

Untersuchung zur Minderung der Ammoniakemissionen im Rinderstall durch ein Spaltenbodenreinigungssystem

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Summary

Keeping dairy cattle in loose housing highly contributes to the emission of ammonia, which leads to acidification and eutrophication of the environment. Especially the natural ventilation of the barns makes it difficult to calculate and to control emission factors. Soiled walking areas and slurry storage provide a large surface with a high emission potential. Therefore it is important to take measures in the field of livestock husbandry in order to reduce ammonia emissions. The self cleaning effect of slatted floors used in dairy barns is only given by a low degree. In order to remove faeces and urine from slatted floors, an adequate cleaning method is required.

In this study, the potential to reduce ammonia emission with a special cleaning device for slatted floors was investigated. The cleaning device combines a mechanical removal of faeces from the walking area (rubber scraper) with an unblocking of the gaps (star rotors) and a high-pressure cleaning with water. To be able to assess the ammonia emission from the slatted floor, a method was developed which allows the isolation of slat elements from the barn and an investigation inside measuring chambers under climatically controlled conditions. The ammonia emission from the slat element was determined via the "indophenol-method" (VDI 2461, 1974). Investigated parameters have been the effect of cleaning on the ammonia emission and the effect of the cleaning on the mechanical removal of faeces from the walking areas during different housing conditions and at different points in time after the cleaning. For comparison, untreated slat elements were investigated as a control. Furthermore, with the aid of a test stand the cleaning effect of the individual cleaning steps were investigated separately.

During the study inside the barn, only the version four hours after the cleaning during the pasture period showed a statistically significant mitigation of the

ammonia emission. Six hours after the cleaning and during the housing period this effect could not be found anymore.

It turned out that a cleaning device with even a three-step cleaning system, used once a day, is not able to reduce ammonia emission adequately. An alternative could be provided with an automatically run cleaning device, which traverses the walking area several times a day. However, compared to the control slatted floor the mechanical removal of faeces from the slatted floor showed a statistical significant difference at all times after the cleaning during the pasture period. The test stand revealed that during fresh soiling of the slatted floor a high-pressure cleaning with water reduces ammonia emission significantly.

Dealing with viscous manure, star rotors can unclog the gaps of slatted flooring and therefore reduce the amount of faeces on the walking area