

# Derogation farms in catchments to Phosphorus sensitive lakes

Scientific note from DCE – Danish Centre for Environment and Energy

Date: 20. December 2023 | **66**



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# Data sheet

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Category: Scientific briefing

Title: Derogation farms in catchments to Phosphorus sensitive lakes

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Publisher: Aarhus University, DCE – Danish Centre for Environment and Energy ©  
URL: <http://dce.au.dk/en>

Year of publication: December 2023

Referee: Gitte Blicher Mathiesen

Quality assurance, DCE: Signe Jung Madsen

External comments: Danish Environmental Protection Agency was invited to comment. No comments received.

Please cite as: Andersen, H. E., 2023. Derogation farms in catchments to Phosphorus sensitive lakes. Aarhus University, DCE – Danish Centre for Environment and Energy, 8 pp. Scientific note no. 2023|66

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Abstract: In connection with negotiation of a possible extension of Denmark's derogation from the Nitrates Directive), the Danish Environmental Protection Agency (MST) has asked DCE to provide a risk map for phosphorus loss in catchments of phosphorus sensitive lakes, with indication of fields benefiting from a derogation in these areas, including the total number of hectares under derogation. For three water districts (Jylland-Fyn, Sjælland and Bornholm), the inventory showed that the phosphorus field balances for cattle derogation farms were not significantly different from any of the other farm type phosphorus field balances. For one water district (International), The phosphorus field balances for cattle derogation farms were significantly lower than phosphorus field balances for poultry and significantly higher than field balances for sheep, but not significantly different from any of the other farm type phosphorus field balances.

Number of pages: 8

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## Preface

In connection with the negotiation of a possible extension of Denmark's derogation from the Nitrates Directive), the Danish Environmental Protection Agency (MST) has asked DCE to provide data for the following topics:

- Risk map for phosphorus loss (catchments of phosphorus sensitive lakes), with indication of fields benefiting from a derogation in these areas.
- The total number of hectares under derogation in catchments of phosphorus sensitive lakes

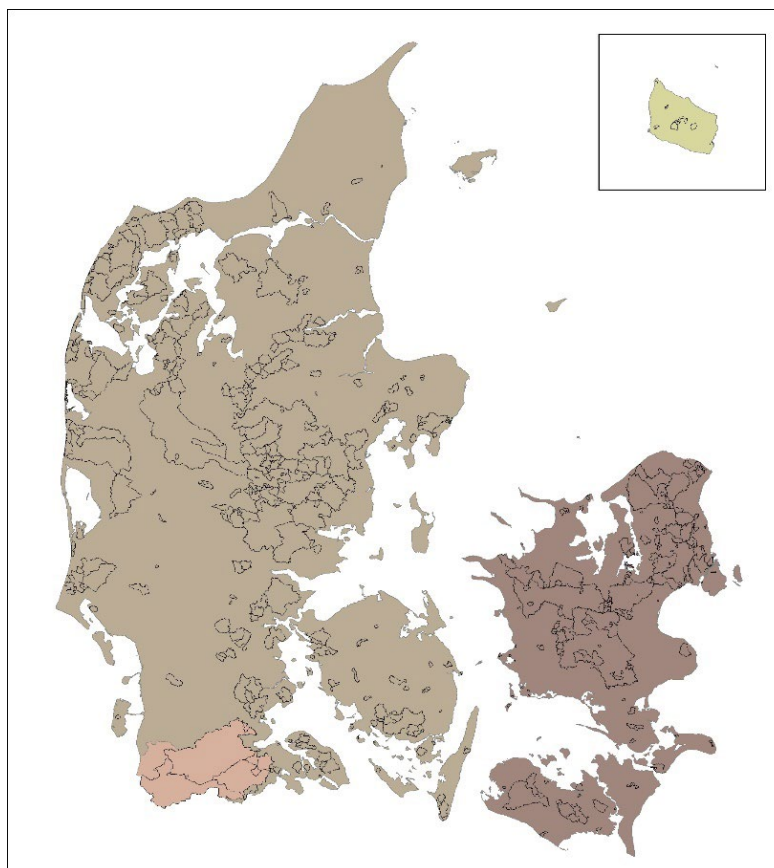
The derogation from the Nitrates Directive allows cattle farms to apply up to 230 kg N/ha as organic fertilizers if they comply with a number of requirements for the share of fodder crops, catch crops and nitrogen-fixing crops on these farms' cultivated area. In order to ensure that the objective of the Nitrate Directive can be fulfilled despite the derogation, monitoring shall be conducted, in order to provide data on nitrogen and phosphorus in the soil profile and nitrates concentrations in surface and groundwater, both under derogation and non-derogation conditions. The results of the monitoring shall be reported to EU annually. DCE contribute to this annual report with an analysis of the development in agricultural practices and leaching (Rolighed et al. 2023). In addition to this report, MST has required an inventory of cultivated area and phosphorus field balances for cattle farms having a derogation compared to other farm types in these catchments.

DCE, AU has received GIS files for relevant lake catchments from MST. AU has merged these together with information on cultivated crops and calculated field balances in the catchments, the latter following the same method for calculated nitrogen field balances as used for DCE's annual contribution to the derogation reporting.

## Area and P-balances for derogation farms in catchments to Phosphorus sensitive lakes

In total, 504 catchments to phosphorus sensitive lakes have been identified. The lake catchments are located in the four water districts as illustrated in figure 1.

**Figure 1.** Location of 504 catchments to phosphorus sensitive lakes in four water districts: Jylland-Fyn, Sjælland, Bornholm and International district.



Each field in each lake catchment is assigned a farm type: cattle, derogation cattle, pigs, poultry, plants, sheep, or mixed farm. Based on information from each farm on purchased inorganic phosphorus fertilizers, own production or import of organic phosphorus fertilizer and import of phosphorus in e.g., waste products, the total phosphorus input to each field is calculated. By subtracting the amount of phosphorus removed by harvest assuming standard yields, a phosphorus field balance is constructed for each field. Data for 2021 is used.

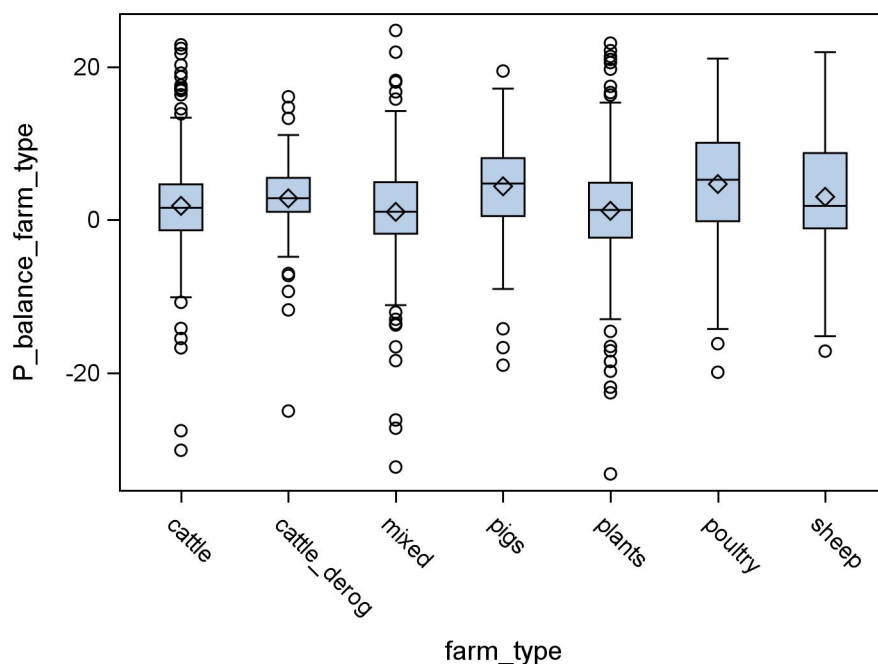
In total, the 504 lake catchments include 141,679 fields covering 632,673 ha. Of these, 6995 fields with a total area of 38,066 ha belong to cattle derogation farms, table 1.

**Table 1.** Number and area of lake catchments per water district and number of lake catchments with derogation farms and the total field area of derogation farms.

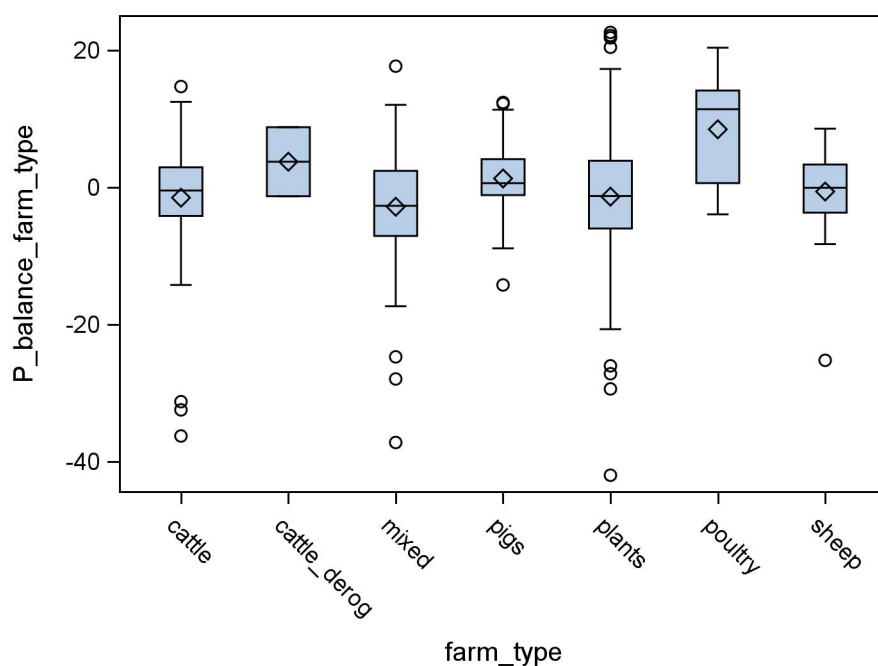
Water district	Number of catchments	Total field area in catchments	Number of catchments with derogation farms	Field area of derogation farms
Jylland-Fyn	327	432,562 ha	117	27,854 ha
Sjælland	161	134,627 ha	2	120 ha
Bornholm	9	639 ha	0	0 ha
International	7	64,843 ha	5	10,091 ha

Subsequently, for each lake catchment, the area-weighted phosphorus balance per farm type is calculated and displayed in figures 2-5 for each water district.

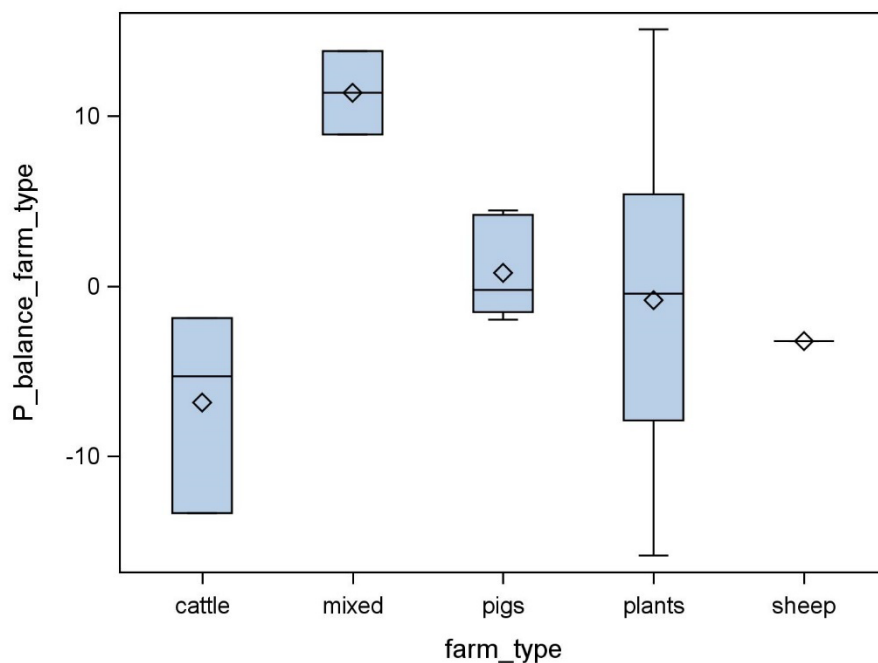
**Figure 2.** Boxplot of phosphorus field balances (kg P/ha) per farm type in catchments to phosphorus sensitive lakes in water district Jylland-Fyn.



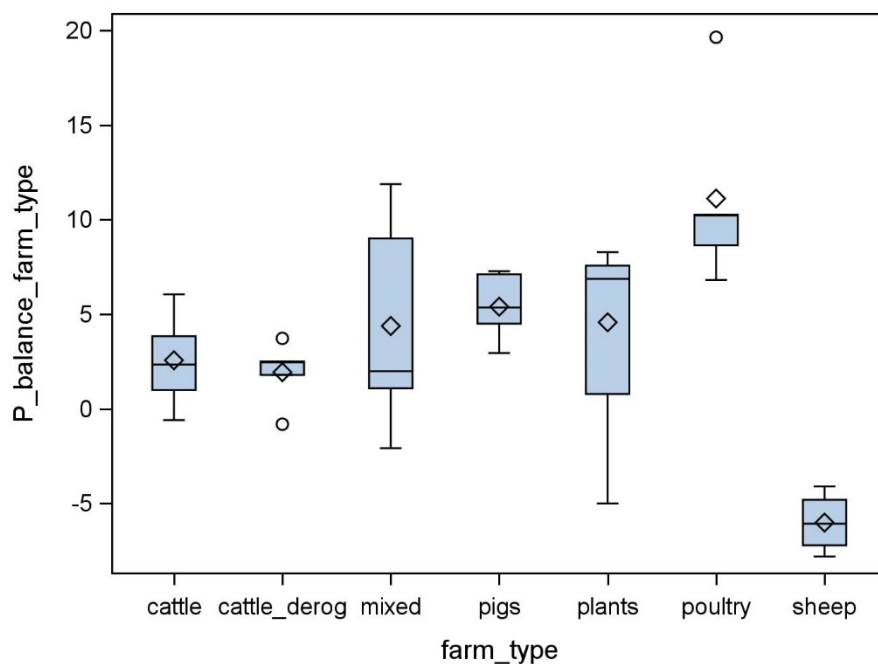
**Figure 3.** Boxplot of phosphorus field balances (kg P/ha) per farm type in catchments to phosphorus sensitive lakes in water district Sjælland.



**Figure 4.** Boxplot of phosphorus field balances (kg P/ha) per farm type in catchments to phosphorus sensitive lakes in water district Bornholm.



**Figure 5.** Boxplot of phosphorus field balances (kg P/ha) per farm type in catchments to phosphorus sensitive lakes in water district International.



For each water district, the farm type-specific phosphorus balances per lake catchment were analyzed statistically (one-way ANOVA with pairwise tests on least squares means adjusted with Tukey's method):

#### Water district Jylland-Fyn:

The phosphorus field balances for cattle derogation farms are not significantly different from any of the other farm type phosphorus field balances.

**Water district Sjælland:**

The phosphorus field balances for cattle derogation farms are not significantly different from any of the other farm type phosphorus field balances.

**Water district Bornholm:**

No derogation farms.

**Water district International:**

The phosphorus field balances for cattle derogation farms are significantly lower than phosphorus field balances for poultry and significantly higher than field balances for sheep, but not significantly different from any of the other farm type phosphorus field balances.



## References

Rolighed J, Thorsen M, Blicher-Mathiesen G. 2023. Miljøeffekten af den danske undtagelse fra nitratdirektivet til brug for afrapportering til EU-Kommissionen i 2022. Aarhus Universitet, DCE – Nationalt Center for Miljø og Energi, 34 s. - - Fagligt notat nr. 2023 | 61.