

ASSESSMENT OF BIOAEROSOLS IN SWINE BARN



BACKGROUND & OBJECTIVE

Poor air quality in livestock buildings adversely affects animal health through a variety of mechanisms, and also enables the transmission of diseases, like Salmonellosis. In bioaerosols we have bacteria and fungi. The Gram negative bacteria (G-) are some of the most important pathogens for swine, and included fecal bacteria, like *Escherichia coli*, *Salmonella* sp., *Neisseria* sp., *Pseudomonas* sp., among others. Some studies have reported G- bacterial exposures in swine barns between 7×10^3 and 65×10^5 CFU/m³ (1), while others (2) reported significantly lower concentrations of 0.42 to 4.52×10^2 CFU/m³. Salmonella airborne transmission was proved possible by experimental studies (3,5). The infection dose found were higher than 10^6 CFU and depends of serotype.

AIM: To assess the bioaerosol contamination in swine barns and with this to obtain field information providing an insight into the possible risk of airborne transmission of Salmonella in swine herds. For this purpose **Gram negative bacteria (G-)** were used as an **indicator** of possible Salmonella presence.

MATERIALS & METHODS

DATA:

- ❖ One herd with post-weaning barns (active ventilation) and two types of fattening barns (passive versus active ventilation).
- ❖ Samples taken at the passages in the middle of the barn at a height near the nostril of the pigs.
- ❖ An air volume of 5 liters was aspirated to total bacteria counts and fungi and 30liters to G- counts.
- ❖ Samples taken once a month in January, February and April 2009 (winter to spring days).
- ❖ Temperature and humidity at the barn and outside the barn was recorded using a hygrometer.
- ❖ Potential differences between barns and months were tested.

MICROBIOLOGICAL ANALYSIS:

- ❖ The air was aspirated by “air IDEAL microbiological air sampler” (bioMérieux®) to 90mm diameter Petri dishes.
- ❖ Three types of culture media were used: Agar MacConkey for G-, Agar Gelose Tripcase Soja for total bacterial and Agar Sabouraud glucose cloranfenicol for fungi.
- ❖ The plates were incubated at 30°C/72h to total bacteria, at 37°C/48h to G- and at 25°C/5days (120h) for fungi.
- ❖ CFUs counts were corrected to most probable number of bacteria (MPN) and divided by the volume of air sampled and are presented as CFU/m³.

RESULTS & DISCUSSION

- Mean stocking densities were 20 pigs/pen in fattening pens (pens with 4x4m) and 25 pigs/pen in post-weaning pens (pens with 2x2m).
- Figure 1 and 2 shows the distribution of CFU/m³ fungi, total bacteria and G- for naturally and mechanically ventilated fattening barn and post-weaning barn.
- There were **no statistical difference** between barns for fungi, total bacteria and G- counts .
- Comparing the values of CFU/m³ of fungi along the months tested showed statistical differences ($p < 0.04$) between January and the rest of the months (Figure 3).

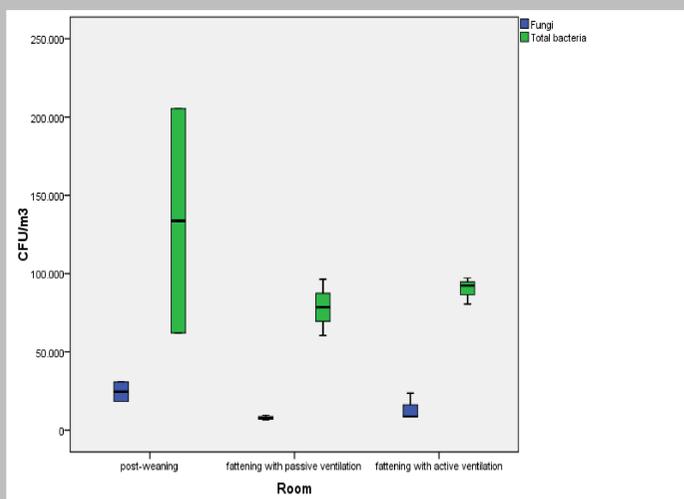


Figure 1: Distribution of CFU/m³ of total bacteria and fungi between barns

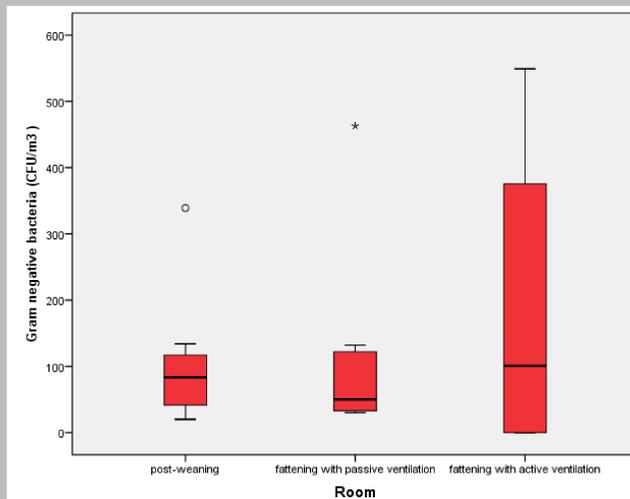


Figure 1: Distribution of CFU/m³ of G- bacteria between barns

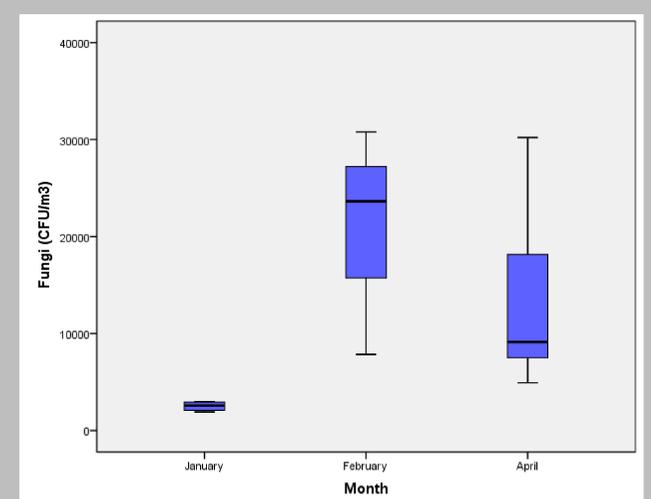


Figure 1: Distribution of CFU/m³ of fungi between months

CONCLUSIONS

- ✓ **High** levels of **total bacteria** and **fungi** concentration in all barns, similar to the ones found in others studies (4).
- ✓ This indicate **a highly contaminated air** with could favor the transmission of microbiological agents within the farms. The piglets are especially at risk because they have a poor immunity system and the results in the post-weaning barn were worst than in the others barns.
- ✓ The contamination with **G- was lower than expected**. It is lower than the one found in other studies (1) but agrees to with Chang's data (2).
- ✓ Using the G- bacteria counts as indicator of fecal contamination and of the possible presence of *Salmonella*, the concentration of *Salmonella* (if present) will be in lower than G- counts and under the infective dose of *Salmonella* trough the air, therefore the risk of airborne infection with *Salmonella* seemed negligible.
- ✓ Although the number of samples from the study was low we decided not to continue with this study because we felt that the results would not become different then the ones obtained.

REFERENCES

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