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DISINFECTION OF SHEARING CLIPPERS TO PREVENT PSEUDOTUBERCULOSIS IN SHEEP

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Introduction

Pseudotuberculosis is caused by C*orynebacterium pseudotuberculosis* and occurs in sheep worldwide. Once introduced into a flock the disease oftentimes affects a relatively high percentage of susceptible animals and leads to serious economic losses, due to a decline of the meat quality and quantity, a drop in birth rates and a reduction in the milk production.

C*orynebacterium pseudotuberculosis* resides in the environment and on the skin of sheep. Small wounds caused i.e. by shearing, are invaded by the infective bacteria. They localize in regional lymph nodes in the body where they form abscesses.

The main source of infection and potential spread of the organism is via the rupture of affected lymph nodes and abscesses, therefore *Corynebacterium pseudotuberculosis* is very likely transmitted by wounds obtained during shearing caused by contaminated shears.

In this study thermal and chemical methods to disinfect shearing clippers were investigated, which could be easily applied between shearing of two sheep.

Material and methods

The experimental setup was based on the CEN guideline EN 14349[1] which specifies a quantitative surface test method for the evaluation of bactericidal activity of chemical disinfectants and antiseptics used in veterinary field on non-porous surfaces without mechanical action. Shearing clippers, consisting of a cutting and a combing side (see figures 1 and 2), were used as test surfaces.

1 ml of a bacterial test suspension of *Corynebacterium pseudotuberculosis* (ATCC 19410) containing 2 x 10^8 to 8 x 10^{10} cfu/ml was mixed with 1 ml interfering substance. The tests were performed using the “high level soiling” given in the EN standards with the final concentration of 10,0 g/l yeast extract and 10,0 g/l bovine albumin, and also lanolin (wool fat), to take into account practical conditions, was chosen as interfering substance in the test procedure.

Figure 1: Shearing clippers

Figure 2: Shears: cutter and comb

For preparation of the test suspension of *Corynebacterium pseudotuberculosis* standard I agar plates (Merck) were inoculated and incubated for 48 h at 37°C ± 1°C. A second subculture was prepared in the same way. This second subculture was used for preparation of the bacterial test suspension. Loopfuls of cells were transferred into a bottle containing 10 ml NaCl and glass beads. The suspension was mixed and the number of cells in the suspension was adjusted to 2 x 10^8 to 8 x 10^{10} cfu/ml by using McFarland-Standard 3.

Both fractions (cutter and comb) of the shears were dry heat sterilized for 8 h at 180°C. 0,1 ml of the test suspension containing bacterial test suspension and interfering substance was inoculated on both parts of the sterilized shears.

Shears inoculated with the test suspension containing the yeast extract/bovine albumin mixture were dried for approx. 60 min at 37°C in an incubator until they were visibly dry. Shearing clippers inoculated with the test suspension containing lanolin were put in a refrigerator (2-8°C) for approx. 45 min to harden the wool fat.

Iso-propanol (60% solution), a commercial disinfectant preparation based on quaternary ammonium compounds, boiling water and boiling water with addition of soda (0,5% - 2%) to improve the solubility of the wool fat were tested as disinfectants.

For disinfectant testing the inoculated parts of the shearing clippers were put together again and dipped in the disinfectant solutions for 15, 30 or 60 sec contact time. At the end of the chosen exposure time the shears were transferred into a flask containing 100 ml neutralization solution. One shearing clipper was treated with A. dest. instead of disinfectant (water control).

For determination of the number of surviving test organisms the shears were sonicated in an ultrasonic bath for 5 min at 0-4°C. At the end of this time a sample of 1,0 ml of the neutralized mixture was taken in duplicate, a series of ten-fold dilutions were prepared and the number of surviving test organisms was determined using the spread plate technique.

For calculation of the reduction the number of cfu/ml in the water control and after exposure to the disinfectant was recorded and the decimal log reduction was calculated.

The treatment had passed the test when it demonstrated at least a 4 decimal log (lg) reduction of *Corynebacterium pseudotuberculosis* under the chosen test conditions.

Results

60% **Isopropanol** and 1% of the **commercial disinfectant product** did not have the activity to reduce the numbers of surviving cells of *Corynebacterium pseudotuberculosis* for at least 4 decimal log (lg) at any chosen contact time.

Boiling water was able to inactivate *Corynebacterium pseudotuberculosis* within 15 sec contact time. No surviving bacteria could be determined after the treatment consequently 6-8 lg reductions could be achieved. Comparable results were obtained in the trials adding soda to the boiling water.

Discussion and conclusions

Boiling water, with or without the addition of soda, is able to disinfect shearing clippers contaminated with *Corynebacterium pseudotuberculosis* within 15 sec exposure time. This treatment could be easily applied between shearing of two sheep. Transmission of *Corynebacterium pseudotuberculosis* by infection of wounds obtained during shearing could be reduced. The addition of soda (0,5-2%) to the boiling water increases the solubility of fatty soiling on the shearing clippers and therefore has a positive effect on the disinfection process. Further studies should determine whether boiling water is able to disinfect contaminated shears in shorter contact times (2-10 sec) too.

Acknowledgement

Firma Heidinger – Adresse Bereitstellung der Schermaschinen

References

1 CEN, European Committee for Standardization, Comité Européen de Normalisation, Europäisches Komitee für Normung (2000)
Chemical disinfectants and antiseptics - Quantitative surface test for the evaluation of bactericidal activity of chemical disinfectants and antiseptics used in veterinary field on non-porous surfaces without mechanical action - Test method and requirements (phase 2, step 2). EN 14349:2004
CEN, Central Secretariat: rue de Stassart 36, 1050 Brussels, Belgium