Project brief

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External review and quality assurance of the emissions calculation: coordination, evaluation and implementation of improvements and corrections

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- **The methodologies of the agricultural emissions inventory in the areas of cattle farming, poultry farming and biogas production have been reviewed**
- **Recommendations for changes and expert judgments have been developed**
- **Annual data for the agricultural emissions inventory have been delivered**

Background and purpose

At the international level, Germany has committed itself to reducing emissions of greenhouse gases and air pollutants. These are the UN Framework Convention on Climate Change (UNFCCC), the Convention on the Reduction and Prevention of Transboundary Air Pollution (UNECE Convention on Long-Range Transboundary Air Pollution, CLRTAP) and, in the European Union, the establishment of upper emission limits for some substances, among others Ammonia (NEC directive).

As part of the international agreements, the national emissions of the corresponding gases and air pollutants must be calculated annually and transmitted to the responsible organizations in the form of an emissions inventory. The Thünen Institute of Climate-Smart Agriculture annually prepares the national inventories for emissions of greenhouse gases, air pollutants and dusts from agriculture. The agriculture sector includes emissions from animal husbandry and the use of agricultural soils, as well as from the digestion of energy crops. Emissions from activities preceding agriculture, from the use of energy and from land use change are reported elsewhere in the national inventories.

For the most important emission sources, there is an obligation to apply detailed calculation methods. In the context of policy advice, there is also interest in the most detailed calculation methods possible in order to be able to discover and examine options for reducing emissions. For this reason, the methods for calculating emissions from German agriculture in the field of animal husbandry have been continuously developed in recent years.

The calculation approaches are examined both in the context of the official reviews of the national emissions reporting and in reviews initiated by the Thünen Institute itself. The results of the reviews must be integrated into the reporting in the form of corrections and improvements, and this must be documented.

The results of the official reviews are integrated into the national quality management, evaluated, necessary corrections implemented and improvements developed and implemented. Own reviews are commissioned according to an internal list of priorities and carried out by the Association for Technology and Structures in Agriculture (KTBL).

Methods

During the project period, the methods used in the German agricultural emissions inventory to calculate emissions from cattle and poultry farming were analyzed in detail by KTBL. Here, data on feeding and the emission factors used were compared with currently available literature. Where necessary, recommendations for changes were drawn up, most of which have already been incorporated into the German greenhouse gas inventory. In individual cases in which no literature was available, expert judgments were given.

In the field of cattle husbandry, reviews and improvements were made to estimate the weight and feed rations of dairy cows, the energy requirements of suckler cows and heifers, with a focus on grazing and nitrogen excretion from suckler cows. In the area of poultry farming, all emission factors used were checked for topicality and consistency, and the feed rations, animal weights, nitrogen excretion and litter quantities used in the emissions inventory were compared with current data.

The following activity data for calculating emissions were made available to the Thünen Institute annually:

1. Data on biogas production from manure and energy crops, at the state and district level.
2. Data on the distribution of air scrubbing systems in the pig and poultry sector.

In addition to the creation of numerous reports and statements for the Federal Ministry of Food and Agriculture, we also worked on various committees, created publications for KTBL and association publications and gave lectures at various conferences and meetings.

Results

As part of the analysis of the cattle models, various suggestions for improvement were developed: In order to better represent the initial weight of the dairy cows, a coefficient was estimated with which this can be derived from the slaughter weight. The coefficient is now used in emissions reporting. The additional energy requirement of suckler cows and heifers due to grazing is now explicitly calculated in the respective animal models after a literature study on this has been carried out. A review of the calculation of the faecal N excretion of dairy cows showed that the model agrees well with data from field studies and should continue to be used as it is.

When reviewing the poultry chapters, it was noted that there is a more up-to-date source for N excretions from geese. This is now used in the emissions inventory. It was also shown that there have been significant improvements in nitrogen efficiency in poultry feeding over the past two decades. From the 2022 emissions inventory onwards, these will be included using updated data on broiler feeding.

Since there were no available literature sources for the required input data or emission factors in some areas, the following expert judgments were drawn up: An ammonia emission factor for the application of manure in short vegetation and a nitrous oxide emission factor for the storage of solid manure. Another expert judgment was drawn up on the amount of litter when keeping male beef cattle.

Further Information

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