

Geographical Scenarios to Assess Environmental Risk of Veterinary Medicines in Europe

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Background

The current EU environmental risk framework for assessing veterinary medicines used to treat livestock is tiered, starting with simplistic calculations followed by refinement using the FOCUS suite of models. The refinement option comprises a conservative application scenario (application of manure to winter cereals in autumn) for assessing surface water exposure (6 drainage and 3 runoff scenarios) and groundwater (1 scenario, Okehampton). The FOCUS suite of models were designed to be broadly representative of pesticide usage in arable agriculture and the current risk assessment approach doesn't take account of geographical differences in livestock husbandry, farming practices and climate. In this poster we consider adopting 'zonal' scenarios that more closely represent geographical areas in Europe where climate, land usage and farming practices are similar.

Relevance of FOCUS scenarios?

In the development of the FOCUS scenarios non-cropped areas (e.g. pasture) were excluded and scenarios were restricted to climate, slope and soil combinations considered representative of arable agriculture. Consequently FOCUS surface water scenarios are more appropriate for modelling manure application to arable crops. Manure application to grassland and excretion during grazing are not necessarily covered (Figure 3).

Cropping

Fodder areas (Figure 4) are an important indicator of where manure will be spread on grassland, as manure is used to replace nutrients lost from hay and silage production. Permanent grassland areas (Figure 5) represent both pasture/meadows used for intensive grazing and rough grazing areas which have lower stocking densities. The distribution of land used for fodder and permanent grassland is influenced by climate, topography and soil type as well as local animal husbandry practice.



Figure 1 – EPPO Climatic Zones and EU PPP Authorisation Zones (EPPO¹)

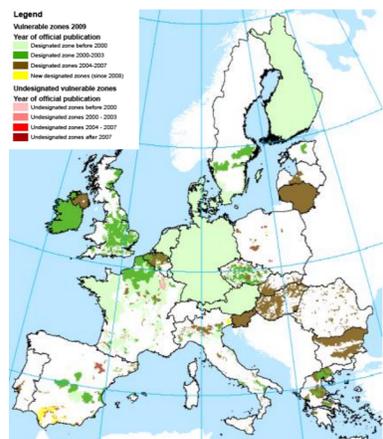


Figure 2 – Nitrate Vulnerable Zones in 2009 (Commission, 2010²)

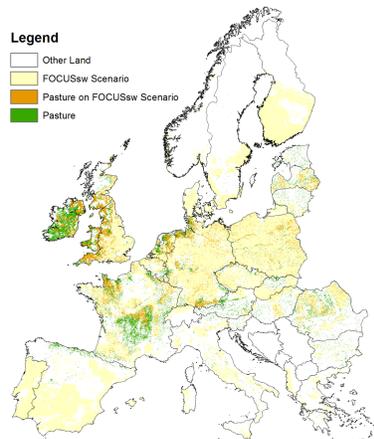


Figure 3 – EU area represented by FOCUS scenarios and pasture (FOCUS, 2001³)

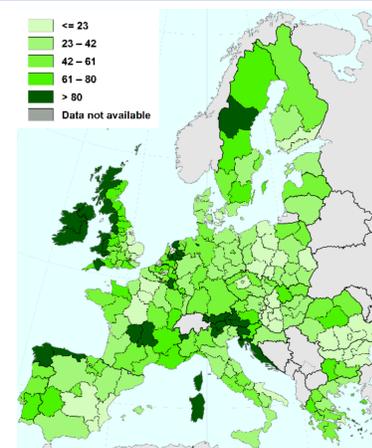


Figure 4 – Share of fodder area in 2013 (%) (EUROSTAT⁴)

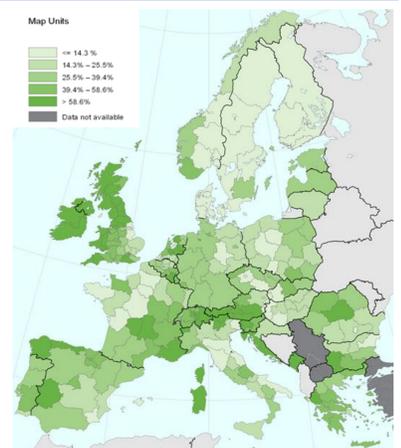


Figure 5 – Share of permanent grassland in 2010 (%) (EUROSTAT⁴)

Nitrate Vulnerable Zones (NVZs) – Some Member States (MS) and regions within MS are designated NVZs (Figure 2). Restrictions on manure application is likely in these areas (e.g. in the UK most soils have a 3 ½ month closed period for grassland and a 4 month closed period for tilled land).

Alternative manure disposal routes – Other alternatives adopted to reduce emissions and control odour include incineration and biogas production. This is of growing importance in some MS (e.g. in Denmark currently 10%; planned 50% by 2030).

Eastern Europe – Should we consider how representative the current ERA framework based on farming practices in Western Europe is for Eastern Europe (e.g. climate and farming practices)?

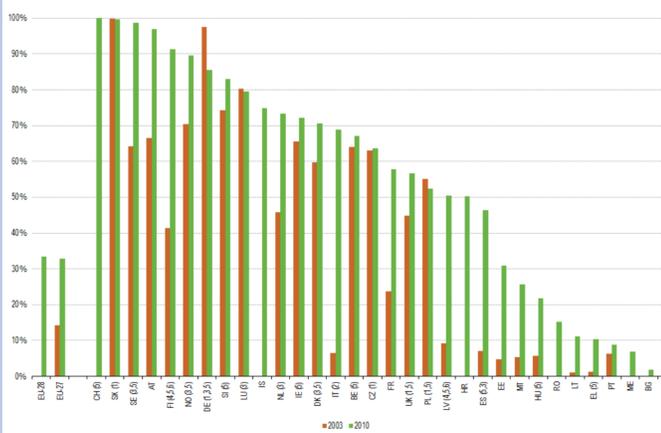


Figure 6 – Share of holdings with livestock and manure storage facilities in total holdings with livestock in 2003 and 2010 (EUROSTAT⁴)

Manure storage facilities - Northern and central MS generally have a greater share of livestock holdings with manure storage facilities than livestock holdings in southern and eastern MS (Figure 6). Other factors to consider alongside this data are the number of livestock per holding and area/type of holding.

Manure storage capacity – Regional differences observed for pigs. Solid manure stored 4-6 months but longer storage times are common in Sweden and Finland. Slurry stored for 6 months but shorter periods for some central and southern MS and longer periods for other central and northern MS.

Changes in behaviour – Figure 6 illustrates changes in farming practice over a relatively short period of time (7 years). Should the ERA framework be flexible to include changes in behaviour and uptake of technology across the EU?

Zonal approaches in PPP regulation

To aid mutual recognition and harmonisation at Annex III, Northern, Central and Southern Zones are defined for countries with similar environmental, climatic and agricultural conditions (Figure 1). These contrast with the EPPO climate zones (Figure 1) used for evaluating PPP efficacy trials which are defined according to comparable climate. Acceptable FOCUS scenarios for individual MS differ and are defined by individual MS to be relevant to their climate, soil and topography.

Where next?

Zonal approaches are adopted in other regulatory frameworks (e.g. PPP) and this could provide a starting point for veterinary medicine ERA. As part of EU agriculture policies, data is collected across the EU on farming practices and this could be utilised to develop more representative scenarios, especially for permanent grassland and fodder areas. Cluster analysis is one means to identify EU regions with comparable climate and soil to inform pesticide efficacy and environmental impact^{5,6} and could be used in a similar way to identify EU regions or 'zones' with comparable climate, livestock production and farming practices. This is not dissimilar to the ranking approach conducted by Mackay et al.⁷ to identify relevant livestock production areas as part of the development of the VetCalc model. The VetCalc model is no longer favoured by regulators, due to the robustness of the FOCUS models at modelling drainage and runoff processes. However, the scenarios developed within VetCalc provide a good starting point for characterising geographical scenarios relevant to veterinary medicines and if used in conjunction with the FOCUS suite of models would draw on the strengths of both in defining a more 'zonal' approach to the ERA of veterinary medicines.