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# When Cattle Stalls Require a Permit

## Evaluation of Cattle Stalls in Construction Permit Applications and Permit Procedures According to the Federal Immission and Ambient Pollution Control Act in Saxony

*After the Article Law from 27 July 2001 went into effect, cattle houses and facilities required a permit according to the Federal Immission and Ambient Pollution Control Act. More than 50% of the over 500 cattle facilities in Saxony which require a permit must be considered problematic. The Technical Regulations Concerning Air Pollution (TA Luft), which became effective on 1 October 2002, do not require any odour-related minimum distance from cattle facilities. The available data basis for process-dependent emission factors for ammonia and fine dust is insufficient as well. Therefore, regulations based on the VDI guidelines and TA Luft which are intended to facilitate the permit procedure for cattle facilities are being prepared in Saxony.*

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### Keywords

Cattle houses, minimum distance, odour, ammonia, fine dust, federal immission and ambient pollution control act, diffusion calculation

### Literature

Literature references can be called up under LT 03125 via internet <http://www.landwirtschaftsverlag.com/landtech/local/htm>.

The law regarding the implementation of the Amending Directive on Environmental Impact Assessment, the IPPC Directive, and other EC directives on environmental protection (Article Act) from 27 July 2001 stipulates that the construction and operation of a cattle housing or rearing facility (fig. 1) having at least 250 animal places or a calf housing or rearing facility having at least 300 animal places require official approval. These facilities are subject to the protection- and precautionary principle. According to TA Luft, the construction of facilities requires minimum distances from the nearest existing residential buildings or residential areas provided by the development plan in order to avoid nuisance caused by odour and to protect sensitive plants and ecosystems against ammonia immission.

However, the minimum distances for the avoidance of nuisance caused by odour which are required by TA Luft only apply to housing or rearing facilities for pigs and poultry. For cattle facilities, no uniform regulations for all of Germany have existed so far.

### Past Regulations

Until the Article Act from 27 July 2001 went into effect, cattle houses and -facilities only required a construction permit. The only exception was slurry storage facilities as of a capacity of 2,500 m<sup>3</sup>, which already required a simplified permit procedure before the revision of the 4<sup>th</sup> Federal Immission and Ambient Pollution Protection Decree. Since 1993, the Odour Immission Directive has been effective in Saxony. Thus far, however, the application of this directive to cattle housing has generally been limited to permits for larger new buildings, the extension of existing facilities, and conversion measures at critical locations. In these cases, the approving authorities demanded diffusion calculations with the aid of a suitable diffusion model (factor-10-model) (fig. 2). In the case of particularly critical locations in the close range, calculations based on the La-

gran particle model in connection with a wind field model were carried out as well. After the draft of the VDI guideline 3473 „Reduction of Emissions from Animal Housing – Cattle“ (which was later withdrawn), had been published, this draft was used as a „source of information“ by the approving authorities. The same has so far applied to the VDI draft guideline 3474 „Reduction of Emissions from Animal Housing – Odorants“.



Fig. 1: Modern outside climate house with eaves ridge and cross ventilation, automatic manure removal with scraper, feeding as TMR

Before the new TA Luft went into effect (1 October 2002), ammonia- and dust emissions had not been considered in construction permit procedures for cattle. Only in the case of slurry storage facilities having a capacity of >2,500 m<sup>3</sup> (facilities according to 9.36, 4<sup>th</sup> Federal Immission and Ambient Pollution Control Decree) and proximity to sensitive biotopes were ammonia emissions taken into consideration.

Thus far, permits for the conversion of stalls and facilities from tethered into loose houses have been granted in a relatively unproblematic manner, especially when the de-manuring system was not altered. Accordingly, the extension of the storage capacity of dung stores to 180 days was also approved in order to meet the requirements of the Saxonian Dung- and Silage Effluent Facility Decree. According to Saxonian Building Re-

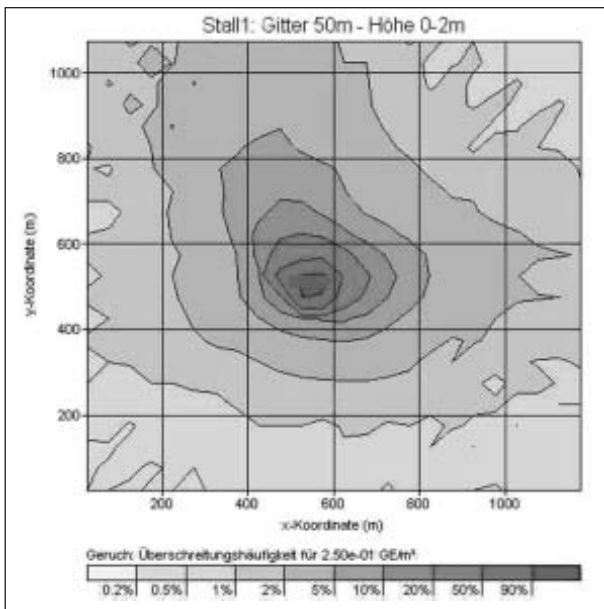


Fig. 2: Odour emissions in the vicinity of stable (diffusion simulation with a diffusion model)

On the basis of these data and the permissibility of a total contamination of  $10 \mu\text{g}/\text{m}^3$ , distance curves for an additional contamination of 5 and  $7 \mu\text{g}/\text{m}^3$  were plotted in addition to the distance curve of TA Luft ( $3 \mu\text{g}/\text{m}^3$  additional contamination).

For fine dust, distance curves for an additional contamination of 12, 20, and  $28 \mu\text{g}/\text{m}^3$  of air are available even though the determination of previous and additional contamination is problematic. However, the distance from residential buildings which can be calculated based on fine dust ranges below the distance curve for odours provided by the VDI 3473 (E) guideline given a permissible additional contamination of only  $12 \mu\text{g}/\text{m}^3$ , an assumed maximum fine dust emission of  $1 \text{ mg}/\text{m}^3$  of exhaust air, and an average air rate of  $300 \text{ m}^3/\text{LU} \cdot \text{h}$ .

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### Odour

Since TA Luft does not provide any distance requirements for cattle facilities with regard to odour and since the VDI 3473 guideline has been withdrawn while VDI 3474 only exists as a draft which is currently not being worked on (VDI commission dissolved), state regulations<sup>1</sup> are being developed in Saxony. These regulations are based on the VDI guidelines 3471 „Reduction of Emissions from Animal Housing – Pigs“ and 3472 „Reduction of Emissions from Animal Housing – Chickens“ as well as TA Luft.

In a process-technological part, the most common techniques of cattle husbandry are described verbally and in the form of drawings following the process steps stalling up, feeding, ventilation, and demanuring. In the process step stalling up, the emitting areas are shown using common measurements even if emission values or emission factors for these areas are not yet available. The paragraph „ventilation“ considers the trend towards cross ventilation with the required fresh- and exhaust air areas for cold animal houses in addition to the conventional ventilation techniques. The resulting exhaust air behaviour of the stalls is shown in the form of figures.

Analogous to the above-mentioned guidelines, the required distances are determined

with the aid of a point system. It is based on the system of VDI 3473 with stalling-up and demanuring technologies consistently being considered separately. Since systematic examinations of the emissions of different techniques are not available, the point system was deduced empirically.

The distance regulations themselves are based on both VDI 3471 and TA Luft. This means that facilities which do not require a permit may fall short of the 100-point limit and the distance from village areas and residential houses may be halved in the outdoor area. In the curve, an emission factor of  $12 \text{ OU}/(\text{s} \cdot \text{LU})$  is assumed. For old facilities, distance reductions will likely be permissible. Under certain conditions, the enveloping curve method of VDI 3473 (E) (fig. 3) may be employed for facilities consisting of several stalls.

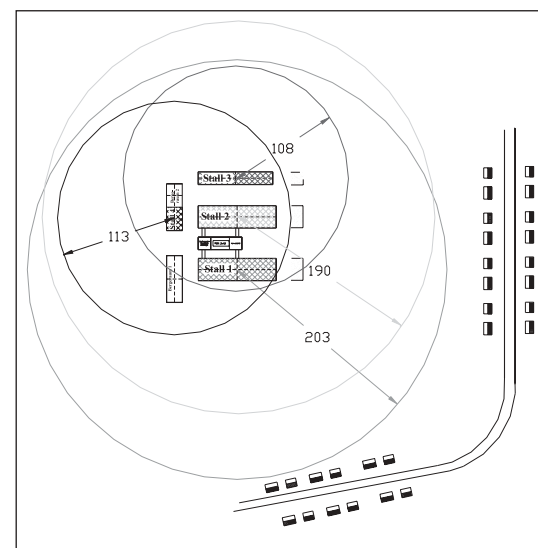
Under a separate point „noise“, the emission limits of Technical Regulations Concerning Noise Protection as well as some technical and organisational measures for the reduction of the noise level are described.

The point „evaluation of special cases“ contains proposals for distance regulations for small herds. These proposals are based on studies by Zeisig and Langenegger (1994) and the regulations in Lower Saxony. However, they are two-staged.

For diffusion calculations, this point also comprises literature references regarding emission factors for odour, ammonia, and fine dust. Especially the fine dust values, however, are subject to considerable variation so that their application in the individual case is difficult.

Additionally, measures for emission reduction (in particular of ammonia) are shown in the form of data from the literature.

Fig. 3: Distance assessment with enveloping curve method at different house occupancy



After cattle facilities had been listed as facilities requiring a permit according to Point 7.1 of the 4<sup>th</sup> Federal Immission and Ambient Pollution Control Decree, more than 500 cattle facilities in Saxony required a permit according to the Federal Immission and Ambient Pollution Control Act. According to the author's estimate, more than 50% of the locations must be considered problematic. This primarily applies to distance from residential buildings (distance <200 m) as well as distance from sensitive biotopes.

While TA Luft requires minimum distances from the nearest residential buildings for pigs and poultry with regard to odour, this does not apply to cattle facilities.

### Ammonia and Fine Dust

Currently, process-related emission factors for fine dust as well as reliable previous regional contamination values are not available because in Saxony relevant measuring stations only exist in conurbations and polluted areas (ridge of the Erzgebirge). For ammonia, TA Luft contains requirements regarding the emission factors of important housing technologies. Requirements concerning previous contamination, however, are only conditionally available. According to estimates of the Saxonian State Institute for the Environment and Geology, previous contamination in Saxony ranges between 2 and  $4 \mu\text{g}/\text{m}^3$  air.

<sup>1</sup> The state regulations are currently only available as a draft. Therefore, alterations of the described contents are possible.