SUMMARY

Investigations about climate and air hygiene have been carried out at JBT:s research station Alnarp Södergård. A climate chamber has been equipped with a housing system for loose housed laying hens which also has been supplied with a manure system with conveyors below a draining floor.

How age, storage time of manure, ventilation rate, ventilation technique, bedding materials, fogging and showering with rape seed oil affect climate and air hygiene have been investigated during two production batches.

The age of the hens had no influence on the release of ammonia. However, the age had an effect on the amount of manure stored in the building which will influence the release of ammonia.

The investigations clearly showed that long time storage of manure will cause a rapid increase in ammonia concentrations. After about 7 days storage of manure in a bin the ammonia concentration will exceed the hygienic threshold limit value of 25 ppm. The release of ammonia from the bedding was considerably lower than from manure stored in a bin below a draining floor. The major reason why the release increases more rapid from manure stored in a bin is probably that the major part of the manure is left on the elevated slatted floor.

It was possible to keep the ammonia concentration below the hygienic threshold limit value when manure was removed daily in a bin. Housing systems with elevated slatted floors should therefore be equipped with manure systems that enable daily removal of manure.

Ammonia concentration decreases when ventilation rate increases. However, the decrease does not correspond to the increase in ventilation rate. The reason is that a high ventilation rate creates a high driving force for the evaporation of ammonia from the manure.

Ammonia release has been investigated when using six different bedding materials. The ammonia release between the materials differed a factor two. The lowest release occurred with chopped paper and peat as bedding materials. However, using peat resulted in dirty eggs and a poor classification of the eggs. The highest release occurred with gravel as bedding material.

The release of carbon dioxide was relatively constant after 120 days. Storage of manure in the bedding had no significant influence on the release of carbon dioxide.

Ventilation rate has a diluting effect on carbon dioxide concentration as there is a relatively constant release from the hens. Carbon dioxide concentration will therefore give information about ventilation rate in relation to animal density.

It could not be proved that the age of the hens had any influence on the production of dust. Other factors in the building environment are more important.
The storage time of manure in the bedding had no significant influence on the production of dust.

The ventilation rate had a limited diluting effect on dust concentration. The variations in dust concentrations have been large which indicates that there are other factors in the building environment which are more important for the dust concentration than ventilation rate. Ventilation rate had no significant influence on the production of dust. The investigations showed that it was a limited amount of the dust produced which was exhausted with the ventilation air. The major part of the dust produced settles on different surfaces.

The level of dust concentration of dust was about the same for the bedding materials wood shavings, LECA- pellets, peat and shopped straw. Shopped paper and gravel resulted in higher concentrations.

How different amounts of water which was fogged influenced dust concentration was investigated. Fogging resulted in a considerable reduction of dust concentration in all trials. The reduction in dust concentration was improved when the amount of water increased.

The effect of showering a mixture of 10% rape seed oil in water on dust concentration has also been investigated. The mixture was showered with full cone nozzles located above a draining floor. Showering the oil mixture reduced the dust concentration with 30 – 50%.

The air exchange at different locations was highest when ventilation air was exhausted at low level in connection to conveyors in a manure storage bin. High air exchange occurred when air inlets were located above the nests. Inlet air should have as long way as possible before it is exhausted. The lowest air exchange occurred in an alley with bedding.