukes i prosjektet med innsikt fra bønders hverdag.

I Italia står bønder overfor høye kostnader for bærekraftig teknologi, fragmenterte regelverk mellom regioner, og et utdatert EU-direktiv (Nitratbehandlingsdirektivet) som ikke tar hensyn til landets mangfoldige jordbruksforhold. Motstand mot endring og lite målrettet opplæring forverrer utfordringene. Mulighetene ligger i ny teknologi som biogassanlegg, modernisering av regelverk, belønning for miljøtjenester, og utdanning rettet mot unge bønder.

I Spania er økonomisk levedyktighet også en utfordring. Komposteringsanlegg og presisjonsteknologi for gjødsling er kostbart, og regelverket er komplisert og lite tilpasset lokale forhold. Vannmangel og miljøskader forverrer situasjonen. Forslag til løsninger inkluderer forenklet regelverk, støtte til samarbeidsmodeller for gjødselhåndtering, subsidier og økt rådgivning og opplæring.

I Norge handler utfordringene om høye kostnader for utstyr, krav til dokumentasjon i ulike systemer og geografisk ubalanse mellom husdyrproduksjon og planteproduksjon. Det finnes kunnskapshull om nitrogenbruk, og mange bønder har ikke tilgang på skreddersydd veiledning. Forslag til løsninger inkluderer økonomiske støtteordninger, betaling for økosystemtjenester, samkjørte rapporteringssystemer og mer lokal forskning.

Felles for landene er barrierer knyttet til økonomi, regelverk, praktiske forhold, kultur og kunnskap. Rapporten anbefaler seks tiltak: (1) modernisering og harmonisering av regelverk, (2) overgang til resultatbaserte insentiver, (3) investering i forskning og teknologi, (4) styrket utdanning og rådgivning, (5) samarbeid og erfaringsdeling, og (6) tiltak mot geografiske og miljømessige utfordringer.

Denne dialogbaserte tilnærmingen skal gjøre det mulig å kombinere miljømål med bønders virkelighet, og bidra til et bærekraftig jordbruk som styrker både natur og økonomi.

SUMMARY:

This report, part of the PROENV project, explores practical and regulatory barriers to sustainable manure management in Italy, Spain, and Norway. Based on interviews with farmers' organizations and regulators. It is intended to complement the abstract statistical models used in the project, by emphasizing real-world challenges and opportunities.

In Italy, farmers face high upfront costs for sustainable technologies, regulatory fragmentation across regions, and outdated EU directives that fail to account for diverse agricultural contexts. Cultural resistance and limited training also hinder progress. However, opportunities lie in modern technologies like biogas, reforming the Nitrate Directive, reward-based incentives for ecosystem services and targeted education for younger farmers.

In Spain, economic viability is also a concern, where composting infrastructure and precision technologies are seen as costly. Bureaucratic complexity, rigid nitrogen rules, water scarcity, and environmental degradation pose additional challenges. Respondents advocate for streamlined regulations, cooperative composting models, subsidies for sustainable practices, and educational outreach to foster change.

In Norway, high costs and profitability concerns are compounded by burdensome documentation systems and geographical mismatches between livestock and crop regions. Farmers also face knowledge gaps about nitrogen use and limited access to tailored training. Key solutions include subsidies for equipment, payments for ecosystem services, streamlined reporting platforms, and localized research on nitrogen dynamics and emissions.

Overall, the report identifies common barriers: economic constraints, inflexible and complex regulations, practical and geographical limitations, cultural resistance, and

knowledge gaps. It recommends six strategic actions: (1) modernizing and harmonizing policy frameworks, (2) shifting to performance-based economic incentives, (3) investing in research and technology, (4) expanding farmer education and outreach, (5) fostering community and cross-country collaboration, and (6) addressing geographic nutrient imbalances and environmental limitations.

This integrated approach aims to align environmental goals with farmers' realities, promoting sustainable agriculture that supports both ecological and economic resilience across Europe.

COUNTRY:	Norway
COUNTY:	Møre og Romsdal
MUNICIPALITY:	Tingvoll

APPROVED	**PROJECT LEADER**
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Tingvoll, 13.06.25

Vegard Botterli

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1 Introduction

Optimizing manure management is a key component on the road to a more sustainable agriculture in Europe. To meet increasing demands nationally and internationally to harmonize environmental, economic, and social sustainability on every level of society.

A large part of the PROENV project has been aimed at creating more precise statistical models to calculate the environmental impact of intensive and extensive agriculture across the EU. These models are abstract and complex, and many farmers feel that such models and statistics are far away from the practical reality that they meet every day on their farms. This report is a small attempt to bridge this gap and give the farmers organizations an opportunity to draw a picture of the practical challenges and opportunities they face, as a balancing point against the more abstract models that has more and more impact on how they farm and their ability to make a living.

We have gathered perspectives from farmers organizations and government regulators in Italy, Spain and Norway, based on a questionnaire and a follow-up interview. Where we have focused on barriers and opportunities in achieving sustainable manure handling in these countries. The topics include economic and time constraints, regulatory dynamics, and the connections between environmental and cultural factors.

The report tries to distill the input from the respondents down to the most actionable facts. It must be stressed that this is based on a small sample of one representative each, from farmers organizations and governmental regulators in Italy, Spain and Norway. The high level of competency and experience of the respondents may however weigh up for some of the effects from the small group-size.

2 Italy

Economic Constraints

Italian farmers organizations stressed the need for structural economic changes. The transition to sustainable manure handling is hindered by high upfront costs, especially for modern equipment and infrastructure like low-emission spreaders and composting facilities. While farmers acknowledge the long-term benefits, short-term profitability remains a significant barrier. Particularly in regions with varying livestock densities and agricultural practices.

Time Constraints

Bureaucratic overload was a recurring theme, with farmers expressing frustration over the lack of alignment across regional, national, and European regulatory frameworks. Farmers in Italy reported spending substantial time navigating differing regional rules, especially when their land spans multiple regions.

Regulatory Challenges

Italian stakeholders highlighted the outdated European Nitrate Directive (1991) as a central challenge. It lacks flexibility to accommodate diverse farming conditions across Italy's regions. Divergent regional implementations of the directive exacerbate inefficiencies, creating an uneven playing field for farmers.

Geographic and Social Factors

Italy's agricultural landscape is highly varied, with densely populated livestock areas in the Po Valley and low-intensity farming in other regions. This diversity complicates the implementation of uniform manure management solutions. Cultural resistance among farmers to adopt new practices, coupled with a lack of targeted training, presents additional barriers.

2.1 Opportunities for improvement

Technological Innovations

The availability of modern fertilizer spreaders and biogas facilities presents an opportunity to enhance nitrogen use efficiency while reducing emissions. However, adoption requires financial support and technical training. Farmers and regulators identified digestate from biogas plants as a potential substitute for synthetic fertilizers, provided quality and safety concerns connected are addressed.

Policy Reforms

Stakeholders advocate for updating the Nitrate Directive to reflect technological advancements and regional farming realities. Flexible nitrogen limits and simplified bureaucratic processes could encourage wider adoption of sustainable practices.

Harmonizing regional and national regulations would reduce administrative burdens on farmers, freeing up time for on-farm activities.

Economic Incentives

Transitioning from subsidy-based models to reward-based systems, such as payments for ecosystem services, could motivate farmers to adopt environmentally friendly practices. Italian farmers emphasized the importance of recognizing and rewarding their contributions to carbon sequestration, biodiversity preservation, and reduced emissions.

Educational and Cultural Shifts

Programs targeting younger farmers have shown promise in promoting practices like conservation agriculture. Expanding these efforts could drive generational change and innovation. Farmers called for on-farm training and awareness campaigns to bridge the gap between scientific advancements and practical application.

2.2 ITALY: Conclusions and Recommendations

Policy Adaptation

Modernize the Nitrate Directive to allow flexibility for regional conditions and ensure alignment across administrative levels. Introduce streamlined processes to reduce bureaucratic burdens on farmers.

Incentive Redesign

Shift from traditional subsidies to market-based rewards for ecosystem services and carbon farming. Provide financial support for purchasing modern manure-handling equipment.

Education and Training

Expand training programs targeting younger farmers and emphasize on-farm demonstrations to promote adoption of sustainable practices.

Foster awareness campaigns that highlight the environmental and economic benefits of innovative manure management.

Collaboration and Research

Facilitate cross-country learning platforms to share best practices.

Invest in research to enhance the quality and usability of digestate and other organic fertilizers. By integrating farmer voices into science and policy, Europe can achieve a balanced approach to sustainable agriculture that respects environmental goals while supporting the economic and social well-being of farmers.

3 Spain

Economic Constraints

Spanish respondents identified economic constraints as a significant barrier and suggested that subsidies should be used to improve practices related to fertilization management. High Initial Investment: Farmers highlighted the financial burden of establishing composting infrastructure and adopting precision technologies.

Time Constraints

Farmers noted that navigating complex regulations and obtaining permissions for composting facilities or centralized manure management systems is time-consuming. More integration across local, regional, and EU levels is needed according to the stakeholders.

Regulatory Challenges

The existing regulatory framework often fails to account for regional variances. Respondents pointed out that facilitating the use of finished compost products as fertilizers could incentivize farmers to adopt better manure practices. Rules governing nitrogen limits in vulnerable zones often necessitate expensive transportation of manure to non-restricted areas, adding to logistical challenges.

Environmental and Geographic Constraints

Farmers in Spain reported that limited access to water and the country's warm climate create additional hurdles for sustainable agriculture. Environmental Degradation: Respondents cited water pollution, soil erosion, and climate emissions as primary environmental challenges linked to agriculture.

3.1 Opportunities for improvement

Technological Innovations

Composting and Fertilizer Production: Stakeholders emphasized the potential of composting to transform manure into marketable products. Encouraging technologies for finished compost products could reduce reliance on synthetic fertilizers.

Introducing technologies for soil analysis and precision nutrient application would help optimize manure use and reduce environmental impact.

Policy Reforms

Respondents proposed that regulatory frameworks should focus on facilitating practical solutions, such as supporting finished products as fertilizers, without overcomplicating compliance requirements.

Suggestions included developing cooperative systems for centralized manure processing to enhance efficiency. There is also a perceived need to develop cohesive frameworks integrating local, regional, and EU requirements to minimize administrative burdens on farmers.

Economic Incentives

Stakeholders highlighted the importance of subsidizing fertilization management and supporting economically viable manure processing systems.

By recognizing the environmental contributions of sustainable practices, farmers could be encouraged to adopt long-term improvements.

Educational and Collaborative Efforts

Farmers need access to training on best practices for manure management, including composting and precision fertilization.

Cooperative models were suggested to address logistical and economic challenges in manure management.

3.2 Conclusions and recommendations

The insights from Spanish stakeholders highlight the interconnected challenges of economic viability, environmental regulation, and resource constraints. To overcome these, the following actions are suggested by the stakeholders:

Policy Adaptation

Simplify regulatory frameworks to promote flexible manure management solutions. Support cooperative and centralized manure processing initiatives.

Technology and Infrastructure

Invest in precision technologies for nutrient management.

Promote the development of centralized composting facilities to optimize manure handling.

Economic Support

Subsidize technologies and processes that improve fertilization efficiency and environmental outcomes. Reward farmers for contributions to ecosystem services, including carbon sequestration and soil health improvement.

Education and Outreach

Provide training and advisory services to enhance knowledge of sustainable manure management practices. Foster collaboration between farmers and regulators to address challenges holistically.

4 Norway

High Costs of Equipment and Implementation:

Modern fertilizer spreaders and direct-seeding equipment are expensive, limiting adoption. Farmers face significant upfront costs to invest in advanced manure management systems, such as separation equipment and slurry tanks.

Profitability Pressures:

Increased costs for sustainable practices, including advanced technologies and regulatory compliance, exceed profit margins in many cases. Farmers prioritize economic survival, often at the expense of long-term environmental considerations.

Complex Reporting Systems:

Norwegian farmers report burdensome documentation requirements spread across multiple systems (e.g., RMP, KSL). Lack of coordination between platforms leads to duplication of data entry and inefficiencies, which consume farmers' time and resources.

Geographical and Climatic Limitations:

The uneven distribution of livestock and crop production across regions creates logistical barriers. Coastal regions in Norway see a concentration of livestock, while crop production dominates in the eastern regions, leading to nutrient imbalances.

Understanding of Nitrogen Dynamics:

Respondents highlighted limited knowledge about nitrogen efficiency in organic and chemical fertilizers under varying local conditions. And insufficient research and dissemination about the impact of manure-based practices on soil health and climate change mitigation.

Farmer Awareness and Training:

Farmers require accessible education on best practices for manure handling and environmental impacts. Current outreach strategies struggle to engage farmers effectively due to their diverse challenges and operational constraints.

4.1 Opportunities for improvement

Subsidies and Support:

Respondents suggest targeted subsidies to offset the costs of advanced manure management systems. Support for cooperative models, such as shared machinery pools, can reduce individual financial burdens.

Market-Based Compensation:

Payments for ecosystem services, such as carbon sequestration and biodiversity preservation, incentivize sustainable practices. Market mechanisms rewarding reduced nitrogen emissions could align environmental and economic goals.

Regulatory Flexibility:

Adapt nitrate directives to accommodate sustainable manure practices that may exceed the 170-kg N limit. Establish clear guidelines for manure use to maximize crop yield and minimize emissions.

Integrated Reporting Systems:

Streamline reporting mechanisms to a unified platform to reduce administrative workload. Ensure data ownership and transparency, empowering farmers with actionable insights.

Localized Research:

Stakeholders recommend expanding research into region-specific nitrogen dynamics and environmental impacts of manure. Investigating gas emissions from different manure-handling techniques can improve mitigation strategies.

Technology Advancement:

Innovations in biochar-treated manure and separation technology can improve nitrogen efficiency and reduce transportation costs. Expand the use of digital tools, such as GPS-enabled applications, for precision nutrient application.

Farmer Collaboration:

Encourage regional cooperation among farmers to share resources and knowledge. Pilot programs for collective manure management can demonstrate economic and environmental benefits.

Improved Communication Channels:

Employ visual tools like infographics and videos to present complex environmental data. Tailor communication strategies to specific farmer demographics and operational contexts.

4.2 Norway: Conclusions and recommendations

Economic Barriers
High equipment costs and low profit margins limit farmers' ability to invest in sustainable manure management. Financial risk and lack of economic incentives make short-term survival a priority over long-term environmental goals.

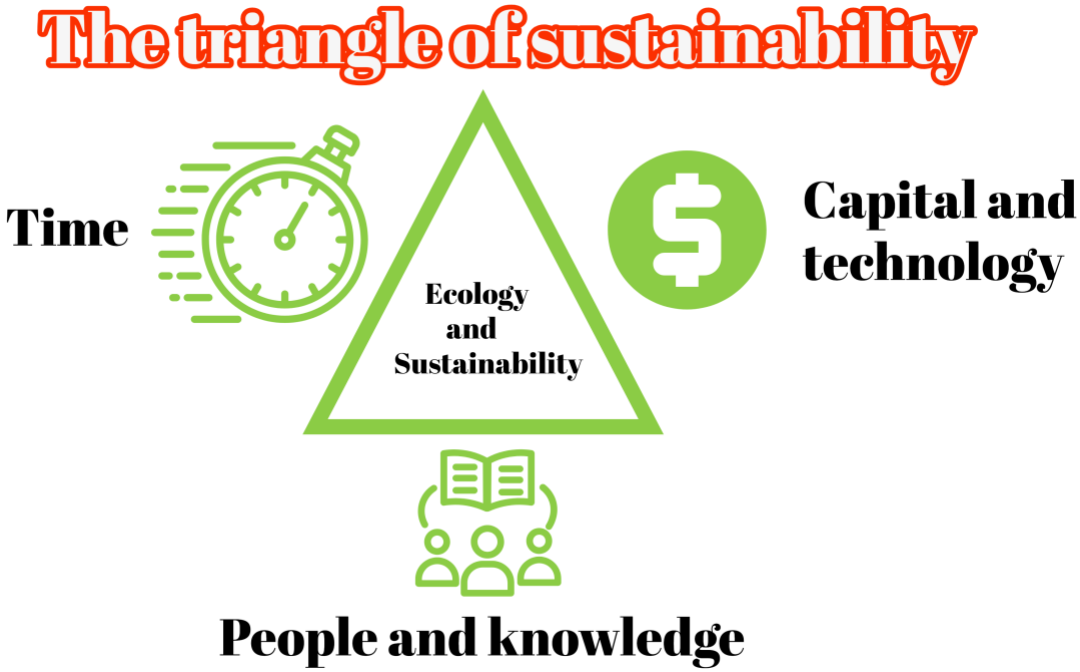
Administrative and Practical Challenges
Complex and fragmented reporting systems take time and create inefficiencies. Geographic mismatches between livestock and crop regions lead to nutrient imbalances and logistical issues.

Knowledge and Engagement Gaps
Farmers often lack localized knowledge about nitrogen efficiency and the environmental impact of manure use. Outreach efforts and training are poorly tailored to farmers' needs.

Opportunities for Improvement
Targeted subsidies and support for cooperative models can reduce financial pressure. Market-based rewards for ecosystem services could motivate sustainable practices.

Policy and Innovation
More flexible regulations and a unified reporting platform would ease the administrative load. Investment in region-specific research and technologies like biochar and precision tools can improve efficiency and reduce emissions.

Education and Collaboration
Stronger, more accessible communication—using visuals and on-farm demos—can improve awareness. Regional cooperation and shared infrastructure can support practical, cost-effective solutions.



Improvements to manure-handling will generally require a combination of time, capital and technology, as well as people and knowledge. Any change to either of these variables may also impact the others. To be successful at improving sustainability and manure-handling, it can be argued that one must understand how the three sides of the triangle impact each other at the farm level.

5 Main conclusions

Sustainable manure management requires balancing economic, environmental, and practical considerations. Insights from Italy, Spain, and Norway indicates that there are diverse, yet interconnected challenges across the European continent.

1. **Economic Constraints**:
    - High costs for modern equipment and infrastructure hinder adoption.
    - Profit margins are often insufficient to justify sustainable investments, with farmers prioritizing short-term economic survival.
2. **Regulatory Challenges**:
    - Current frameworks, such as the Nitrate Directive, lack flexibility to account for regional variances and technological advancements.
    - Complex and uncoordinated reporting systems and regulations across local, regional and EU levels increase administrative burdens on farmers.
3. **Practical and Geographical Challenges**:
    - The uneven distribution of livestock and crop production exacerbates nutrient imbalances and logistical difficulties.
    - Limited access to water and soil erosion, particularly in Spain, add to environmental challenges.
4. **Knowledge Gaps**:
    - Farmers often lack localized data on nitrogen efficiency and best practices for manure handling.
    - Outreach and education efforts struggle to reach farmers effectively, leaving many unaware of the environmental and economic benefits of sustainable practices.
5. **Cultural Resistance**:
    - Resistance to adopting new practices persists, partly due to entrenched traditions and inadequate targeted training.

Recommendations

To address these barriers, the following multi-faceted strategies are recommended:

1. Policy Adaptation

- Modernize the Nitrate Directive to include flexibility for regional conditions and advancements in technology.
- Harmonize local, regional, and EU regulations to streamline administrative processes.
- Introduce integrated reporting platforms to simplify documentation and data management.

2. Economic Incentives

- Transition from subsidy-based systems to market-based rewards for ecosystem services, such as carbon farming and biodiversity preservation.
- Provide financial support for farmers investing in sustainable technologies, such as advanced manure separation systems and biochar treatments.
- Subsidize centralized composting and cooperative models to reduce individual financial burdens and logistical constraints.

3. Technology and Research

- Invest in precision tools for nutrient management, including GPS-enabled applications and biochar technology.
- Expand localized research into region-specific nitrogen dynamics and manure-handling emissions.
- Enhance the usability and quality of digestate and other organic fertilizers as viable alternatives to synthetic fertilizers.

4. Education and Outreach

- Establish robust on-farm training programs targeting younger farmers and promoting generational shifts toward sustainability.
- Conduct awareness campaigns using visual tools like videos and infographics to simplify complex environmental data.
- Develop advisory services to bridge the gap between scientific advancements and practical implementation.

5. Community Collaboration

- Facilitate cooperative models for shared manure management resources and infrastructure.
- Create platforms for cross-country knowledge sharing, allowing best practices to circulate within Europe.
- Strengthen farmer networks to encourage regional cooperation and collective problem-solving.

6. Geographic and Environmental Adjustments

- Address nutrient imbalances by incentivizing the transport of surplus manure from livestock-dense areas to regions requiring organic inputs.
- Support water management practices and technologies in water-scarce regions like Spain to optimize manure application.

The integrated approach outlined here leverages policy reforms, financial incentives, technological innovation and education to address the barriers to sustainable manure management. By adopting these strategies, stakeholders can promote environmentally sustainable practices that are economically viable and socially acceptable. This balanced approach ensures that farmers remain key contributors to sustainable agriculture while preserving the environment and supporting rural communities.

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