

Thomas Richter, Nürtingen

Mould Fungi – Indicating an Inconvenient House Climate

Even if mould fungi barely harm livestock directly (with the exception of mycotoxines), their existence reflects massive problems in the house climate. How this can be prevented, is presented in the following.

The physical and chemical conditions of the air in an animal house are usually summarized by the term house climate. Out of consideration remains frequently the close interconnection of these technical parameters with the living factors we summarize with the term germ pressure, the microbial concentration. Moulds, which usually can not be blamed to harm livestock directly – except of mycotoxines that can be

wrong. On a pasture, dandelion would be an example, which indicates a surplus of nitrogen. In a stable moulds do indicate a poor house climate. All these conditions of the environment do interact with all of the organisms in a house, the organisms by themselves - farm animals as well as pathogens or bio-indicators - are environmental conditions to all the other organisms. This is a complex ecological interconnection.

Let us have a look now on the most important parameters of house climate from the point of view of the microorganisms, especially the mould fungi and from the point of the farm animals.

Temperature

Microorganisms are not able to keep their body temperature constant by their own; they depend on the outside temperature. Too hot temperatures for microorganisms will not occur in our stables in practice. Cold temperatures frequently in non-insulated stables with out-door-climate will slow down their reproduction drastically. By this means alone, stables with out-door-climate are to be preferred, instead of fully insulated stables, for all the farm animal species, which can stand it. Do the farm animals have a requirement for higher air temperature in the resting area, which is the fact for small calves, for pigs and for poultry, to offer a small area with higher temperature, like igloos for calves, piglets' nests or chicken rings with heaters is to preferable to heating the whole stable to a constant warm temperature. If it is necessary to heat the whole stable, special attention must be paid to the air exchange.

Humidity

Microorganisms need – like any organisms – water for living. Moulds take their water often from the humidity, precipitation at walls and roofs. High humidity is often accompanied by high concentrations of noxious gases and germ pressure. In practice this will occur



Fig. 1: High humidity, e.g. in slurry storage underneath the floor, favours mould fungi growth

effective through the dust – belong to the same interconnection. To get a clear idea of the interrelation it is useful to imagine the animal house as a biotope, comparable with a field. The different living and not living factors influence all the organisms in the house. Are the conditions favourable, the organisms will spread and propagate, are the conditions miserable, they will become sick and die. Like on a field we will patronize some organisms even in a stable – the useful plants here and the livestock animals there – and repress some organisms – the pathogens. The best method is to optimize the conditions for the livestock and to minimize them for the pathogens. In addition there are some organisms, which do not harm a lot, but show as indicators that something is

Prof. Dr. Thomas Richter is a member of the scientific staff of the department agriculture at the college of economy and environment Nürtingen-Geislingen, Neckarsteige 6-10, D-72622 Nürtingen; e-mail: thomas.richter@hfwu.de

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because of inadequate air exchange rate and/or large surfaces which emit water. This is the case when storing slurry underneath the floor. In addition high humidity will damage the fabric of the building and the stable's equipment.

50% to 80% humidity for all livestock species and age groups are recommended.

Air flow

The air flow in a stable barn does not influence the mould fungi growth directly. But sufficient ventilation will dry the house air and will extract the heat. Bad conditions for moulds but good for farm animals, because the noxious gases are extracted as well, which do not harm the moulds but harm the farm animals badly.

Noxious gases

More important than extracting the gases would be to prevent their emergence (and the into the air, which shall not be our concern at the moment). By this the knowledge of the gas origin is necessary. You have to distinguish between gases that originate mostly from the animals like carbon dioxide (CO₂) from exhaling and gases that are formed in the stable environment. Of course there are gases with both sources like methane (CH₄). The CO₂ emission of the lung and the CH₄ production in the rumen of the ruminants are correlated mostly to the body mass of the animals and the duration. A remarkable influence of stable construction, feeding or management to the gas production can not be seen. The concentration of these gases in the air of the stable is correlated with the number of animal per space and the air flow rate. On the other hand ammonia (NH₃) is a product of the metabolism of microorganisms from urine and – as well as hydrogen sulphide (H₂S) – from the amino acids in the faeces. The microbiological activity depends on substrate, temperature, moisture and duration of storage; but these are the factors again, which influence the growing of moulds. Removing the excrements quickly from the stable, e.g. with an automatically working scraper, reduces the production of ammonia and hydrogen sulphide as well as a low temperature of the slurry, or the dropping drying in poultry houses and hence indirectly the growing of moulds.

Stable designs, which reduce the gas production by removing the excrements quickly, combined with temperatures as low as possible, in poultry even with drying the excrements, minimize the mould growing as well. In addition most effective ventilation is recommended.



Fig. 2: Fast removal of excrements from the stable reduces noxious gas formation and indirectly the growth of moulds

Light

Light has a lot of functions in animal husbandry. Animals and humans need it for seeing first. In addition light is a pacemaker for rhythmically recurring events, physiological, or ethological. Best known is the light-dark-rhythm during a day, influencing mostly the periods of activity or resting, or the change in the length of daylight, which influences the oestrus cycle in animals which have different sexual activity around the year. Not often taken into consideration is the influence of the light spectrum to the animals. Observations from farmers indicate that the UV-fraction of the sunlight plays an important role to health and fertility. Some authors attribute the positive effect that stables with out-door-climate have especially to

calves and cows, even to the influence of the UV-part of the sunlight. In any case, UV-light is very useful to reduce pathogens, especially viruses, but even moulds. Well illuminated houses are often well ventilated and dry in addition, too, which is good for the livestock and bad for the mould fungi.

Dust

Dust itself has little impact on the growing of moulds. But dust is extracted by good ventilation. So dust is mostly just an indicator for bad house climate in general.

But if the dust contains mould fungi, the toxins produced by them can do their damage to the mucosa of the respiratory tract of the farm animal.

The book you will be interested in:

Krankheitsursache Haltung, Beurteilung von Nutztierställen - Ein tierärztlicher Leitfaden.

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