

Contaminants in manure – a problem for organic farming?

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Implications

This work addresses possible ways in which animal manure might become contaminated by undesirable elements and how such manure might pose a risk to the health of soil organisms, animals, plants and humans. Research has shown that the pathways of organic compounds such as veterinary medicines and pesticides may be unpredictable and that undesirable elements can be transferred to the food chain. The basic principles of organic farming, in this case specially related to the principles of health, ecology and care, imply that special attention should be given to precaution and responsibility. These are key concerns in the management of organic farming. Taking these principles seriously, would mean a more restrictive practice on the use of animal manure from conventional farming. Through identifying which compounds might be present, their environmental properties and their residue levels in manure and environment, the authorities will be able to establish restricted practice based on knowledge.

Background and objectives

The review (Serikstad et al. 2012) came forward as a request from The Norwegian Food Safety Authority (NFSA) and The Advisory Committee for Organic Farming Regulations. The purpose of the project was to gain more knowledge concerning potential contamination of manure by undesirable elements, such as residues of veterinary medicines and pesticides or high levels of heavy metals.

Within certain restrictions, conventional animal manure can be used in organic farming when the farm's own resources do not cover the demand for plant nutrients. A survey (Holten 2012) among Norwegian certified organic farmers showed that different types of conventional manure are used for both fodder and food production. Many farmers wish to continue using manure from conventional farming. It is important for both the environment and the reputation of organic food products that this source of nutrients doesn't contain any toxic contaminants.

Key results and discussion

The sources of heavy metals in manure are mainly the fodder but also drinking water, bedding and the fixtures where the farm animals are kept. Manure from pigs and poultry can contain amounts of copper (Cu) and zinc (Zn) at levels that reduce the quality and affect its usage according to Norwegian regulations for organic fertilisers. This might apply to manure from other animals and other heavy metals as well.

Residues of veterinary medicine can be found in animal manure (Jacobsen and Halling-Sørensen 2006, Martínez-Carballo et al. 2007). These residues can be taken up by plants and localised in different parts depending on the plant species and the type of medicine (Boxall et al. 2006, Eggen et al. 2011). Special attention should be given to veterinary medicine used as prophylactic treatments for the whole herd. The decomposition time of organic compounds in the environment, including potential residues of medicines or pesticides, will be prolonged in the cold, Nordic climate compared to a warmer climate.

Residues of certain herbicides in manure and compost have been found to give crop failure or deformation. Particular consideration should be given to persistent pesticides. Pesticide residues can reduce the quality of commercial manure and compost and cause problems for the companies who sell these products.

Conventional manure is used in organic farming in Norway. The manure can come from parallel production on the farm, conventional farms or as commercial fertilisers. Usage is restricted based on the amount of nitrogen. As yet there are no special restrictions regarding levels of contaminants in animal manure from one's own or imported conventional manure. Commercial fertilisers based on conventional animal manure are regulated through the general governmental regulation for fertilisers. This only specifies levels for heavy metals. For other potential contaminants such as veterinary medicines or pesticides, the regulation only requests precaution so products won't contain such substances at levels that might pose a threat to health or the environment.

Both the literature review and contact with relevant research and advisory institutions in Europe shows that there is a need to investigate the topic further. There is a lack of documentation on residue levels of veterinary medicine and pesticides in animal manure. Furthermore, when the risk compounds are detected, there is a need for knowledge related to these compounds' dissipation rate, and particularly their potential for transfer to plants. Since there are no analytical methods established for many of the relevant compounds in environmental matrixes, establishing this and performing a screening of potential risk compounds in different manures after medicine treatment should be the very first step. Those who make standards for use of manure in conventional and organic farming need more knowledge to make better decisions.

How work was carried out?

The work was carried out through a literature review and through contact with researchers, governmental authorities, organic certifying organizations and organic farmer organizations, mainly in the Nordic countries but also in other European countries.

A Nordic workshop for researchers, control bodies, advisers and government administration was arranged. The aim of the workshop was to exchange knowledge, establish a Nordic network and to discuss the need for future research on a Nordic level.

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