

## **Practical advice for cleaning of stables**

This document is a guide containing practical advice for the routine cleaning of stables in cattle farms. If sanitation against specific infectious agents is required, other strategies and methods might also be needed.

## **What to think about before you get started?**

### **Planning**

To optimise the efficiency of the stable cleaning, adequate planning prior to beginning the work is required. This step should include surveying the different stables to plan for the most suitable cleaning method.

Cleaning during summer has many advantages. Most often, the stables can be completely or partially emptied when animals are released out to pasture, and the season also allows for a faster drying-up period after cleaning. Other factors, making summer the best period for cleaning, may be that the efficiency of cleaning detergents and disinfectants for cleaning and disinfection may be reduced at lower temperatures.

### **Prerequisites: electricity, water, drainage**

High pressure washers usually require 16-21 litres/min of water. Drainage needs to be addressed, most often through the manure removal system. In buildings with inadequate draining, cleaning water can be handled by scraping the water using a rubber scraper to a suitable area where it can be removed with a water vacuum cleaner and moved to a well or culvert. The integrity and safety of the electricity needs to be ensured not to run the risk of starting fires. Around certain types of equipment, such as fuseboxes, cleaning with water must be carried out very carefully or avoided. Cleaning with water usually results in a very high air humidity in the cleaned space, which may affect electric installations.

### **Materials and reparations**

For surfaces that have had a lot of wear or are very uneven, it is recommended to replace parts prior to cleaning, since holes, porous concrete, rugged/rotten wood and so forth, make it more difficult to remove dirt and bacteria with water and cleaning detergents. Cavities can create microclimates that are suitable for bacterial growth.

### **Protective equipment**

Examples of protective equipment that may be needed are gloves for handling certain chemicals or face masks for working in dusty and foggy settings or for handling of slake lime. Be careful to cut the power as well as to put up information signs when cleaning spaces with hazardous automatic equipment.

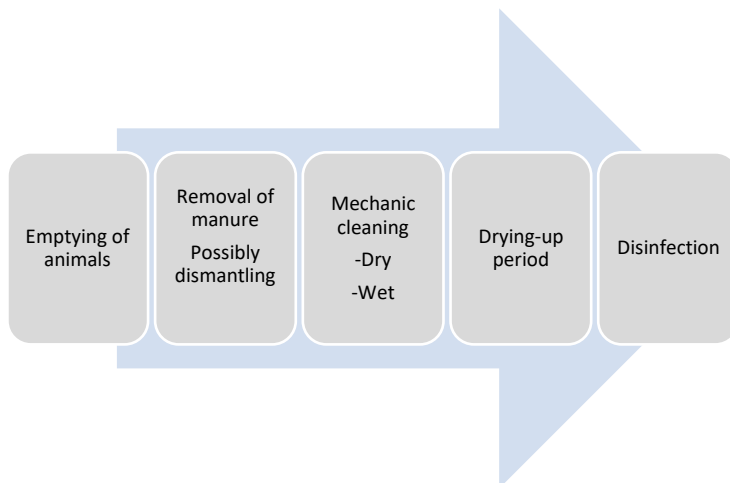
### **Pest control**

Washing and cleaning of stables may increase the activity in existing populations of vermin (rats and mice). Intensified pest control could therefore be a precaution in connection with cleaning of stables.

## Methods for cleaning

General principles for an annual stable cleaning are emptying of stables of livestock, removal of manure, mechanical cleaning (with or without water), drying-up period and disinfection. The procedure needs to be adapted to the local conditions; for instance, wet cleaning may not be suitable in wooden feed silos, and in some stables the emptying of animals may have to be done in different sections/groups.

Figure: Principles for cleaning



Mechanical processing, temperature, time and cleaning detergent all work together (The Zinner circle). In practice, this means for example that at a low water pressure, additional mechanical cleaning using a brush may be needed.

## Emptying of stables

During the cleaning of stables, it is recommended to empty the stable of animals. The cleaning is more easily undertaken in empty stables and the risk of disease transmission to any remaining animals is minimised. Preferably, stables are left empty during the drying up-period. When a complete removal of animals is not possible, a sectioned emptying should be done. Emptying the stables in larger sections facilitates cleaning more efficiently.

## Removal of manure/initial cleaning

Removal of manure and a basic cleaning are prerequisites for all types of cleaning regardless of the method of cleaning that will be used later. The basic initial cleaning should comprise of removing loose parts and furnishings and cleaning the feeding points from old feed.

## Dry cleaning in addition to the removal of manure

If wet cleaning cannot be carried out, for instance when cleaning uninsulated stables in winter, dry cleaning (without using water) may be an option. Dry cleaning means that all visible dirt and manure is removed through scraping or brushing. To obtain sufficient reduction of infectious agents, an extended downtime period should be applied. Powdered disinfectants can be used after dry cleaning. Slaked lime has a disinfecting effect. There are several commercially available substances that can be used for hygienic purposes.

## **Soaking**

Soaking surfaces prior to cleaning will dissolve the dirt and facilitate its removal which will make cleaning more rapid (it can decrease the cleaning time with up to 40% according to some sources). The soaking can be undertaken one or a few days prior to cleaning. To optimise the effect of the soaking, the surface should be consistently damp. Preferably, the soaking can be done frequently with smaller amounts of water, or throughout continuous application of water. Pressure washers set on low pressure, water hoses or sprinklers can be used to soak the surfaces.

## **Low pressure cleaning**

Washing using water at a low pressure, for example using a hose without a high pressure unit, may be an alternative for surfaces not suitable for high pressure cleaning. This method could also be preferable when the risk of disease transmission through aerosols is increased, for example when animals are present in the stables. The aim is to achieve sufficient cleaning results without spraying or splashing facilities where animals are kept, but without using a high-pressure cleaner. In order to obtain adequate results, the washing usually needs to be combined with mechanical cleaning (brushing/scrubbing). Scrubbing brushes on long shafts offers a good work position and facilitates powerful processing of the surfaces in question for cleaning.

## **High pressure cleaning**

High pressure cleaning is an efficient cleaning method since the high pressure significantly improves the mechanical cleaning and removal of dirt. Water use is also reduced compared with cleaning at low pressure. There are a number of things to consider when conducting high pressure cleaning. This method will increase the wear on some surfaces, and some materials are not suitable for high pressure cleaning, due to their current state or sensitivity (such as electric installations). Using water at the right temperature is crucial. If the water is too cold, it will less efficiently dissolve fatty coatings in comparison with warm water and lessen the effect of added cleaning detergents. Using water of a too high temperature will denature some proteins so they will get attached to the surface. The recommended temperature is between 50 and 60 degrees Celsius. It is important to consider the formation of aerosols when using high pressure cleaning. The high pressure creates small droplets that can spread through the air and transmit infectious agents. This is particularly important to keep in mind when cleaning stables that cannot be completely emptied of animals. The recommended pressure for high pressure cleaning is 150-200 bar. There are many types of brands, fuel, nozzles and attachments to choose between. Covered high pressure washers are often used within the food industry (there are also models that will remove the water) and can be used for cleaning of smooth surfaces.

The optimal cleaning procedure is as follows:

1. Initial basic cleaning using only water
2. Cleaning using detergents. Commonly, hidden nooks or corners, such as behind automatic waterers, are easily forgotten. Washing should be carried out starting from the floor and working upwards, towards the ceiling, to ensure sufficient coverage of all surfaces with the cleaning solution.
3. The exposure time for the cleaning solution should be chosen according to the manufacturer's instructions (usually around 15 minutes).
4. Flushing from the highest point and down.

## **Cleaning detergents**

Use of cleaning detergents when washing improves the cleaning results since dirt will be more efficiently dissolved in comparison with cleaning using only water. Cleaning detergents come in several dosage forms. The most common is a concentrate that is mixed with water and applied manually or via high pressure washers. Dosage forms that create a foam have the advantage that the application of detergent is easily visible to the cleaner. Particularly cleaning of milking parlours or milking robots require detergents that can dissolve fat.

## **Drying-up period**

Stables should be left to dry up sufficiently after cleaning to further to allow for more reduction of microorganisms. In pig stables, a minimum length of five days as a drying-up period after washing is recommended (at 60% humidity, which requires an ambient temperature of 20 degrees Celsius and adequate ventilation). If time is limited, a heating fan can help reduce the drying-up period, for instance in a clean and empty calving pen.

## **Downtime period in addition to drying-up period**

In cases where cleaning has been carried out without the use of water, the downtime period should be extended to reduce the number of microorganisms. Some bacterial species have a significantly extended survival period in residual manure in comparison with their survival period on a washed surface. Stables that have been emptied and dry cleaned carefully in the beginning of summer and then have a downtime period for the rest of the summer (minimum 2 months) most likely have a very efficient reduction of infectious agents.

## **Disinfection**

Applying disinfectants after cleaning is an additional way to reduce the infectious pressure. However, applying disinfectants alone will not replace cleaning. The presence of organic residues may have an adverse effect on some disinfectants and reduce or completely neutralise their efficiency. Different disinfectants work better or worse against different types of infectious agents (see table). To achieve adequate effect, the disinfectants need to be blended to the right concentration. Wet surfaces will dilute the disinfectant resulting in a reduced effect. Disinfectants should be used on dry surfaces. Apply the amount recommended by the manufacturer (varies between 0.2-1 L/m<sup>2</sup>). For optimal effect, moisten the surface during the exposure time. Some disinfectants may have an adverse or reduced effect if the temperature is too low. Some disinfectants are corrosive and should be rinsed off after the exposure time if applied on easily affected materials, such as sensitive metal parts. Most often, disinfectants are applied as surface disinfection using low pressure, for example with the use of a knapsack sprayer or a high-pressure washer at a low pressure setting.

Table: Effects of disinfectants against different types of microorganisms (Modified by Cecilia Hultén, SVA, from “Disinfectants in livestock keeping”, Message nr 154 SHS)

Good effect: ++

Limited effect: +

No effect: -

|                                             | Virus                                                                           |                           | Bacteria              |                  |                     | Fungi | Comment                                       |
|---------------------------------------------|---------------------------------------------------------------------------------|---------------------------|-----------------------|------------------|---------------------|-------|-----------------------------------------------|
|                                             | Env<br>elo<br>pe<br>d                                                           | Non-<br>enve<br>lope<br>d | "Regular<br>bacteria" | Mycobacter<br>ia | Bacterial<br>spores |       |                                               |
| Aldehydes                                   | ++                                                                              | ++                        | ++                    | ++               | +                   | ++    | OBS! Safety regulations                       |
| Alcohols                                    | +                                                                               | -                         | ++                    | +                | -                   | ++    |                                               |
| Biguanides                                  | -                                                                               | -                         | ++                    | -                | -                   | +     | Inhibited by soap/cleaning<br>detergent       |
| Halogenes<br>- chlorine<br>compounds        | ++                                                                              | ++                        | ++                    | +                | -                   | ++    |                                               |
| Halogenes<br>-iodine<br>compounds           | ++                                                                              | +                         | ++                    | +                | +                   | ++    |                                               |
| Strong bases<br>(for ex lye,<br>slake lime) | ++                                                                              | ++                        | ++                    | +                | +                   | ++    | OBS! Safety regulations                       |
| Weak acids                                  | May vary with the infectious agent – check the effect for the<br>specific agent |                           |                       |                  |                     |       |                                               |
| Surfactants                                 | May vary with the infectious agent – check the effect for the<br>specific agent |                           |                       |                  |                     |       |                                               |
| Oxidizing<br>products                       | ++                                                                              | ++                        | ++                    | ++               | +                   | ++    | Efficient also at a low<br>temperature (+4°C) |

## Liming

**Slake lime:** calcium oxide, mainly in hydroxide form, produced through controlled slaking of burnt lime.

**Limewater:** Slake lime slammed in water