

An extended soiled bedding sentinel system.

by Tage Waller, Patricia Hedenqvist, & Krister Iwarsson.

Laboratory Animal Unit, Karolinska Institutet, 171 77 Stockholm

Correspondence: T. Waller, Laboratory Animal Unit, Karolinska Institute, S-17177 Stockholm, Sweden

Introduction

Historically, corona virus, mycoplasmas, pinworms and fur mites have been discovered in mice and rats in some of the animal departments at the Karolinska Institute (Iwarsson 1990). These, and other infections as PVM, Sendai virus and parvovirus have also occasionally been detected in animals brought to the Institute from other sources. The new centralized animal facilities for rodents at the Karolinska Institute are designed for keeping animals pathogen-free behind physical barriers. Ventilation, room construction and working routines have all been designed to prevent the rapid spread of infections. Health monitoring in these new facilities is an important tool in keeping rodent infections under control. In order to decrease the costs of health monitoring, an

"extended soiled bedding sentinel system" has been developed.

Materials and Methods

Animals

Sentinels are 5-7 weeks old when taken into use. Female NMRI mice from the National Veterinary Institute or Charles River Sweden AB, both in Uppsala, Sweden, are used as mouse sentinels. As rat sentinels, male or female PVG/Bkl from B&K Universal, Sollentuna, Sweden are used. All three colonies have a history of superior and consistent microbiological quality. Instead of purchasing sentinels, serologically negative animals with a normal immune system from one animal room can be used as sentinels in the same room. We distinguish between "rack sentinels" and "room sentinels" (Figure 1).

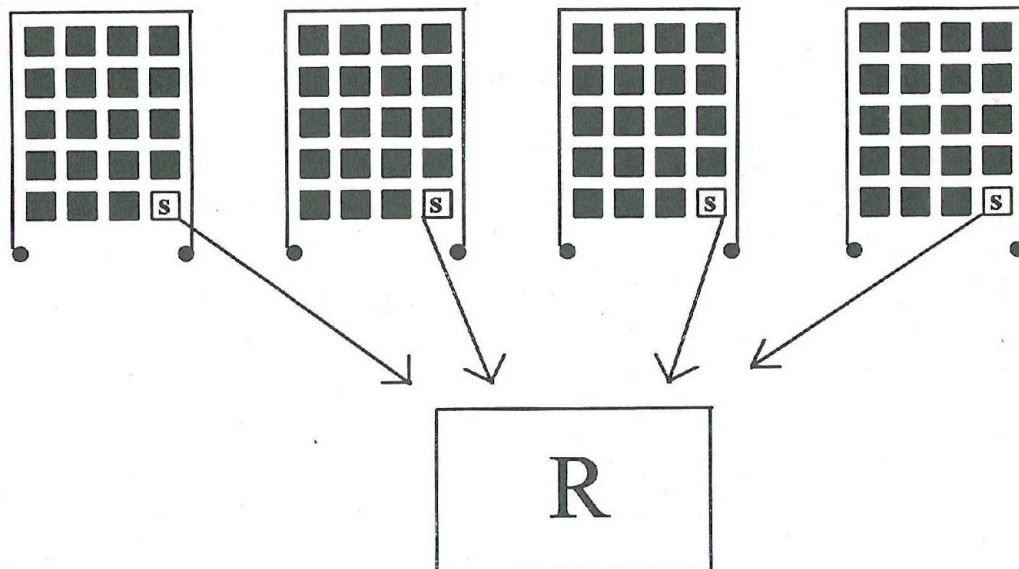


Figure 1. Rack and room sentinels. S = rack sentinels, R = room sentinels. Arrows indicate ways of soiled bedding from rack sentinels to room sentinels.

Rack sentinels

A cage with 2-4 rack sentinels is placed at the bottom right of each rack. These sentinels are given small amounts of used bedding from each of the other cages in the rack at the time of cleaning. Cages are changed twice a week, starting at the top left and ending at the bottom right. Hands are washed or gloves changed before changing cages in the next rack as the most efficient transmission of mouse corona virus is through personnel spreading the virus with their hands (Homberger 1997).

Room sentinels

One cage with 2-4 room sentinels is placed in a specially chosen place in the animal room. Each time cages are changed, small amounts of used bedding from all rack sentinel cages are placed into the room sentinel cage. The room sentinel cage is changed last.

Caging

The animals are caged either in regular Macrolon III or Macrolon IV cages, or in individually ventilated microisolators in Vent-A-Cage racks (Iwarsson & Norén 1992). The rack sentinels are caged in the same manner as the other animals in the rack and the room sentinels are housed in a filtertop cage.

Health monitoring procedures

The minimum housing time before a sentinel can be used for testing is 3 weeks. A complete health monitoring of two room sentinels is performed once or twice a year at the Swedish National Veterinary Institute according to their current standard (SVA 1997) completed with a number of viruses. In addition, testing for corona virus is presently carried out every two weeks and pinworms every two months. Sera are tested individually for corona virus antibody and intestines of two sentinel mice from the same cage are pooled for pinworm examination. Room sentinel rats are examined for pinworms by cellophane tape tests.

Rack sentinels are monitored when room sentinels are found positive for any infection. Two rack sentinels from each rack are tested and thus infection can be traced to racks in the room. Rack

sentinels that have not been used for testing within a year are replaced.

Results

The system described has been in use since November 1996, and proved efficient on two occasions when MHV-infections occurred in one animal department. On both occasions the room sentinels were found serologically positive against MHV by ELISA, with titers of 1:250. When the rack sentinels were tested, rack sentinels in 5 out of 18 racks, and 4 out of 6 racks, respectively, showed MHV titers of 1:250 or 1:1250.

Discussion

The reliability of any soiled bedding sentinel system is dependent on the spread of infections via dirty bedding. In the recent history of the Karolinska Institute, corona virus infections and pinworms, both of which spread via soiled bedding, have been the most common infections detected.

It is important to be aware of the time delay before room sentinels get positive in case a pathogen is introduced into the room. The mouse pinworm *Aspicularis tetraptera* has a prepatence period of 24 days (Owen 1992) and a virus infection may have been present for 1-2 weeks in the infected animal before seroconversion.

Detection of infections that do not, or only slowly, spread via soiled bedding may call for supplementary testing by random sampling from the animal colony.

The extended soiled bedding system described here is economically effective and to some extent also labor saving because only the room sentinels require regular testing.

Summary

A soiled bedding sentinel system with rack sentinels and room sentinels is described. Rack sentinels get soiled bedding from the other cages in the rack, the room sentinels get soiled bedding from the rack sentinels. Only room sentinels are regularly tested. The method is economically effective and labor saving and has on two occasions proved efficient when mouse corona virus has appeared in an animal department at the Karolinska Institute.

References

Homberger, F. R.: Enterotropic mouse hepatitis virus. *Laboratory Animals* 1997, *31*, 97-115.

Iwarsson, K.: Laboratory animal health monitoring: an introductory survey of the university mouse breeding colonies in Stockholm. Proceedings of the third CFN Symposium held in Stockholm, Sweden May 9-11, 1988. *Acta Physiol Scand* 1990, *140*, Suppl. 592, 139-140.

Statens Veterinärmedicinska Anstalt (SVA): Försöksdjursverksamhet 1997: Undersökningar avseende försöksdjur vid SVA. Trycksak SVA, Uppsala 1997.

Iwarsson, K. & L. Norén: Comparison of microenvironmental conditions in standard versus forced-air ventilated rodent filter-top cages. *Scand. J. Lab. Anim. Sci.* 1992, *19*, 167-173.

Owen, D. G.: Parasites of laboratory animals. *Laboratory Animal Handbooks* No. 12. Laboratory Animals Ltd, London 1992.