Prax-REDUCE - Implementation of urease in-hibitor formulation for ammonia mitigation in the cattle farming

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Too many ammonia emissions from agri-culture are still released into the environ-ment. 86% of ammonia emissions from German agriculture are caused by animal husbandry especially by manure manage-ment. To achieve German obligations un-der Directive (EU) 2016/2284 to reduce ammonia emissions, by 5% for any year from 2020 to 2029, by 29% from 2030, further measures are necessary.

One possibility could be the use of an ure-ase inhibitor (UI) to inhibit the conversion of urea to ammonia in the urine of ani-mals. The effectiveness was already demonstrated in the project REDUCE. Under practically relevant conditions in naturally ventilated dairy barns signifi-cant reductions of ammonia emissions by 40 to 60% were proven by regular apply-ing urease inhibitor (UI). Through the Project Prax-REDUCE, the UI usage shall be transferred and established in broad agricultural practice (dairy/cattle farm-ing).

Therefore, a feasible technique will be developed for automatically daily dos-age, mixing and application of the UI for formulation on the stable floor. Two con-cepts for the application technique will be pursued:

(1) robotic manure scraper and

(2) flexible hose drop system.

In addition to good application tech-niques, also a qualified proof of safe us-age must be provided.

This evidence based on exposure scenarios and exposure data obtained under stable conditions. Fluorometry is a methodical approach to measure those exposures. For this pur-pose, the fluorescent dye pyranine is sprayed as a tracer instead of the UI. Col-lectors such as filter paper, petri dishes and plastic strings can be used and placed in certain areas of the barn or on a cow model to collect exposures. In a first ap-proach, studies were performed to eval-uate the suitability of the different collec-tors to detect a wide range of exposure levels. Depending on the applied amount of pyranine, some of the collectors are more suitable than others to detect the exposures precise enough.

Filter papers proved to be suitable for high exposure levels as there is no drip-ping. However, due to the fact that the filter material has a certain amount of flu-orescence by itself, very small quantities of the applied fluorescent dye pyranine could not be detected properly. Plastic strings appeared to be more useful to de-tect small pyranine exposures.

For further method development, an im-provement of the lab analysis and systematic testing of further collectors is necessary.