The use of filter tops as a short term protective barrier in laboratory animal management

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Introduction and background

A new quality conventional animal colony has been built at the University of Bergen. The colony was to be opened at the begining of October 1983. Due to delays the colony could not be opened before the begining of December 1983. A researcher had ordered a group of 200 C3H/tifBom SPF quality (LAC **** standard) female mice that were to be at least 360 days old at the time of delivery. The mice were delivered to the colony one month before the expected opening date. As a result of this, the mice had to be housed in an existing conventional colony housing several species and high background contamination.

An emergency measure was thus conceived that would allow the mice to remain in the conventional colony and simultaneously be as well protected as possible from the surrounding environment. Pending a low grade of inocuous contamination, the mice would be transferred to the new colony on opening. In this way an attempt would be made to reduce the degree of contamination of the new colony.

It was decided that the mice should be transferred from the unopened transport containers into macrolon III cages covered by filter tops. Special routines were introduced to reduce the chance of contamination.

Animals and routines

Animals

Two hundred C3H/tifBom female mice delivered with breeder certified SPF quality (LAC category **** status) (Bom Mice, Denmark).

The animals were +360 days old and were intended for use in chronobiological studies.

The animals were received in standard transport crates with filters.

Colony conditions:

a. Intended colony conditions: Conventional with high degree of hygiene. Limited barrier conditions (LAC category ***). No routine breeding. All animals obtained from high quality commercial sources.

b. Placement colony: Conventional colony low degree of hygiene. Multi species. Breeding of mice and rabbits. Known contamination with Sendai virus, Syphacia obvelata, Mycoplasma pulmonis, Pasteurella multocida, Pasteurella pneumotropica, Pasteurella spp., Bordetella bronchiseptica, Myobia musculi. Previous contamination with Encephalitozoon cuniculi, Coccidia spp.

Mice in the colony had been inoculated on site with Coxackie virus, Toxoplasma gondii and Pneumococcus.

Guinea pigs are inoculated on site with Mycobacterium tuberculosis.

Procedure:

A room that had been emptied of animals was thoroughly washed down and disinfected with a chlorine based disinfectant (Diversol Bx, Scandiversey).

A rack was disinfected and placed in the room.

New type III macrolon cages (Techniplast type III) were filled with pine shavings (Hahnflock- nonsterilised but from a new

unopened bag. The bag was stored in the new colony). The mice (10–12 per cage) were placed in the cages. Each cage was equipped with a filter top and frame (Scanbur FFH system). The filter tops were equipped with a polyester filter material made according to ASHRAE standard 52–76, and would filter on average 88 % of particles larger than 0.3 mμ (manufacturers specification).
Preparation and filling of the cages was performed in the new unopened colony. All materials were stored in the new colony area. All cages used during the period were stored in the new colony and all cage washing and subsequent maintenance preparation was performed in the new colony area. The prepared cages were then transported to the housing colony. Mice were transferred to new prepared cages twice weekly in the room. Water bottles were changed twice weekly. Used cages and water bottles were disinfected using a chlorine based disinfectant (Diversol Bx) and washed in the housing colony and then transported to the new colony for autoclaving followed by machine cleaning.
Personell from the housing colony did not perform any maintenance procedures in the room. Staff from the new colony were responsible for all maintenance.
Protective clothing was placed in the room. On entry a cover coat was put on prior to any procedure. Hands were washed with a chlorhexidine based soap (Hibiscrub-ICI). New disposable Latex gloves were worn. A surgical mask was worn.
The animals were not placed on grids in the cages. The filters were therefore changed every 21 days.
The animals were screened immediately before transfer to the new colony.

Screening:

The Laboratory Animal Centre screening scheme was used. (Medical Research Council Manual Series No. 1.)
One animal per cage was killed and subjected to parasitological, bacteriological and virological tests.

Results:

The animals were found to be in accordance with LAC *** status with the following contaminants.
The animals were found to be infected S. obvelata.
The animals were infected with P. pneumotropica.
The mice had low titres against Sendai virus (8–32).
The animals were considered fit for transfer. It was decided that S. obvelata would be controlled by the addition of a helminthostat (Fenbendazole-Hoechst) to the diet for the duration of the experiment.

Discussion:

During planning of the new animal colony at the University of Bergen it was decided that the colony be managed as a conventional open colony with a high standard of hygiene (LAC category ***). Areas of the colony can be run as a barrier colony (LAC category ****) if desired. It was therefore considered undesirable to introduce animals that could represent a source of future potential contamination.
The inopportune arrival of the mice therefore placed demands on management of the animals while the new colony was being finished. The animals had to kept isolated in a contaminated conventional colony. The use of filter tops enabled the animals to be housed within the colony while allowing a reasonable degree of security. The use of the tops also ensured a procedure that was not demanding on the system and was easy to operate (did not require special cages, limited place requirement).
The successfull use of individual cage filtration has been described previously (*Kraft L*, 1958; *Lane Petter*, 1970, *Heine*, 1968; *Serrano*, 1971). The filter system

used in the present procedure was described by Heine (*Heine* 1981).

Contamination with S. obvelata was not unexpected since the personell responsible for maintenance in the room had been in contact with other contaminated areas on the hospital site. It is likely that the new colony will eventually be contaminated with S. obvelata from sources other than the housing colony.

Sendai virus is a ubiquitous agent that is present in most areas and it is highly unlikely that the mice would be kept free. The titres seen are representative of post-recovery phase infection. It is therefore unlikely that these animals will represent a serious threat to animals housed in the new colony.

P. pneumotropica is a common agent in most colonies and it would have been impossible to prevent contamination with this organism.

Bearing in mind the planned conventional non-barrier status of the new colony, it was felt that the animals would not represent any serious potential threat to most classes of animals intended placed there. S. obvelata could be checked by the addition of a helminthostat to the diet. Fendabendazole was therefore added and will be added for the duration of the experiment.

The results seen in this management procedure are in accordance with the findings of other authors (*Schneider and Collin*, 1966, *Cumming* 1967 and *Flynn* 1968). The use of filter tops allowed a high degree of security and did not place serious constraints on management procedures (*Heine*, 1981). The filter top system was accessible on short notice and did not require a time consuming start up, such as would have been experienced had a positive pressure plastic film isolator been used. Personell unaquainted with high security hygiene barriers are able to use the system with a minimum of training.

The results obtained in the present procedure advocate the use of filter tops as a reasonable hygienic barrier. Filter top systems allow stop-gap measures to be taken in order to protect animals against contamination. The results indicate that similar filtration would, in the short run, protect clean environments against introduced contamination.

References

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Sammendrag

Filterlokk systemer er velegnt til korttids beskyttelse av forsøksdyr i situasjoner som ikke

krever en høy grad av sikkerhet. Filterlokkene er lett å bruke og krever ikke en lang oppstartingstid eller spesial kunnskaper fra personalet. Lokkene ble brukt til beskyttelse av mus som ble levert for tidlig og som skulle senere plasseres i en nybygget ukontaminert konvensjonell koloni med en høy grad av miljøhygiene. Musene ble kontaminert med Syphacia obvelata, Sendai virus og Pasteurella pneumotropica. Tatt i betraktning kontaminasjonsgraden i kolonien der musene ble midlertidig plassert er dette akseptabelt. Dersom man ikke krever en absolutt grad av beskyttelse, er filterlokkene et brukbart alternativ og fungerer i kortere perioder.