

Animal feed mineral phosphorus tax in Denmarkⁱ

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Brief summary of the case

Denmark's tax on animal feed phosphorus came into effect in 2005 with a tax rate of DKK 4 (EUR 0.53) per kg of phosphorus. It targets commercial animal feed phosphate and aims to reduce the saturation of soils with phosphorus, and leaching to surface waters. Consumption of mineral phosphate in animal feeds has been reduced by about 2,000 tonnes (or 15%) since the introduction of the tax, although the tax rate has not been adjusted with inflation. The tax is believed to have improved overall efficiency in the use of animal feed.

Farmer organisations did not oppose the tax and accepted it as part of a broader package deal on measures to reduce nutrient leaching and pollution of surface waters. Environmental NGOs voiced concerns about impacts on organic farms, and were not strong advocates of the tax. The tax arose from efforts to identify the most cost-effective means for reducing nutrient losses. These efforts were undertaken in a Government committee with civil servants from several ministries and representatives from interested groups including farmers and NGOs.

The analysis published shows that a tax on phosphorus would have been environmentally and economically more effective if applied to all sources, including also to mineral fertilizer.

1 Description of the design, scope and effectiveness of the instrument

1.1 Design of the instrument

The tax on mineral phosphorus in commercial animal feed phosphate - in short the animal feed phosphorus tax - was enacted in 2004 and came into effect on 1 April 2005. The tax rate has remained at DKK 4 (EUR 0.53) per kg of phosphorus since then. The tax is a measure to reduce the saturation of agricultural soil with phosphorus and to curb the leaching of phosphorus to surface waters, as most lakes in Denmark suffer from poor water quality caused by eutrophication, conditioned mainly by accumulated phosphorus-leaching.

The tax applies to imported and domestically produced animal feed phosphates used for feeding agricultural livestock. All other purposes (e.g. pet food) are exempt. The tax base is the weight of mineral phosphorus in animal feed phosphates. The tax applies at the point of sale, and is administered in line with the value-added tax. Own production of animal feed is exempt.

1.2 Drivers and barriers of the instrument

The animal feed phosphorus tax was agreed as part of a broader package of measures to address the pollution of surface waters in Denmark. The package is the third stage of an ambitious national plan originated in 1987, 'Vandmiljøplanen' (Action plan for the aquatic environment), to reduce nutrient pollution of surface waters.

The liberal-conservative minority Government of Denmark in office from 2001-2011 had a general policy of not increasing taxes, which did however allow for a revenue-neutral shifting of tax burdens. In compensation for the animal feed phosphorus tax the rate of another tax relating to farmers was consequently reduced; the land value tax.

The main concern in Denmark has been with nitrogen nutrients that have an impact on surface water quality in many vulnerable fjords and other marine areas, whereas issues relating to freshwater pollution with phosphorus have not received as much attention. Version III of the plan for the aquatic environment in the end turned this around and highlighted phosphorus, while downplaying measures and extending deadlines related to nitrogen reductions. The animal feed phosphorus tax helped to win support for Government policy from two smaller parties in parliament, securing a majority.

1.3 Revenue collection and use

Annual revenues from the animal feed phosphorus tax have amounted to about DKK 50 (EUR 6.7) million, with data available up to and including 2015. In 2008-09 during the financial crisis revenues dropped to about DKK 40 (EUR 5.4) million, but then returned to their previous level (Danmarks Statistik, 2016) A greater environmental impact from the tax had been expected, with annual revenues estimated to have dropped to DKK 15-20 (EUR 2-2.9) million by 2010 (Folketingstidende, 2004).

Revenues are collected by the national tax administration, SKAT, and accrue to the treasury (SKAT, 2016). There is no earmarking of the revenues, but the rate of the land value tax ('grundskyld') for farmland has been reduced, providing a net relief of DKK 36 (EUR 4.8) million.

As the tax is levied at the point of sale it is passed on from wholesale sellers to individual farm managers, though it can also be levied at the point of import from non-EU countries.

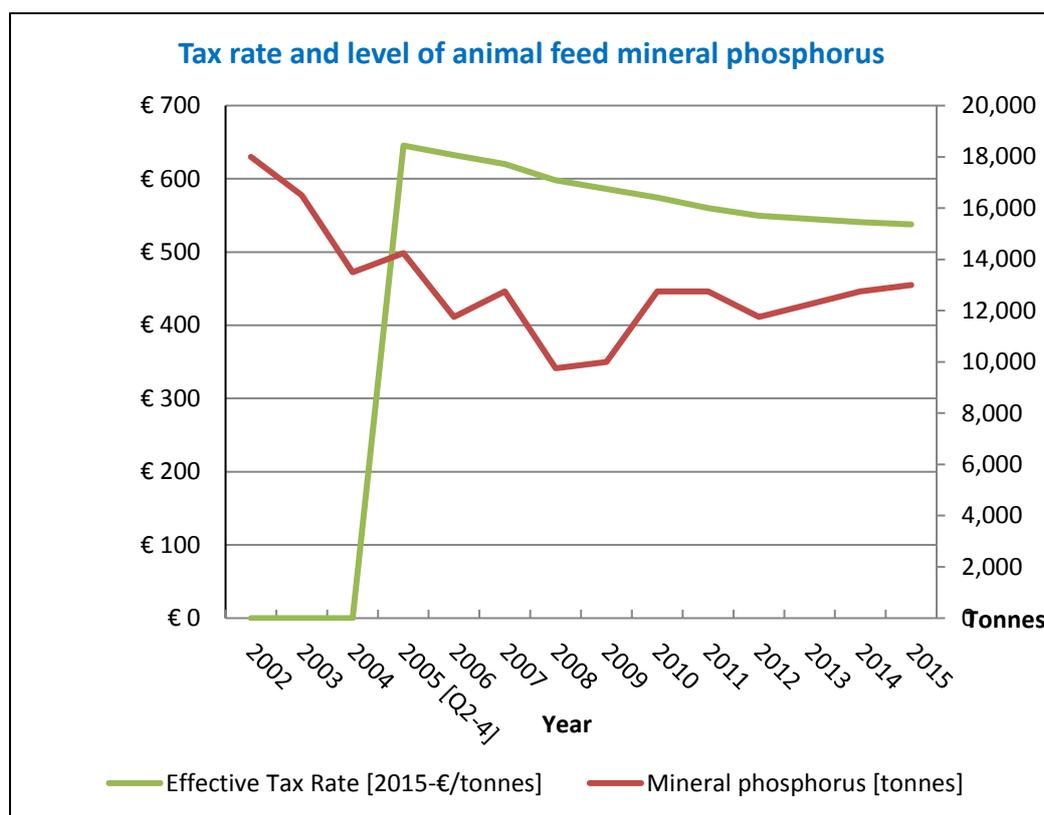
1.4 Environmental impacts and effectiveness

The tax rate has not been adjusted since its introduction in 2005, implying a depreciation of the real effective tax rate. Figures in this case study show tax rates over time adjusted to 2015 price levels.

The amount of mineral phosphorus had begun to decline before the tax came into effect on 1 April 2005, although there was a hoarding effect of 5,000 tonnes in the first quarter of 2005 (Jacobsen, 2009a).

An ex-ante assessment stipulated the tax to yield a reduction of 4,500-5,000 tonnes of phosphorus from a baseline of 13,500 tonnes in 2004 (Fosforfokusgruppen, 2004; Folketingstidende, 2004). Actual reductions observed between 2005 and 2015 amount to about 2,000 tonnes, while livestock numbers are about the same. This suggests that the tax has had a more limited environmental impact than anticipated (as mentioned in Jacobsen 2009b).

Figure 1 Animal feed phosphorus tax rate (2015 prices) and sales of mineral phosphorus feed



Sources: Statistics Denmark and Dansk Landbrugs Grovvareselskab, DLG

Actual losses of phosphorus to the environment depend on excretion rates. Phosphate is used in animal feed as nutrition for livestock, but it is not all bioavailable for animals and is excreted again at rates of up to 95% (MFVM, 2003). Phosphorus uptake in animals can be increased by adding enzymes ('fytase'), a practice that was introduced in 2002 by wholesale companies. Following the decision to tax mineral phosphorus, the additive doses were doubled and expanded to all farm animal feed. At a cost of DKK 16 per kg of mineral phosphorus in animal feed, the tax increased feed costs by 25%, while fytase could be added at a cost of only DKK 2 per kg (MFLF, 2003).

The loss or surplus of farming phosphorus (after excretion and including mineral fertilizers, net of plant uptake) amounted to 33,700 tonnes of phosphorus in 2001 and has been reduced to about 16,000 tonnes of phosphorus in 2014, due to several different measures (Vinther og Olsen, 2015). The political target of a 50% reduction was achieved and has provided relief to surface waters, but lakes continue to suffer from eutrophication due to large accumulated soil deposits of phosphorus.

1.5 Other impacts

The tax has led to greater efficiency in the use of animal feed for non-ruminants. It follows from a technology brief produced by the Environmental Protection Agency, that for a technology level corresponding to the obtained standard practice of adding fytase, the additional cost per full pig for slaughter is estimated at EUR 0.07 (MST, 2011). Therefore, the tax is not fully cost neutral for farmers.

2 Stakeholder engagement

The policy processes that led to enactment of the animal feed phosphorus tax began with the evaluation cycle of progress on nutrient reductions. The Danish Government mandated working groups of civil servants, scientific experts and interest group representatives to review the evidence base and make proposals for future nutrient measures to policymakers. This approach reflects well established policy traditions in Denmark for deliberation and consensus-seeking prior to taking decisions in parliament. Farmer organisations and environmental NGOs were equally represented in the main working group.

The Ministry of Taxation led investigations by one working group into the design of possible nutrient taxes. Several models were analysed and reported, including more comprehensive designs based also on taxation of fertilizer-phosphorus, as well as a deposit-refund 'balancing' scheme that would penalise only the losses of phosphorus.

The national farmers' organisation, 'Dansk Landbrug', expressed their doubts about applying taxes to nutrients, but in a more timid way than on previous occasions, highlighting only concerns about environmental effectiveness and not costs to farmers (Berlingske, 2003). In view of their previous rather fierce opposition to taxes on nutrients this was somewhat surprising (Information, 1997).

The technical opportunities for reductions in animal feed phosphorus were seen to be promising (see below), which may have created expectations among farmers for a net tax relief. In addition the compensating reduction in land value taxes could be expected to be passed over into rising prices for land, securing an economic gain to owners of farm land (though not to prospective farmers).

Three environmental NGOs – The Nature Conservation Society, WWF and Ecological Council – issued a joint statement in which they expressed doubts about relying only on environmental taxation, which would not provide a cap on the amount of nutrients applied by farmers. They proposed to rely instead on a package of measures, with taxation as one element (Berlingske, 2003). One concern was that taxes on nutrients could penalise organic farmers, especially if a balancing tax (comparable to the Dutch mineral accounting scheme, MINAS) was introduced. Organic farmers use only animal manure for fertiliser, which is more difficult to administer correctly, and tends to cause larger nutrient losses, resulting in higher costs due to the need to provide more nutrients (i.e. more animal manure).

3 Windows of opportunity

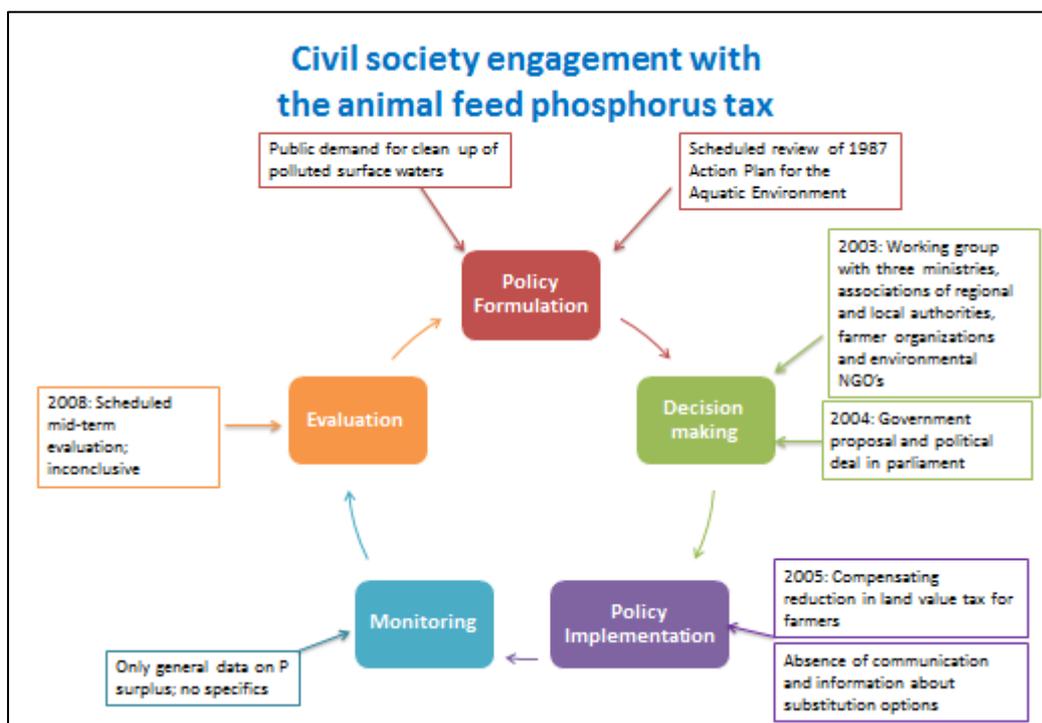
Policy formulation: In 1999 a tax had been enacted for nitrogen fertilizer, but with exemptions for farmers (Söderholm och Christiernsson, 2008). The scheduled review and update of the Action Plan for the Aquatic Environment changed focus towards phosphorus. Civil servants of all ministries agreed on recommending the use of economic instruments over administrative regulations for both nitrogen and phosphorus. The working group considered seven different nutrient tax models.

Decision-making: The decision to opt for the animal feed phosphorus tax was taken at the political level by the Government after the working group had reported. Representatives from agricultural interest groups and environmental NGOs were involved in the preparatory working groups. In a subsequent formal consultation phase the few submissions mainly targeted technical details.

Policy implementation: The animal feed phosphorus tax was not complemented by educational or informational measures to communicate to farmers the advantages of substitution measures (adding enzymes to increase uptake of animal feed phosphorus; a technology introduced in the years prior to the tax).

Monitoring: Denmark’s official monitoring programme for the aquatic environment provides a national balance of the phosphorus surplus, but provides no breakdown on impacts of individual policy instruments.

Evaluation: The 2008 mid-term review of the Action Plan for the Aquatic Environment noted that available data did not allow for a thorough assessment of the impact from the tax. Revenues remain about three times higher than expected, indicating less substitution of mineral phosphorus through enzymes than expected.



4 Insights into future potential/reform

4.1 Actual Planned reforms and stakeholder engagement

There are no planned reforms and no current attention from stakeholders.

4.2 Suggestions for future reforms – instrument design and civil society engagement

Under the mid-term review of the Action Plan for the Aquatic Environment one working group reviewed the animal feed phosphorus tax and considered options for reform (Ministeriet for Fødevarer, Landbrug og Fiskeri and Miljøministeriet, 2008). World market prices for phosphorus were peaking at the time of the mid-term review with prices six times higher than at the time of adoption of the tax, which implied that both the existing tax rate and any increase of it (the group considered a doubling to DKK 8 (EUR 1.1 per kg of phosphorus)) would have limited influence on actual demand, and thus have limited credibility in environmental terms. The report briefly mentions that the tax might be directly linked to world market prices, but does not provide any analysis of this. World market prices are presently (2016) still about twice as high as they were in 2004.

The tax would be environmentally considerably more effective if it applied not only to mineral phosphorus but to phosphorus at large, including phosphorus in mineral fertilizers (see working group analysis in Miljøministeriet; Ministeriet for Fødevarer, Landbrug og Fiskeri; Skatteministeriet (Ministry of Environment, Ministry of Food, Agriculture and Fishery; Ministry of Taxation) (2004).

4.3 Suggestions for replicability

Farmers are adding enzymes to animal feed phosphates to improve on bioavailability of phosphorus in several other countries, but it might not be common practice. In view of dwindling phosphorus reserves globally a wider adoption of animal feed phosphorus taxes could support demand management.

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