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Scand-LAS working group on defined animals

Recommendations for health monitoring of pig, cat, dog and gerbil breeding colonies

Report of the Scandinavian Federation for Laboratory Animal Science (Scand-LAS) Working Group of Animal Health

Annelise Hem,
Central Lab. Anim. Services, National Institute of Public Health, N-0462 Oslo.

Axel Kornerup Hansen,
Animal Dept., Panum Institute, University of Copenhagen, DK-2200 Copenhagen N.

Claes Rehbinder,
Dept. Pathology, National Veterinary Laboratory, S-75007 Uppsala, Sweden.

Hanna-Marja Voipio,
National Laboratory Animal Center, P. O. Box. 1627, SF-70211 Kuopio, Finland.

Espen Engh,
Animal Dept., Preclinical Medicine, University of Oslo, N-0372 Oslo 3.

Introduction

There is good evidence that infections in laboratory animals, whether producing clinical diseases or not, can influence experimental data and thereby the outcome of many experiments (1–6). Laboratory animals are permanently running the risk of being affected by infections or other exogenous factors (7). Depending on the specific infection a variety of biological parameters may be affected such as immune response, tumour development, enzyme levels, growth rate, behaviour etc. (1–3, 8–13).

In addition, infections in laboratory animals may lead to contamination of organs, cell transplants, tissue cultures, biological products etc. Some laboratory animal infections are also zoonotic (1–3).

Hence, health monitoring programmes are of vital importance as research data obtained from animals of an unknown microbiological status and pathology may make it necessary to performe large numbers of experiments to compensate for unexplainable and/or diverging results. Even so, interpretation of the results may anyhow sometimes be difficult and possibly erroneous (9, 14).

There is an obvious need for health monitoring programmes to achieve "for the purpose calibrated animals". It is thus imperative to define the experimental animal with regard to its microbiological status – past and present – and status with regard to pathological lesions and anatomical abnormalities. This is accomplished by health monitoring which includes both microbiological screening and patho-anatomical analysis of macro- and microscopic alterations that may be the result of genetic, microbiological, physical, chemical or nutritional influences (14–16).

The Federation of European Laboratory Animal Science Associations (FELASA) – Working Group on Animal Health has in 1994 published recommendations for the health monitoring of mouse, rat, hamster, guinea pig and rabbit breeding colonies (17).

The Scandinavian Federation for Laboratory Animal Science (Scand-LAS) – Working Group on Animal Health has been requested, by Scandinavian researchers, and laboratory animal scientists, to work out recommendations for the health monitoring of gerbil, dog, cat and pig breeding colonies. The work has been carried out in accordance with the model used by the FELASA-Working Group on Animal Health.

The Scand-LAS working group on defined animals hope that these recommendations may work as guidelines until either generally accepted or further complemented by the FELASA Working Group on Animal Health.

Claes Rehbinder.

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Recommendations for health monitoring of experimental pig breeding colonies

by *Annelise Hem, Axel Kornerup Hansen, Claes Rehbinder, Hanna-Marja Voipio & Espen Engh*

Report of the Scandinavian Federation for Laboratory Animal Science
(Scand-LAS) Working Group of Animal Health

Preamble

The health of an animal is always at risk from a variety of infections. Infections may be inapparent or at least not made apparent by gross and obvious lesions. Clinical disease may thus not be observed until the animal is stressed, for example by an experimental procedure.

There is overwhelming evidence that infections in laboratory animals may influence the outcome of experiments. Depending upon the specific infection, a variety of biological parameters may be affected, including behaviour, growth rate, relative organ weights, immune response and tumour development. Subtle or overt infections can also lead to contamination of biological materials, tissue cultures, cell-lines, transplantable tumours and biological products. All infections, apparent or inapparent, are likely to increase biological variability.

Some laboratory animal diseases are zoonotic.

For all these reasons, a laboratory animal health monitoring programme is of vital importance, decreasing the risk of zoonotic infection and adding to the reliability and reproducibility of research data.

This report proposes a scheme for the health monitoring of breeding colonies of pigs bred for experimental purposes with the intention of harmonizing procedures within the Scandinavian countries.

General Considerations

These recommendations are aimed at all breeding colonies of pigs bred for experimental purposes. It must be emphasized that they are minimal requirements for health monitoring, and constitute a common baseline for breeders. Actual practice may exceed these recommendations in various ways, depending on local circumstances.

The term "breeding unit" is here used to describe a self-contained unit, which could be considered a microbiological entity.

The existence of detailed written procedures – **S**tandard **O**perating **P**rocedures (SOPs) within monitoring laboratories is expected and must be available on request.

Monitoring laboratories should follow the principles of **G**ood **L**aboratory **P**ractice (GLP) where applicable and participate in a Quality Assurance Programme.

It should be emphasized that negative results mean only that the presence of the microorganisms monitored has not been demonstrated in the animals screened by the test(s) used. The results are not necessarily a reflection of the status of all the animals in the breeding unit.

An agent must be declared as present if it is identified or antibodies to it are detected in any of the animals screened. The results must continue to be reported as positive at subsequent screens until the agent has been eradicated by means of e.g. rederivation or restocking. However, agents known to be present need not be monitored at subsequent screens provided that they are declared in the health report.

The presence of antibodies in a colony is only an indicator of infection. Their significance can be elucidated using methods other than serological methods.

Sample size and frequency of monitoring

Sampling frequency	Sample size		Test			
	Age	No. of animals	Clinical ex	Ser	Baxt	Par
Every 6 months	Weanlings	≥ 2	+	–	+[1]	+[2]
	2–7 months[1]	≥ 4	+	+	+	+
	≥ 8 months[1]	≥ 4	+	+	+	+
Every 3 months	all animals in the colony		+			

Monitoring procedures

The monitoring consists of two parts:

Clinical examination of the colony

Laboratory investigation of samples from live animals.

Clinical examination

At least every 3 months all the animals in the colony must be subject to a clinical examination by a veterinarian. All clinical signs should be noted and the result of this clinical examination should be presented in the health monitoring reports.

If any signs of clinical disease are present, the animals must immediately be further investigated by appropriate laboratory or pathological investigations. The owner must immediately report any sign of disease among the animals to the veterinarian.

Animals found dead in the colony should be necropsied.

The results of clinical and pathological examinations should be reported in the health monitoring report.

Laboratory investigations

All samples are to be taken from live animals. Agents, methods, frequencies and sample sizes are specified below.

Diseases included in official, national governmental screening programmes and diseases considered not present in Scandinavia, will not be monitored.

[1] If not available increase the number of samples from the other age group(s).

[2] If not available at the time of scheduled testing, test for parasites later when available.

Viral infections

List of viral infections to be serologically monitored.

	Antigens	Suitable test methods[3] (alphabetical)
1	Aujeszky's disease	ELISA
2	Hemagglutinating encephalomyelitis	HA, NT
3	Porcine influenza	ELISA, HI
4	Porcine parvovirus	ELISA, HI
5	Smedi[4]	SN
6	Teschener disease[4]	IFA, SN

The animals should not be vaccinated against any of the listed agents.

Equivocal or unexpected positive serological test results must be confirmed by an alternative test method and/or repeated investigation.

List of viral infections to be monitored by other methods.

	Antigen	Suitable test method
7	Porcine rota virus	Detection of antigen in feces by ELISA; EM or latex-agglutination

[3] Abbrevations:

ELISA Enzyme-linked immuno-sorbent assay.
EM Electron microscopy.
HA Hemagglutination test.
HI Haemagglutination inhibition test.
IFA Immunofluorescence assay.
NT Neutralization test.
SN Seroneutralization test.

Sampling frequency

Every 6 months	Antigen numbers 1–4, 7
On request[4]	Antigen numbers 5, 6

Sample size

A minimum of 8 animal sera (not pooled) randomly sampled.

Bacterial, mycoplasmal and fungal infections

Methodology

Cultural methods

Bacteriological investigations must always include non-selective media e.g. blood agar. Selective and enriched media must be used in addition to non-selective media for routine and special or confirmatory investigations. Aerobic culture conditions are sufficient for most bacteria.

Serological methods

Serological methods exist for the detection of antibodies to various pathogens e.g. *Actinobacillus pleuropneumoniae, Haemophilus parasuis, Mycoplasma hyopneumonia* and others.

Samples to be investigated

Samples from the following sites must be cultured:

Nasum (swab), skin, prepuce/vagina (swab).

Fresh fecal material must be collected by a suitable method.

Serum samples should be investigated for antibodies.

List of bacterial, mycoplasmal and fungal infections to be compulsory monitored.

1 *Actinobacillus pleuropneumoniae* serotypes 2, 3 and 4 (serology)
2 *Bordetella bronchiseptica*
3 *Campylobacter* spp
4 *Clostridium perfringens*
5 *Eubacterium (Corynebacterium) suis*
6 *Erysipelothrix rhusiopathiae*
7 *Haemophilus parasuis* (serology and culture)
8 *Mycoplasma hyopneumoniae* (serology)
9 *Pasteurella multocida* (toxin producing) (serology) demonstration of toxin by ELISA
10 Salmonellae
11 *Staphyllococcus hyicus*
12 Streptococci beta-hemolytic (designation Lancefield group, if possible)
13 *Streptococcus pneumoniae*
14 *Streptococcus suis*
15 *Yersinia enterocolitica*

Culturing is the method of choice unless otherwise stated.

List of bacterial and fungal infections to be monitored on request[4]

Brucella suis
Corynebacterium pyogenes
Escherichia coli (designation of serotype, if possible)
Klebsiella pneumoniae
Microsporon spp
Pseudomonas aeruginosa
Serpulina hyodysenteriae (serology and culture)
Staphylococcus aureus
Trichophyton spp

Sampling frequency

Every 6 months.

Sample size

A minimum of 10 animals randomly sampled.

[4] To be monitored
- when associated with lesions
- when associated with clinical signs of disease
- when there is evidence of pertubation of physiological parameters and/or breeding performance
- when using immunodeficient animals

Parasitology
Methodology
Routine methodology
Fecal flotation
Serology for *Toxoplasma gondii*. Individual blood/serum samples (not pooled) must be taken at random from at least 10 animals.
The following organisms must be included in the final report of results, with a declaration of whether the organism has been detected or not (numbers of animals positive), or not tested (NT).

List of parasites to be compulsory monitored

All arthropods
(identification as far as possible to the systematic name)
All helminths
(identification as far as possible to the systematic name)
Eimeria spp
(identification as far as possible to the systematic name)
Isospora spp
(identification as far as possible to the systematic name)
Toxoplasma gondii

List of parasites to be monitored on request[4]

Sarcoptes scabei (dermal scrapings and/or serology)
Demodex spp. (dermal scrapings)

Sampling frequency
Every 6 months.

Sample size
A minimum of 10 or 8 + 2 animals[5] randomly sampled.

Report
While Scand-LAS cannot accept responsibility for tests or their implication, breeders or users of laboratory animals who are reporting on health monitoring of their animal colonies may use words "in accordance with Scand-LAS recommendations" only where that is in fact the case.
A Scand-LAS approved health report should follow the guidelines laid out in the FELASA recommendations appendix II.[6]

[5] If weanlings are not available at time of scheduled testing, test later when available.

[6] Recommandations relatives au contrôle sanitaire des élevages de souris, rats, hamsters, cobayes et lapins. Recommendations for the health monitoring of mouse, rat, hamster, guinea pig and rabbit breeding colonies. Rapport de la Federation des Associations Européennes pour La Science de l'Animal de Laboratoire (FELASA), Kraft et al., Sci. Tech. Anim. Lab. 1993, *18*, 141–163.

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Recommendations for health monitoring of experimental cat breeding colonies

by *Annelise Hem, Axel Kornerup Hansen, Claes Rehbinder, Hanna-Marja Voipio & Espen Engh*

Report of the Scandinavian Federation for Laboratory Animal Science (Scand-LAS) Working Group of Animal Health

Preamble

The health of an animal is always at risk from a variety of infections. Infections may be inapparent or at least not made apparent by gross and obvious lesions. Clinical disease may thus not be observed until the animal is stressed, for example by an experimental procedure.

There is overwhelming evidence that infections in laboratory animals may influence the outcome of experiments. Depending upon the specific infection, a variety of biological parameters may be affected, including behaviour, growth rate, relative organ weights, immune response and tumour development. Subtle or overt infections can also lead to contamination of biological materials, tissue cultures, cell-lines, transplantable tumours and biological products. All infections, apparent or inapparent, are likely to increase biological variability.

Some laboratory animal diseases are zoonotic.

For all these reasons, a laboratory animal health monitoring programme is of vital importance, decreasing the risk of zoonotic infection and adding to the reliability and reproducibility of research data.

This report proposes a scheme for health monitoring of laboratory cat breeding colonies with the intention of harmonizing procedures within the Scandinavian countries.

General Considerations

These recommendations are aimed at all breeding colonies of cats. It must be emphasized that they are minimal requirements for health monitoring, and constitute a common baseline for breeders. Actual practice may exceed these recommendations in various ways, depending on local circumstances.

The term "breeding unit" is here used to describe a self-contained unit, which could be considered a microbiological entity.

The existence of detailed written procedures – Standard Operating Procedures (SOPs) within monitoring laboratories is expected and must be available on request.

Monitoring laboratories should follow the principles of Good Laboratory Practice (GLP) where applicable and participate in a Quality Assurance Programme.

It should be emphasized that negative results mean only that the presence of the micro-organisms monitored has not been demonstrated in the animals screened by the test(s) used. The results are not necessarily a reflection of the status of all the animals in the breeding unit.

An agent must be declared as present if it is identified or antibodies to it are detected in any of the animals screened. The results must continue to be reported as positive at subsequent screens until the agent has been eradicated by means of e.g. rederivation or restocking. However, agents known to be present need not be monitored at subsequent screens provided that they are declared in the health report.

The presence of antibodies in a colony is only an indicator of infection. Their significance can be elucidated using methods other than serological methods.

Sample size and frequency of monitoring

Sampling frequency	Sample size		Test			
	Age	No. of animals	Clinical ex	Ser	Baxt	Par
Every 6 months	Weanlings	≥ 2	+	–	+[1]	+[2]
	2–4 months[1]	≥ 4	+	+	+	+
	≥ 6 months[1]	≥ 4	+	+	+	+
Every 3 months	all animals in the colony		+			

Monitoring procedures

The monitoring consists of two parts:

Clinical examination of the colony

Laboratory investigation of samples from live animals.

Clinical examination

At least every 3 months all the animals in the colony must be subject to a clinical examination by a veterinarian. All clinical signs should be noted and the result of this clinical examination should be presented in the health monitoring reports.

If any signs of clinical disease are present, the animals must immediately be further investigated by appropriate laboratory or pathological investigations. The owner must immediately report any sign of disease among the animals to the veterinarian.

Animals found dead in the colony should be necropsied.

The results of clinical and pathological examinations should be reported in the health monitoring report.

Laboratory investigations

All samples are to be taken from live animals. Agents, methods, frequencies and sample sizes are specified below.

Diseases included in official, national governmental screening programmes and diseases considered not present in Scandinavia, will not be monitored.

Viral infections

The vaccination status of the colony must be stated. The date, brand name, producer and batch number of the vaccination must be recorded. Monitoring of agents against which the colony is vaccinated is not mandatory. It is emphasised that not all vaccines will give protection to all individuals inoculated.

List of viral infections to be serologically monitored.

	Antigens	Suitable test methods[3] (alphabetical)
1	Chlamydia	ELISA
2	Feline calicivirus	NT
3	Feline immuno-deficiency virus	ELISA
4	Feline infectious peritonitis virus (coronavirus)	ELISA, PCR
5	Feline leucemia virus	ELISA
6	Feline parvovirus	ELISA
7	Feline rhinotracheitis virus	NT
8	Pox virus	IF

[1] If not available increase the number of samples from the other age group(s).

[2] If not available at the time of scheduled testing, test for parasites later when available.

[3] Abbrevations:
ELISA Enzyme-linked immuno-sorbent assay.
EM Electron microscopy.
IF Immunofluorescence test.
NT Neutralization test.
PCR Polymerase chain reaction.

Equivocal or unexpected positive serological test results must be confirmed by an alternative test method and/or repeated investigation.

List of viral infections to be monitored by other methods.

	Antigen	Suitable test method
9	Intestinal corona virus[4]	Detection of antigen in feces by ELISA; EM or latex-agglutination
10	Rota virus[4]	Detection of antigen in feces by ELISA; EM or latex-agglutination

Sampling frequency

Every 6 months	Antigen numbers 1–8
On request[4]	Antigen numbers 1–10

Sample size
A minimum of 8 animal sera (not pooled) randomly sampled.

Bacterial and fungal infections
Methodology
Cultural methods
Bacteriological investigations must always include non-selective media e.g. blood agar. Selective and enriched media must be used in addition to non-selective media for routine and special or confirmatory investigations. Aerobic culture conditions are sufficient for most bacteria.

Serological methods
Serological methods exist for the detection of antibodies to various pathogens e.g. *Leptospira* spp.

[4] To be monitored
- when associated with lesions
- when associated with clinical signs of disease
- when there is evidence of pertubation of physiological parameters and/or breeding performance
- when using immunodeficient animals

Samples to be investigated
Samples from the following sites must be cultured:
Tonsillary region (swab), skin/hair (combed sample), prepuce/vagina (swab).
Fresh fecal material must be collected by a suitable method.
Serum samples should be investigated for antibodies.
In addition blood smears must be made.

List of bacterial and fungal infections to be monitored.

1 *Bordetella bronchiseptica*
2 *Campylobacter* spp
3 *Leptospira* spp (serology)
4 *Pasteurella* spp
5 Salmonellae
6 Streptococci beta-hemolytic (designation of Lancefield group, if possible)
7 *Yersinia enterocolitica*
8 *Microsporon* spp
9 *Trichophyton* spp

Culturing is the method of choice unless otherwise stated.

Sampling frequency
Every 6 months.

Sample size
A minimum of 10 animals randomly sampled.

Parasitology
Methodology
Routine methodology
Fecal flotation
Microscopic examination of wet mounts.
Ear swab for *Otodectes cynotis*.
Blood smears stained with May-Grünewald-Giemsa for the screening of *Haemobartonella felis*.
Serum samples examined for the presence of antibodies to *Toxoplasma gondii*.

The following organisms must be included in the final report of results, with a declaration of whether the organism has been detected or not (numbers of animals positive), or not tested (NT).

List of parasites to be compulsory monitored

All arthropods
(identification as far as possible to the systematic name)
All helminths
(identification as far as possible to the systematic name)
Eimeria spp
(identification as far as possible to the systematic name)
Haemobartonella felis
Isospora spp
(identification as far as possible to the systematic name)
Toxoplasma gondii

List of parasites to be monitored on request[4]

Sarcoptes scabei (dermal scrapings and/or serology)
Demodex spp. (dermal scrapings)

Sampling frequency
Every 6 months.

Sample size
A minimum of 10 or 8 + 2 animals[5] randomly sampled.

Report
While Scand-LAS cannot accept responsibility for tests or their implication, breeders or users of laboratory animals who are reporting on health monitoring of their animal colonies may use words "in accordance with Scand-LAS recommendations" only where that is in fact the case.
A Scand-LAS approved health report should follow the guidelines laid out in the FELASA recommendations appendix II.[6]

[5] If weanlings are not available at time of scheduled testing, test later when available.

[6] Recommandations relatives au contrôle sanitaire des élevages de souris, rats, hamsters, cobayes et lapins. Recommendations for the health monitoring of mouse, rat, hamster, guinea pig and rabbit breeding colonies. Rapport de la Federation des Associations Européennes pour La Science de l'Animal de Laboratoire (FELASA), Kraft et al., Sci. Tech. Anim. Lab. 1993, *18*, 141–163.

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Recommendations for health monitoring of experimental dog breeding colonies

by *Annelise Hem, Axel Kornerup Hansen, Claes Rehbinder, Hanna-Marja Voipio & Espen Engh*

Report of the Scandinavian Federation for Laboratory Animal Science (Scand-LAS) Working Group of Animal Health

Preamble

The health of an animal is always at risk from a variety of infections. Infections may be inapparent or at least not made apparent by gross and obvious lesions. Clinical disease may thus not be observed until the animal is stressed, for example by an experimental procedure.

There is overwhelming evidence that infections in laboratory animals may influence the outcome of experiments. Depending upon the specific infection, a variety of biological parameters may be affected, including behaviour, growth rate, relative organ weights, immune response and tumour development. Subtle or overt infections can also lead to contamination of biological materials, tissue cultures, cell-lines, transplantable tumours and biological products. All infections, apparent or inapparent, are likely to increase biological variability.

Some laboratory animal diseases are zoonotic.

For all these reasons, a laboratory animal health monitoring programme is of vital importance, decreasing the risk of zoonotic infection and adding to the reliability and reproducibility of research data.

This report proposes a scheme for health monitoring of laboratory dog breeding colonies with the intention of harmonizing procedures within the Scandinavian countries.

General Considerations

These recommendations are aimed at all breeding colonies of dogs. It must be emphasized that they are minimal requirements for health monitoring, and constitute a common baseline for breeders. Actual practice may exceed these recommendations in various ways, depending on local circumstances.

The term "breeding unit" is here used to describe a self-contained unit, which could be considered a microbiological entity.

The existence of detailed written procedures – **S**tandard **O**perating **P**rocedures (SOPs) within monitoring laboratories is expected and must be available on request.

Monitoring laboratories should follow the principles of **G**ood **L**aboratory **P**ractice (GLP) where applicable and participate in a Quality Assurance Programme.

It should be emphasized that negative results mean only that the presence of the microorganisms monitored has not been demonstrated in the animals screened by the test(s) used. The results are not necessarily a reflection of the status of all the animals in the breeding unit.

An agent must be declared as present if it is identified or antibodies to it are detected in any of the animals screened. The results must continue to be reported as positive at subsequent screens until the agent has been eradicated by means of e.g. rederivation or restocking. However, agents known to be present need not be monitored at subsequent screens provided that they are declared in the health report.

The presence of antibodies in a colony is only an indicator of infection. Their significance can be elucidated using methods other than serological methods.

The breeding unit should employ an irradication scheme for the hereditary diseases known for the breed(s) in the unit.

Sample size and frequency of monitoring

Sampling frequency	Sample size		Test			
	Age	No. of animals	Clinical ex	Ser	Baxt	Par
Every 6 months	Weanlings	≥ 2	+	–	+[1]	+[2]
	2–8 months[1]	≥ 4	+	+	+	+
	≥ 12 months[1]	≥ 4	+	+	+	+
Every 3 months	all animals in the colony		+			

Monitoring procedures

The monitoring consists of two parts:

Clinical examination of the colony

Laboratory investigation of samples from live animals.

Clinical examination

At least every 3 months all the animals in the colony must be subject to a clinical examination by a veterinarian. All clinical signs should be noted and the result of this clinical examination should be presented in the health monitoring reports.

If any signs of clinical disease are present, the animals must immediately be further investigated by appropriate laboratory or pathological investigations. The owner must immediately report any sign of disease among the animals to the veterinarian.

Animals found dead in the colony should be necropsied.

The results of clinical and pathological examinations should be reported in the health monitoring report.

Laboratory investigations

All samples are to be taken from live animals. Agents, methods, frequencies and sample sizes are specified below.

Diseases included in official, national governmental screening programmes and diseases considered not present in Scandinavia, will not be monitored.

Viral infections

The vaccination status of the colony must be stated. The date, brand name, producer and batch number of the vaccination must be recorded. Monitoring of agents against which the colony is vaccinated is not mandatory. It is emphasised that not all vaccines will give protection to all individuals inoculated.

List of viral infections to be serologically monitored.

	Antigens	Suitable test methods[3] (alphabetical)
1	Canine adenovirus type 1 (HCC)	CF, NT
2	Canine distemper virus	ELISA, NT
3	Canine parainfluenza virus	ELISA
4	Canine parvo virus	ELISA

Equivocal or unexpected positive serological test results must be confirmed by an alternative test method and/or repeated investigation.

[1] If not available increase the number of samples from the other age group(s).

[2] If not available at the time of scheduled testing, test for parasites later when available.

[3] Abbrevations:
CF Complement fixation test.
ELISA Enzyme-linked immuno-sorbent assay.
EM Electron microscopy.
NT Neutralization test.

List of viral infections to be monitored by other methods.

	Antigen	Suitable test method
5	Intestinal corona virus	ELISA, SN (Serology) Detection of antigen in feces by ELISA; EM or latex-agglutination
6	Rota virus	Detection of antigen in feces by ELISA; EM or latex-agglutination

Sampling frequency

Every 6 months	Antigen numbers 1–4
On request[4]	Antigen numbers 5–6

Sample size
A minimum of 8 animal sera (not pooled) randomly sampled.

Bacterial and fungal infections
Methodology
Cultural methods
Bacteriological investigations must always include non-selective media e.g. blood agar. Selective and enriched media must be used in addition to non-selective media for routine and special or confirmatory investigations. Aerobic culture conditions are sufficient for most bacteria.

Serological methods
Serological methods exist for the detection of antibodies to various pathogens e.g. *Leptospira* spp.

Samples to be investigated
Samples from the following sites must be cultured:
Tonsillary region (swab), skin/hair (combed sample), prepuce/vagina (swab).
Fresh fecal material must be collected by a suitable method.
Serum samples should be investigated for antibodies.

List of bacterial and fungal infections to be monitored.

1 *Bordetella bronchiseptica*
2 *Campylobacter* spp
3 *Leptospira* spp (serology)
4 *Pasteurella* spp
5 Salmonellae
6 Streptococci beta-hemolytic (designation of Lancefield group, if possible)
7 *Yersinia enterocolitica*
8 *Microsporon* spp
9 *Trichophyton* spp

Culturing is the method of choice unless otherwise stated.

Sampling frequency
Every 6 months.

Sample size
A minimum of 10 animals randomly sampled.

Parasitology
Methodology
Routine methodology
Fecal flotation
Microscopic examination of wet mounts.
Ear swab for *Otodectes cynotis*.

[4] To be monitored
- when associated with lesions
- when associated with clinical signs of disease
- when there is evidence of pertubation of physiological parameters and/or breeding performance
- when using immunodeficient animals

The following organisms must be included in the final report of results, with a declaration of whether the organism has been detected or not (numbers of animals positive), or not tested (NT).

List of parasites to be compulsory monitored

All arthropods
(identification as far as possible to the systematic name)
All helminths
(identification as far as possible to the systematic name)
Eimeria spp
(identification as far as possible to the systematic name)
Isospora spp
(identification as far as possible to the systematic name)

List of parasites to be monitored on request[4]

Sarcoptes scabei (dermal scrapings and/or serology)
Demodex spp. (dermal scrapings)

Sampling frequency
Every 6 months.

Sample size
A minimum of 10 or 8 + 2 animals[5] randomly sampled.

Report
While Scand-LAS cannot accept responsibility for tests or their implication, breeders or users of laboratory animals who are reporting on health monitoring of their animal colonies may use words "in accordance with Scand-LAS recommendations" only where that is in fact the case.
A Scand-LAS approved health report should follow the guidelines laid out in the FELASA recommendations appendix II.[6]

[5] If weanlings are not available at time of scheduled testing, test later when available.

[6] Recommandations relatives au contrôle sanitaire des élevages de souris, rats, hamsters, cobayes et lapins. Recommendations for the health monitoring of mouse, rat, hamster, guinea pig and rabbit breeding colonies. Rapport de la Federation des Associations Européennes pour La Science de l'Animal de Laboratoire (FELASA), Kraft et al., Sci. Tech. Anim. Lab. 1993, *18*, 141–163.

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Recommendations for health monitoring of experimental gerbil breeding colonies

by *Annelise Hem, Axel Kornerup Hansen, Claes Rehbinder & Hanna-Marja Voipio.*

Report of the Scandinavian Federation for Laboratory Animal Science (Scand-LAS) Working Group of Animal Health

Preamble

The health of an animal is always at risk from a variety of infections. Infections may be inapparent or at least not made apparent by gross and obvious lesions. Clinical disease may thus not be observed until the animal is stressed, for example by an experimental procedure.

There is overwhelming evidence that infections in laboratory animals may influence the outcome of experiments. Depending upon the specific infection, a variety of biological parameters may be affected, including behaviour, growth rate, relative organ weights, immune response and tumour development. Subtle or overt infections can also lead to contamination of biological materials, tissue cultures, cell-lines, transplantable tumours and biological products. All infections, apparent or inapparent, are likely to increase biological variability.

Some laboratory animal diseases are zoonotic.

For all these reasons, a laboratory animal health monitoring programme is of vital importance, decreasing the risk of zoonotic infection and adding to the reliability and reproducibility of research data.

This report proposes a scheme for health monitoring of laboratory gerbil breeding colonies with the intention of harmonizing procedures within the Scandinavian countries.

General Considerations

These recommendations are aimed at all breeding colonies of dogs. It must be emphasized that they are minimal requirements for health monitoring, and constitute a common baseline for breeders. Actual practice may exceed these recommendations in various ways, depending on local circumstances.

The term "breeding unit" is here used to describe a self-contained unit, which could be considered a microbiological entity.

The existence of detailed written procedures – Standard Operating Procedures (SOPs) within monitoring laboratories is expected and must be available on request.

Monitoring laboratories should follow the principles of Good Laboratory Practice (GLP) where applicable and participate in a Quality Assurance Programme.

It should be emphasized that negative results mean only that the presence of the micro-organisms monitored has not been demonstrated in the animals screened by the test(s) used. The results are not necessarily a reflection of the status of all the animals in the breeding unit.

An agent must be declared as present if it is identified or antibodies to it are detected in any of the animals screened. The results must continue to be reported as positive at subsequent screens until the agent has been eradicated by means of e.g. rederivation or restocking. However, agents known to be present need not be monitored at subsequent screens provided that they are declared in the health report.

The presence of antibodies in a colony is only an indicator of infection. Their significance can be elucidated using methods other than serological methods.

As the questions of strain/breed specificity of infections is not fully understood, in an animal unit containing more than one strain/breed of the same species, the strains must be screened successively.

If a unit contains more than one animal species, each species must be screened separately, according to the test schedules.

Sample size and frequency of monitoring

Sampling frequency	Sample size		Test			
	Age	No. of animals	Clinical ex	Ser	Baxt	Par
Every 3 months	Weanlings	≥ 2	–	+	+	+
	10–14 weeks	≥ 4	+	+	+	+
	≥ 6 months	≥ 4	+	+	+	+

Viral infections

List of viral infections to be serologically monitored.

	Antigens	Suitable test methods[1] (alphabetical)
1	Lymphocytic choriomeningitis virus	ELISA, IFA
2	Pneumonia virus of mice (PVM)	ELISA, HI, IFA
3	Reovirus type 3 (Reo 3)	ELISA, IFA
4	Sendai virus	ELISA, HI, IFA
5	Simian virus 5 (SV5)	ELISA, IFA

Equivocal or unexpected positive serological test results must be confirmed by an alternative test method and/or repeated investigation.

Sampling frequency

Every three months Antigen numbers 1–5

Sample size

A minimum of 8 animal sera (not pooled) randomly sampled.

[1] Abbrevations:
ELISA Enzyme-linked immuno-sorbent assay.
HI Haemagglutination inhibition test.
IFA Immunofluorescence assay.

Bacterial and fungal infections

Methodology

Cultural methods

Bacteriological investigations must always include non-selective media e.g. blood agar. Selective and enriched media must be used in addition to non-selective media for routine and special or confirmatory investigations. Aerobic culture conditions are sufficient for most bacteria.

Serological methods

Serological methods exist for the detection of antibodies to various pathogens, e.g. *Bacillus piliformis.*

Samples to be investigated

Samples from the following sites must be cultured:

Nasal turbinates/nasopharynx, trachea, prepuce/vagina, caecum, lesions.

Fresh fecal material must be collected by a suitable method.

Serum samples should be investigated for antibodies against *B. piliformis.*

List of bacterial and fungal infections to be compulsory monitored.

Bacillus piliformis (serology)
Bordetella bronchiseptica
Pasteurella spp
Salmonellae
Streptococci beta-hemolytic (designation of Lancefield group, if possible)
Streptococcus pneumoniae

Culturing is the method of choice unless otherwise stated.

List og bacterial and fungal infections to be monitored on request[2]

Clostridium spp
Dermatophytes
Escherichia coli
Klebsiella pneumoniae/oxytoca
Proteus spp
Pseudomonas aeruginosa
Staphylococcus aureus

Sampling frequency
Every three months

Sample size
Ten animals randomly sampled from each breeding unit.

Parasitology
Methodology
Routine methodology at necropsy
Examination of the pelt (skin and hair) with the use of a dissecting microscope.
Microscopic examination of fresh wet mounts of caecal contents and of the inner lining of the ileum.
Fecal flotation.

The following organisms must be included in the final report of results, with a declaration of whether the organism has been detected or not (numbers of animals positive), or not tested (NT).

List of bacterial, mycoplasmal and fungal infections to be compulsory monitored

All arthropods
(identification as far as possible to the systematic name)
All helminths
(identification as far as possible to the systematic name)
Eimeria spp
(identification as far as possible to the systematic name)
Giardia spp
Spironucleus spp
Other flagellates
(identification of species unneccessary)
Toxoplasma gondii (serology)
Encephalitozoon cuniculi (serology)

List of parasites to be monitored on request[2]

Sarcoptes scabei (dermal scrapings and/or serology)
Demodex spp. (dermal scrapings)

Sampling frequency
Every three months.

Sample size
Ten animals from each breeding unit.

Pathology
The following organs should be monitored for abnormalities at routine necropsy: skin, oral cavity, brain, respiratory system, heart, liver, spleen, gastro-intestinal tract, kidneys, adrenals, urogenital tract (including testes), body lymph nodes.

[2] To be monitored
- when associated with lesions
- when associated with clinical signs of disease
- when there is evidence of pertubation of physiological parameters and/or breeding performance
- when using immunodeficient animals