Separation distances from livestock farms – results from a sensitivity study

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Odour dispersion models can calculate ambient odour concentrations and thus the separation distance between livestock buildings and residential areas defined by a pre-selected odour threshold and an exceeding probability. Here, the Austrian Odour Dispersion Model AODM will be used to calculate direction-dependent separation distances for three selected sites in Austria. AODM consists of three modules: (1) the emissions module which can take into account the daily and yearly course of emissions, e. g. due to animal activity; (2) the dispersion module, a Gauss model, and (3) the peak-to-mean module, which calculates peak concentrations in the range of 5 seconds, the average duration of a human breath. The peak-to-mean ratios are usually large and thus expected to be valid only close to the odour source. Due to turbulent mixing, the peak-to-mean ratios are reduced with increasing distance from the source. The separation distances will be calculated for two odour impact criteria: 1 OU/m^3 and 3 % exceedence probability, representative for pure residential areas (high odour protection), 1 OU/m^3 and 8 % exceedence probability, representative for residential areas mixed with commercial/industrial activity (low odour protection). For a North-Alpine and a South-Alpine site, direction – dependent separation distances will be calculated for a 1000 head pig fattening unit.

Direction-dependent separation distances will be shown for the two sites and the two selected odour impact criteria. The main focus is on the different methods to calculate the proposed reduction of the peak-to-mean ratio with increasing distance and its effect on the separation distances. This involves knowledge of the ratio standard deviation of wind components to wind speed, either from the literature or from ultrasonic anemometer data. The results show that the separation distances for the main wind directions are reduced effectively when using on-site meteorological information from sonics.