

The Danish experience: The consequences of reducing the nitrogen input below the optimal rates of the crops

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Since 1980, Danish agriculture has reduced its environmental impact remarkably. The loss of nitrogen to the sea has been reduced by 50 per cent, and the nitrogen content of the ground water is decreasing. The main reason for that is a much better utilization of the nutrients in organic manure. In the 1980s, nitrogen in farmyard manure and slurry was hardly taken into account when calculating the need for chemical fertilizers.

30 years ago, the capacity for storage of slurry and the application machinery was insufficient for optimal application. Much of the slurry was applied in the autumn with heavy losses and insufficient benefit for the crops. Due to lack of knowledge concerning the exact fertilizing effect, farmers often on top on that applied too much nitrogen to be sure that the crops had been sufficiently supplied. During the 1980s and 1990s a lot of research and trial activities was conducted, which made it possible for us to describe how to get the maximum benefit of the slurry which reduced the need for supplementing chemical fertilizers.

The drivers

There were more drivers for this evolution.

- Farmers were, like other responsible people, more and more aware of the need for reducing the loss of nutrients to the environment
- The loss of nutrients was also loss of money.
- New R&D and field trials demonstrations had shown how to do it.
- Political water protection plans including 9 month of storage capacity for animal manure, maximum norms for nitrogen application to the individual crops and a minimum utilization of nitrogen in organic manure.

Until 1999, the yields of the crops were only slightly reduced due to the reduced input of nitrogen, and most farmers were happy (Figure 1).

The political disaster

In 1999, the Danish Parliament decided to reduce the maximum norms by 10-20 percent. The result is that the trend of yield increase has slowed down, and the protein content of the crops is extremely low (Figure 2). The result is that, every year, the Danish farmers lose 100-250 Euros per hectare, on average.

A new regulation is needed

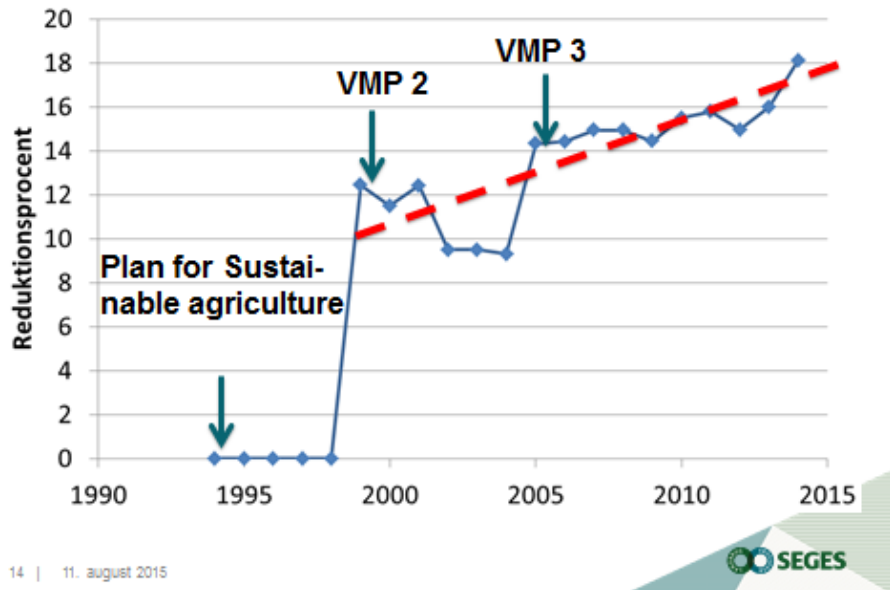
To make Danish agriculture competitive again it is necessary to ensure enough nutrients for the crop. We have to re-evaluate what is necessary to implement the Water Frame Directive. The new government is probably going to accept optimal amounts of nitrogen within 3 years, and the details for that have to be settled in the near future.

There is a growing agreement that it shall be possible again to supply the crops with their need for nutrients. If this results in too high a load of nitrogen to the coastal waters, new measures will be needed.

For the time being a lot of R&D is going on. Concerning for example:

- Re-establishing of eelgrass in the coastal waters
- Production of mussels and seaweed to clarify the water and to remove nutrients
- Constructed wetlands
- Intelligent buffer zones
- Controlled drainage
- Early sowing of winter cereals
- Catch crops

REDUCTION OF THE N-RATE FROM OPTIMAL

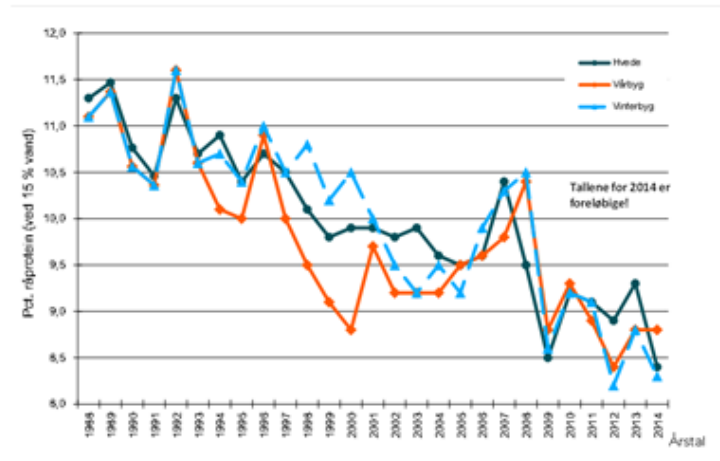


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Figure 1. Reduction of the N rate from optimal (1995-2015)

PROTEIN CONTENT IN CEREALS 1986-2014



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Figure 2. Protein content in cereals (1986-2014)