FELASA recommendations for the health monitoring of experimental units of calves, sheep and goats

Report of the Federation of European Laboratory Animal Science Associations (FELASA) Working Group on Animal Health

FELASA Working Group on Animal Health: C. Rehbinder (Convenor), S. Alenius, J. Bures, M. de las Heras, C. Greko, P. S. Kroon & A. Gutzwiller
FELASA, BCM Box 2989, London WC1N 3XX, UK

Contents

Introduction

Small ruminants have by tradition been regarded as farm or agricultural animals with very little connection with biomedical research and laboratory animal science (Rehbinder & Öbrink 1997). The use of small ruminants in biomedical research, however, has a long tradition and how to produce germ-free goats has been described already in 1913 by Küster (see Juhr 1976). Since the late fifties, several reports on germ-free and gnotobiotic calves, sheep and goats have been published (Juhr 1976).

Today the use of calves, sheep and goats in biomedical research is increasing. They may to a certain extent replace traditional laboratory animals, including dogs (FELASA 1998), in the fields of surgery, genetics, physiology, transplantation techniques, endocrinology and bio-technology (Küster 1913, Tavernor *et al.* 1971, Alexander *et al.* 1973, Leader & Stark 1987, Fowler *et al.* 1993, Bruns *et al.* 1996, Tulamo *et al.* 1996, Pennisi *et al.* 1997, Wilmut *et al.* 1997). A large size is sometimes a crucial factor making the traditional laboratory animals (rodents and lagomorphs) less suited.

The health of an animal is always at risk from a variety of infections. Whether clinically manifest or not, infectious agents may produce effects that may impinge upon and change the outcome of experiments and treatments undertaken. Depending upon the

specific infection, a variety of biological parameters may be affected such as behaviour, growth rate, relative organ weights, immune response, tumour development, etc. Subclinical infections can also lead to contamination of biological materials, tissue cultures, transplantable tumours and biological products. All infections, apparent or inapparent, are likely to increase biological variability. In addition, some animal infections are zoonotic, i.e. transmissible to man. For all these reasons, animal health monitoring programmes are important, adding to the reliability and reproducibility of research data and decreasing the risk for researchers and staff of contracting zoonotic infections.

These recommendations propose health monitoring programmes for small ruminants, defined as calves, sheep and goats, used in biomedical research, with the intention of harmonizing procedures and achieving similar standards of testing within the FELASA member countries. It is recognized that the wide variety in animal sources, husbandry practices, local and national animal health regulations and standards will lead to more variations in health status and monitoring requirements than encountered with common laboratory species such as rodents. A major goal of these recommendations is to ensure that health monitoring reports have a common standard and format, identifying the presence or absence of specific pathogens in laboratory animal colonies.

1. General considerations

1.1 Depending on local conditions, the number of agents to be monitored will vary from country to country. Diseases declared, by a national authority, to be absent in a certain country or region do not need to be monitored. Actual practice may exceed these recommendations in various ways, depending on local circumstances—for example the regional prevalence of specific organisms, the intended use of progeny or the existence of national monitoring schemes. Additional investigations may be deemed necessary. The results of these investigations should be reported.

1.2 These recommendations are intended for the selection and purchase of small ruminants (e.g. calves, sheep and goats) for use in biomedical research.

1.3 The specialized breeding of small ruminants for scientific purposes is an exception, and calves, sheep and goats are usually purchased from farms with traditional agricultural production. The standard and suitability of the premises on farms selected for the breeding of small ruminants intended for use in biomedical investigations, as well as the health of the animals being bred, must be regularly monitored (at least two visits/year) and the results recorded. All dead and aborted animals should be necropzied and the results incorporated in records kept for inspection.

1.4 These recommendations are also intended for experimental colonies and units where calves, sheep and goats are kept and used for biomedical research.

1.5 Each unit, farm or experimental colony being monitored is considered to be a separate microbiological entity.

1.6 Detailed written procedures—Standard Operating Procedures (SOPs)—within monitoring laboratories must be available.

1.7 Monitoring laboratories should follow quality procedures, such as FELASA's scheme (Homberger *et al.* 1999), Good Laboratory Practice or national animal health diagnostic laboratory schemes.

1.8 An agent must be declared as present if it is identified. It should be emphasized that negative results mean only that the presence of the pathogens 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 unit.

1.9 The presence of antibodies against organisms for which the animals have

not been vaccinated is an indicator of infection in the colony, with the exception of vaccinated animals (see 1.13). The presence of passively acquired colostral antibodies in young calves, lambs and kids has to be considered. The actual presence of the agent, when still remaining in the animal, can be verified using methods other than serology.

1.10 Equivocal or unexpected positive serological test results must be confirmed by an alternative test method and/or repeated investigation, preferably by a reference laboratory.

1.11 Written copies of vaccinations and/or antiparasitic and antimicrobial treatments should be provided. All kinds of veterinary treatments, whether medical or not, should be recorded.

1.12 When antiparasitic and antimicrobial drugs are administered, the brand name and the dose and date must be recorded. Information on manufacturer, batch number and expiry date of the product should also be recorded.

1.13 When calves, sheep and goats are vaccinated, it is according to general conditions (non-barrier) and buyers' requirements, on request and according to import/export regulations. The brand name of the vaccine, the dose used, and the date must be recorded. Information on manufacturer, batch number and expiry date of the product should also be recorded. Monitoring of agents against which the animals are vaccinated should not be mandatory and should be undertaken only when requested.

2. Inspection of the farm of origin

2.1 A health surveillance programme, based on clinical observations, shall be established under the direction of a veterinarian. All animals should be inspected daily by the farm personnel and deviations from normal appearance should be reported and recorded. The programme should be in place for at least one gestation period of the species concerned (gestation period cattle $\approx$280, sheep and goat 144–150 days) before the delivery of animals to the colony.

2.2 Records should be kept for inspection concerning movements of animals, changes in feeding regimens, diagnostic investigations, all kinds of treatments, deaths and necropsy results. Dead animals should always be considered an important source of information.

2.3 When applicable, microbiological and chemical analyses of feed and drinking water ought to be undertaken and recorded annually.

2.4 The construction and hygienic standard of the premises used should be recorded and records should be kept for inspection concerning constructional changes and repairs, ventilation, temperature, relative humidity, etc.

3. Inspection of the experimental animal unit

A clinical health monitoring programme shall be established under the direction of a veterinarian.

All animals should be observed daily by an animal technician. Any signs of disease among the animals should be immediately reported to the veterinarian in charge. Animals with disease symptoms should be investigated by suitable diagnostic methods and in accordance with accepted veterinary practices. The presence of organisms and lesions listed in these recommendations and the results of clinical and pathological examinations should be included in the health monitoring report. Results obtained from other diagnostic investigations should be made available on request. Daily records should be kept for inspection. Before new animals are introduced either at the farm premises or at an experimental unit they should be kept separated and tested before they are put together with the other animals at the farm or unit.

4. Monitoring procedures

4.1 *Laboratory investigations*

All samples obtained from calves, sheep and goats in connection with routine health monitoring are to be taken from live animals. However, additional samples may be obtained from dead or euthanazed animals. Samples (bacteriology, serology, parasitology) are preferably monitored individually.

4.2 *The screening programme*

The number of animals monitored depends on the scope of the investigation and the total number of animals involved. At least four animals should be sampled. Frequency and sampling procedures should be in accordance with international standards or with the respective national disease control programmes and import/export regulations, but monitoring should occur at least once a year. Infectious diseases that do not need to be monitored for are:

- diseases which are already included and monitored in an official, national governmental screening programme (but the results should be included in the health monitoring report);
- diseases officially declared absent in that country or region;
- diseases for which the animals are vaccinated. In the latter case, special consideration should be given to clinical signs indicating the presence of such diseases.

Some agents are to be monitored on request or

- when associated with lesions;
- when associated with clinical signs of disease;
- when there is evidence of perturbation of physiological or experimental parameters and/or breeding performance.

5. Health monitoring report

The main purpose of the health monitoring of experimental units is to supply investigators with data on variables that might influence the outcome of their experiments. These data are not necessarily part of the experimental work, but may have to be considered during the interpretation of the experimental results by the investigator and by the readers of the publication. Results obtained by means of health monitoring should, therefore, be included in scientific publications. While FELASA cannot accept responsibility for tests or for their implications, breeders or users of laboratory animals who are reporting the health monitoring of their animals may use the words 'in accordance with FELASA recommendations', but only where that is in fact the case. The report should also include, when related to colony/herd-wide measures, a note of the occasional or regular use of antimicrobial feed additives, antimicrobial and antiparasitic drugs, and the dates of administration (important for the evaluation of some laboratory results, e.g. parasitological findings).

5.1 *General information on each report*

The title of the report should be *FELASA-Approved Health Monitoring Report.* This wording can only be used if the methods, frequency, sample size, species list of organisms monitored, and reporting are in full accordance with the recommendations published by FELASA. The design of the report can be changed, but only if it incorporates the data requested in the recommendations. At the top of each report should be: the identification of the breeder and the unit and the month and year when it was last re-stocked with the kind of species used. The introduction of animals of other ruminant species should also be mentioned (with the risk of cross-infection between animals of different species), the date of the report, the date of sampling and testing of the animals, and the species and breed.

5.2 *Layout of the report with respect to pathogens monitored and the colony status*

Except for general information the report is divided into five columns: the first

listing the pathogens monitored; the second recording the historical status of the unit if the experiment is undertaken over a considerable length of time i.e. more than 3 months, or if the risk of contamination is considered high and the need to control the microbiological health status of the experimental animals is regarded as being of great importance; the third giving the results of the current screen; the fourth recording the laboratory carrying out the test; and the fifth column showing the method used. Samples should, when applicable, be analysed individually. Species names of pathogens should be used in preference to more general generic names. The suggested test methods are given as illustrations of current available techniques. In general the most appropriate and up-to-date methods should be used.

5.3 *Listing of pathogens, methods and names of monitoring laboratories*

The organisms detailed in these recommendations should be listed alphabetically in their appropriate sections in the order: 1st section: viruses, including prions; 2nd section: bacteria, including mycoplasma, chlamydia, rickettsia and fungi; and 3rd section: parasites. Current accepted abbreviations for the pathogens may be used in the report. The full or abbreviated name of the laboratory carrying out the test must be recorded for each organism/agent, but where it is abbreviated the full name must be given at the bottom of the report. Where both a method and laboratory name are to be recorded, they should be in the order: microorganism, laboratory, method (FELASA 1998).

5.4 *Historical status of the farm(s), for the colony(ies) and unit(s)*

For each organism the status must be recorded:
Pos if the organism or antibodies to the organism have ever been detected (i.e. positive), plus date of last positive finding.
Neg if the organism or antibodies to the organism have never been detected in previous screens (i.e. negative).
NE if the organism has not been included in the health monitoring programme (i.e. not examined).

5.5 *Current health monitoring results*

For each organism the results must be recorded:
Pos if the organism or antibodies to the organism have been detected in the current screen of animals (number of animals positive out of numbers tested).
Neg if the organism or antibodies to the organism have not been detected in the current screen of animals.
NE if the organism has not been examined for in the current screen of animals.

The results of special investigations of unusual or unexpected occurrences should be reported separately.

5.6 *Additional information*

Any additional information should be given on a separate sheet accompanying the main report and not on the *FELASA-Approved Health Monitoring Report* itself. If an infection is discovered outside of the routine monitoring schedule, users should be informed immediately. Every animal has to be identified, using the technique relevant for the country or region. The identity number of each animal sampled should be noted in the health report.

6. Remarks on the selection, sampling procedures and laboratory examinations of infectious organisms in calves, sheep and goats

6.1 *Viruses*

Several viruses which infect calves, sheep and goats can influence the outcome of experiments undertaken even when they are occurring subclinically. Examples of such viruses are: bovine virus diarrhoea virus (BVDV) in calves,

bovine herpesvirus-1 (BHV-1) in calves, sheep and goats; the caprine arthritis encephalitis virus (CAEV) in goats; and the Visna Maedi virus in sheep. The monitoring of these viruses in compulsory in calves, sheep and goats used as experimental animals. Monitoring programmes for these viruses already exist in several countries in Europe, and the possibility of performing adequate diagnostic tests is generally available. These viruses can be monitored using serological testing of individual animals, e.g. twice yearly, or by the use of pooled serum or milk samples. The number of serum or individual milk samples that can be pooled varies and depends on the sensitivity of the test used. It is possible to pool 5–10 serum or milk samples and achieve reliable results. It is recommended that some viruses are monitored on request.

6.2 *Bacteria and fungi*

Culturing is the method of choice unless otherwise stated. Bacteriological investigations must always include the use of non-selective, as well as of selective, media. Serological methods exists for the detection of antibodies to various pathogens.

Other recognized and validated methods may be used.

6.2.1 *Samples to be investigated*

Samples from the following sites must be cultured: nose, tonsillary region (swab), preputium/vagina and faeces (fresh material collected by a suitable method) and milk in lactating sheep and goat. If the presence of resistant bacteria strains or new or uncommon resistance patterns are found they should be reported.

6.3 *Parasites*

Laboratory diagnosis of most parasitic diseases relies on the identification of parasites as such or, in the case of helminth infections, on the demonstration of eggs or larvae. There exist serological tests for monitoring, e.g. babesiosis, cryptosporidiosis, dictyocaulosis, sarcosporidiosis, theileriosis, neosporosis, toxoplasmosis. Positive serological results do not necessarily imply the presence of a still active infection.

For blood parasites and cyst-forming parasites, acknowledged smear techniques for microscopy may be used. Still some parasites are only found at necropsy using histological techniques. Young growing animals and females are quite susceptible to certain parasitic diseases just before and after parturition. Samples for monitoring the presence of parasites in the herd should preferably be taken from animals belonging to these susceptible groups.

6.3.1 Mandatory routine examinations are: Microscopic examination of faeces for eggs of gastrointestinal helminths, *Eimeria* spp., *Cryptosporidia* and *Giardia* (although ruminants rarely show signs of giardiasis, they appear to act as a *Giardia* infection reservoir for humans). Faeces must be examined for eggs of liver flukes and for lungworm larvae in herds with access to pasture. Clinical examination must be undertaken for the detection of ectoparasitic arthropods (lice, sheep ked), of mange, and of hypodermosis (hypoderma spp.). The clinical diagnosis of mange has to be confirmed by microscopic identification of mites or by serology. Samples for parasitological examinations have to be taken from animals which have not been recently treated against parasites.

6.3.2 Confirmation by laboratory examination is compulsory when, on the basis of suggestive clinical signs, of lesions or haematological findings, parasitic diseases are suspected, e.g.: babesiosis; neosporosis; theileriosis; toxoplasmosis.

References

Alexander TJL, Lysons RJ, Elliot LM, Wellstead PD (1973) Equipment for rearing gnotobiotic lambs. *Laboratory Animals* 7, 195–217

Bruns DP, Olmstead ML, Litsky AS (1996) Technique and results for total hip replacement in sheep: An experimental model. *Veterinary Comparative Orthopaedics* **9**, 158–64

FELASA recommendations for the health monitoring of breeding colonies and experimental units of cats, dogs and pigs. *Laboratory Animals* 1998, **32**, 1–17

Fowler ME, ed (1993) *Zoo and Wild Animal Medicine, Current Therapy 3*. Philadelphia: WB Saunders, pp 1–617

Homberger FR, Boot R, Feinstein R, Kornerup-Hansen A, van der Logt J (1999) FELASA guidance paper for the accreditation of laboratory animal diagnostic laboratories. *Laboratory Animals* **33** (suppl. 1), 19–38

Juhr N-C (1976) Gewinnung und Aufzucht gnotobiotischer kleiner Wiederkäuer. Herausgegeben von der Fachrichtung Versuchstierkunde und Versuchstier-krankheiten der Freien Universität Berlin. *Tierlaboratorium* **3**, 194–207

Küster (1913) cited from Juhr 1976

Leader RW, Stark D (1987) The importance of animals in biomedical research. *Perspectives in Biology and Medicine* **30**, 470–85

Pennisi E, Williams N (1997) Will Dolly send in the clones? *Science* **275**, 1415–16

Rehbinder C, Öbrink K-J (1997) Laboratory animal science: a definition. In: *Harmonization of Laboratory Animal Husbandry* (O'Donoghue PN, ed). Proceedings of the Sixth Symposium of the Federation of European Laboratory Animal Science Associations 19–27 June 1996, Basel, Switzerland. London: Royal Society of Medicine Press, pp 144–5

Tavernor WD, Trexler PC, Vaughan LC, Cox JE, Jones DGC (1971) The production of gnotobiotic piglets and calves by hysterotomy under general anaesthesia. *Veterinary Record* **88**, 10–14

Tulamo RM, Peltoniemi H, Pihlajamäki H, Kallioinen M, Pohjonen T, Törmälä P, Rokkanen P, Waris T (1996) The consolidation of craniotomy after resorbable polyactide (SR-PLLA) and titanium plating: a comparative experimental study in growing sheep. *Veterinary Surgery* **26**, 256

Wilmut J, Schnieke AE, McWhir J, Kind A & J, Cambell KHS (1997) Viable offspring derived from fetal and adult mammalian cells. *Nature* **385**, 810–13

Monitoring of virus infections in calf

Mandatory routine monitoring

Agent/antigen	Suitable samples and methods
Bovine herpesvirus 1 (BHV 1 or IBR/IPV)	ELISA (individual or pooled serum or milk samples)
Bovine leukaemia virus (BLV)	ELISA (individual or pooled serum or milk samples)
Bovine virus diarrhoea virus (BVDV)	Virus isolation, antigen ELISA (individual or pooled serum or milk samples), PCR

Virus infections to be monitored on request or when associated with lesions or clinical signs

Agent/antigen	Suitable samples and methods
Bovine adenoviruses (BAV 1-10)	ELISA, NT
Bovine corona virus (BCV)	ELISA (individual or pooled serum or milk samples), antigen ELISA
Bovine herpes virus type 1 or 5	Necropsy, virus isolation, PCR, ELISA
Bovine mamillitis virus (BHV-2)	Virus isolation, NT, immunohistochemistry
BSE	Necropsy, histology
Cowpox virus or Bovine papular stomatitis virus	EM, NT
Foot and mouth disease	ELISA, virus isolation
Malignant catarrhal fever	ELISA, PCR
Rinderpest	CIEP
Rotavirus	EM, antigen-ELISA, PAGE

Laboratory examinations only on request

Bovine respiratory syncytial virus (BRSV)	ELISA (individual or pooled serum or milk samples)
Parainfluenza-3 virus (PIV-3)	ELISA (individual or pooled serum or milk samples)

NT = neutralization test, PCR = polymerase chain reaction, EM = electron microscopy, CIEP = counter immunoelectrophoresis, PAGE = polyacrylamide gel electrophoresis

Monitoring of virus infections in sheep

Mandatory routine monitoring

Agent/antigen	Suitable samples and methods
Border disease virus (BDV) or Bovine virus diarrhoea virus (BVDV)	Virus isolation, antigen ELISA or ELISA (individual or pooled serum or milk samples), PCR
Maedi–Visna virus	ELISA, AGID. Individual samples

Virus infections to be monitored on request or when associated with lesions or clinical signs

Agent/antigen	Suitable samples and methods
Bluetongue	Virus isolation, NT
Ecthyma (Orf) virus	EM, NT
Foot and mouth disease	ELISA, virus isolation
Ovine adenoviruses (OAV 1-6)	ELISA or NT
Peste des petits ruminants	AGID, CIEP
Rotavirus	EM, ELISA, PAGE
Scrapie	Necropsy, histology
Sheeppox virus	EM, NT

Laboratory examinations only on request

Ovine respiratory syncytial virus	ELISA, individual or pooled serum samples
Parainfluenza-3 virus (PIV-3)	ELISA, individual or pooled serum samples
Pulmonary adenoma	PCR

AGID = agar gel immunodiffusion test. See page 336 for other abbreviations

Monitoring of virus infections in goat

Mandatory routine monitoring

Agent/antigen	Suitable samples and methods
Border disease virus (BDV) or Bovine virus diarrhoea virus (BVDV)	Virus isolation, antigen ELISA or ELISA (individual or pooled serum or milk samples), PCR or NT
Caprine arthritis-encephalitis virus (CAEV)	ELISA, AGID, individual samples

Virus infections to be monitored on request or when associated with lesions or clinical signs

Agent/antigen	Suitable samples and methods
Bluetongue	Virus isolation, NT
Contagious Ecthyma (Orf) virus	EM, NT
Foot and mouth disease	ELISA, virus isolation
Goatpox virus	EM, NT
Peste des petits ruminants	AGID, CIEP
Rotavirus	EM, ELISA, PAGE
Scrapie	Necropsy, histology

Laboratory examinations only on request

Caprine herpesvirus	NT, individual samples
Caprine respiratory syncytial virus	ELISA, individual or pooled serum samples
Parainfluenza-3 virus (PIV-3)	ELISA, individual or pooled serum samples

See pages 336 and 337 for abbreviations

Monitoring of bacterial infections in calf

Mandatory routine monitoring

Agent/antigen	Suitable samples and methods
Brucella (*B. abortus; B. melitiensis; B. ovis*)	Serology, serum. ELISA–milk. Rose bengal plate test
Coxiella burnetti	Serology, CFT, PCR
Enterohaemorrhagic E. coli O157	Faeces; culture*
Haemophilus somnus	Serology, culture, blood-yeast extract plates
Leptospira spp.	Serology, milk, ELISA
Mycobacterium bovis, tuberculosis and *avium*	Comparative dermal tuberculin test
M. paratuberculosis	Faeces; culture, direct microscopy, serum; ELISA
Salmonella spp.	Faeces; culture

Bacterial and fungal infections to be monitored on request or when associated with lesions or clinical signs

Agent/antigen	Suitable samples and methods
Actinobacillus spp.	Culture
Actinomyces (Archanobacterium) pyogenes	Culture
*Clostridia (Cl. chauvyi; Cl. septicum; Cl. sordelli; Cl. novyi; Cl. perfringens)***	Serology (FA). Culture
Campylobacter fetus var venerealis, Campylobacter fetus var fetus	Culture of stomach content, collected from aborted fetuses
Dermatophilus congolensis	Direct microscopy, culture
Dermatophytes	Culture
Erysipelothrix rhusiopathiae	Culture, serology
Mycoplasma bovis	Culture
Pasteurella spp.	Culture

*Immunomagnetic enrichment culture on selective media (CT-SMAC cefiximetellurite sorbitol MacConkey) PCR analysis on verotoxin 1 and 2 and eae A genes

**Cl. chauvyi* associated with muscle lesions (blackleg)
Cl. novyi type B and *Cl. haemolyticum* associated with liver lesions (Black disease)
Cl. perfringens types B, C and D associated with lesions of the gastrointestinal tract
Cl. septicum associated with braxy (brad sot)
See pages 336 and 337 for abbreviations

Monitoring of bacterial infections in sheep

Mandatory routine monitoring

Agent/antigen	Suitable samples and methods
Brucella spp. (*B. melitiensis; B. ovis*)	Serum; ELISA, Rose bengal test, complement fixation
Chlamydia spp.	Serology, CFT, ELISA, PCR
Coxiella burnetti	Serology, CFT, PCR
Leptospira spp.	Serum; blood agar gel imm diff test, ELISA, microagglutination
Mycobacterium bovis, tuberculosis avium,	Comparative dermal tuberculin test
Mycobacterium paratuberculosis	Faeces; culture, direct microscopy, ELISA
Mycoplasma agalactiae	Serum; Comp test
Salmonella spp.	Faeces; culture

Bacterial and fungal infections to be monitored on request or when associated with lesions or clinical signs

Agent/antigen	Suitable samples and methods
Actinobacillus spp.	Culture
Actinomyces (Archanobacterium) pyogenes	Culture
Clostridium spp.	Serology (FA)
Corynebacterium pseudotuberculosis	Culture, serology, ELISA
Dermatophilus congolensis	Direct microscopy, culture
Dermatophytes	Culture
Erysipelothrix rhusiopathiae	Culture, serology, ELISA
Haemophilus somnus	Culture
Listeria monocytogenes	Serum (ELISA), necropsy material, PAP and culture
Pasteurella spp.	Culture

See pages 336 and 337 for abbreviations

Monitoring of bacterial infections in goat

Mandatory routine monitoring

Agent/antigen	Suitable samples and methods
Brucella (*B. abortus*; *B. melitiensis*)	Serum, milk; ELISA, Rose bengal test
Chlamydia spp.	Serology, CFT, ELISA
Coxiella burnetti	Serology, CFT, PCR
Leptospira spp.	Serum, milk; ELISA
Mycobacterium bovis, tuberculosis, avium	Comparative dermal tuberculin test
M. paratuberculosis	Faeces; culture, direct microscopy. Serum; Agar gel imm diff test
Mycoplasma agalactiae	Serum; Comp test
Salmonella spp.	Faeces; culture

Bacterial and fungal infections to be monitored on request or when associated with lessions or clinical signs

Agent/antigen	Suitable samples and methods
Actinobacillus spp.	Culture
Actinomyces (*Archanobacterium*) *pyogenes*	Culture
Clostridium spp.	Serum (FA), culture
Corynebacterium pseudotuberculosis	Culture
Erysipelothrix rhusiopathie	Culture, serology, ELISA
Pasteurella spp.	Culture, serology, ELISA
Staphylococcus aureus	Culture

See pages 336 and 337 for abbreviations

Monitoring of parasites in calf, sheep and goat

Mandatory routine monitoring

Agent	Suitable samples and methods
Gastrointestinal helminths	Faeces, flotation, microscopy
Intestinal protozoa (*Eimeria, Cryptosporidium, Giardia*)	Faeces fixed in SAF or MIF, microscopy
Liver flukes[1]	Faeces, sedimentation, microscopy
Lungworm larvae[1]	Baermann technique, microscopy; serology[2]
Ectoparasites[3]	Clinical examination; microscopic examination of material from mange lesions[4]
Hypoderma[3]	Clinical examination

Laboratory examinations mandatory when signs or lesions are suggestive of one of the following diseases are found

Babesiosis (*Babesia* spp.)	Blood smear; Giemsa stain, serology[1,2] (IFAT)
Neosporosis (*N. caninum*)	Placenta, aborted fetus; histology, PCR; serology[1,2]
Theileriosis (*Theileria* spp.)	Blood smear or lymph node biopsy material, Giemsa stain; serology[1,2]
Toxoplasmosis (*Toxoplasma gondii*)	Placenta, aborted fetus; histology, PCR; serology[1,2]

[1] Mandatory only if animals have access to pasture
[2] A positive serological result does not imply the presence of an active infection
[3] For the detection of ectoparasites and hypodermosis, clinically suspect cases must be examined preferentially
[4] If, on the basis of laboratory examinations, mange has been shown to be endemic in the herd, confirmation of each clinical diagnosis by laboratory examinations is not compulsory. In this case, clinically diagnosed cases have to be mentioned in the health monitoring report
See pages 336 and 337 for abbreviations

FELASA-APPROVED HEALTH MONITORING REPORT

Name and address of the breeder:

Restocked year:

Other ruminants introduced:

Name and address of Experimental unit:

Date of issue: Current sampling date: Current test date:

Species: **Calf** Breed: Indentification:

	HISTORICAL results pos/tested	CURRENT TEST results pos/tested	LABORATORY	METHOD
VIRAL INFECTIONS				
Bovine herpesvirus 1 (BHV 1 or IBR/IPV)				
Bovine leukaemia virus (BLV)				
Bovine virus diarrhoea virus (BVDV)				
VIRAL INFECTIONS MONITORED ON REQUEST OR WHEN ASSOCIATED WITH LESIONS OR CLINICAL SIGNS				
Bovine adenoviruses (BAV 1–10)				
Bovine corona virus (BCV)				
Bovine herpes virus type 1 or 5				
Bovine mamillitis virus (BHV-2)				
BSE				
Cowpox virus or Bovine papular stomatitis virus				
Foot and mouth disease				
Malignant catarrhal fever				
Rinderpest				
Rotavirus				
VIRAL INFECTIONS MONITORED ONLY ON REQUEST				
Bovine respiratory syncytial virus (BRSV)				
Parainfluenza-3 virus (PIV-3)				

FELASA-APPROVED HEALTH MONITORING REPORT

Name and address of the breeder:

Restocked year:

Other ruminants introduced:

Name and address of Experimental unit:

Date of issue: Current sampling date: Current test date:

Species: **Sheep** Breed: Indentification:

	HISTORICAL results pos/tested	CURRENT TEST results POS/TESTED	LABORATORY	METHOD
VIRAL INFECTIONS				
Border disease virus (BDV) or Bovine virus diarrhoea virus (BVDV)				
Maedi–Visna virus				
VIRAL INFECTIONS MONITORED ON REQUEST OR WHEN ASSOCIATED WITH LESIONS OR CLINICAL SIGNS				
Bluetongue				
Ecthyma (Orf) virus				
Foot and mouth disease				
Ovine adenoviruses (OAV 1-6)				
Rotavirus				
Scrapie				
Sheeppox virus				
VIRAL INFECTIONS MONITORED ONLY ON REQUEST				
Ovine respiratory syncytial virus				
Parainfluenza-3 virus (PIV-3)				
Pulmonary adenoma				

FELASA-APPROVED HEALTH MONITORING REPORT

Name and address of the breeder:

Restocked year:

Other ruminants introduced:

Name and address of Experimental unit:

Date of issue: Current sampling date: Current test date:

Species: **Goat** Breed: Indentification:

	HISTORICAL results pos/tested	**CURRENT TEST results pos/tested**	**LABORATORY**	**METHOD**
VIRAL INFECTIONS				
Border disease virus (BDV) or Bovine virus diarrhoea virus (BVDV)				
Caprine arthritis-encephalitis virus (CAEV)				
VIRAL INFECTIONS MONITORED ON REQUEST OR WHEN ASSOCIATED WITH LESIONS OR CLINICAL SIGNS				
Bluetongue				
Ecthyma (Orf) virus				
Foot and mouth disease				
Goatpox virus				
Pestes des petits ruminants				
Rotavirus				
Scrapie				
VIRAL INFECTIONS MONITORED ONLY ON REQUEST				
Caprine herpesvirus				
Caprine respiratory syncytial virus				
Parainfluenza-3 (PIV-3)				

FELASA-APPROVED HEALTH MONITORING REPORT

Name and address of the breeder:

Restocked year:

Other ruminants introduced:

Name and address of Experimental unit:

Date of issue: Current sampling date: Current test date:

Species: **Calf** Breed: Indentification:

	HISTORICAL results pos/tested	**CURRENT TEST results pos/tested**	**LABORATORY**	**METHOD**
BACTERIAL AND FUNGAL INFECTIONS				
Brucella spp. *(B. abortus; B. melitiensis; B. ovis)*				
Coxiella burnetti				
Enterohaemorrhagic E. coli O 157				
Haemophilus somnus				
Leptospira spp.				
Mycobacterium bovis,				
tuberculosis and *avium*				
Mycobacterium paratuberculosis				
Salmonella spp.				
BACTERIAL AND FUNGAL INFECTIONS MONITORED ON REQUEST OR WHEN ASSOCIATED WITH LESIONS OR CLINICAL SIGNS				
Actinobacillus spp.				
Actinomyces (Archano-bacterium) pyogenes				
Clostridium spp.				
Campylobacter fectus var veralis				
Campylobacter fectus varfetus				
Dermatophilus congolensis				
Dermatophytes				
Erysipelothrix rhusiopatiae				
Mycoplasma bovis				
Pasteurella spp.				

FELASA-APPROVED HEALTH MONITORING REPORT

Name and address of the breeder:

Restocked year:

Other ruminants introduced:

Name and address of Experimental unit:

Date of issue: Current sampling date: Current test date:

Species: **Sheep** Breed: Indentification:

	HISTORICAL results pos/tested	**CURRENT TEST results pos/tested**	**LABORATORY**	**METHOD**
BACTERIAL AND FUNGAL INFECTIONS				
Brucella spp. (*B. melitiensis; B. ovis*)				
Chlamydia spp.				
Coxiella burnetti				
Leptospira spp.				
Mycobacterium bovis, tuberculosis, avium				
Mycobacterium spp.				
Mycobacterium paratuberculosis				
Salmonella spp.				
BACTERIAL AND FUNGAL INFECTIONS MONITORED ON REQUEST OR WHEN ASSOCIATED WITH LESIONS OR CLINICAL SIGNS				
Actinobacillus spp.				
Actinomyces (Archanobacterium) pyogenes				
Clostridium spp.				
Corynebacterium pseudo-tuberculosis				
Dermatophilus congolensis				
Dermatophytes				
Erysipelothrix rhusiopatiae				
Listeria monocytogenes				
Pasteurella spp.				

FELASA-APPROVED HEALTH MONITORING REPORT

Name and address of the breeder:

Restocked year:

Other ruminants introduced:

Name and address of Experimental unit:

Date of issue: Current sampling date: Current test date:

Species: **Goat** Breed: Indentification:

	HISTORICAL results pos/tested	**CURRENT TEST results pos/tested**	**LABORATORY**	**METHOD**
BACTERIAL AND FUNGAL INFECTIONS				
Brucella spp. (*B. abortus; B. melitiensis*)				
Chlamydia spp.				
Coxiella burnetti				
Leptospira spp.				
Mycobacterium bovis, tuberculosis, avium				
Mycobacterium paratuberculosis				
Mycoplasma agalactiae				
Salmonella spp.				
BACTERIAL AND FUNGAL INFECTIONS MONITORED ON REQUEST OR WHEN ASSOCIATED WITH LESIONS OR CLINICAL SIGNS				
Actinobacillus spp.				
Actinomyces (Archano-bacterium) pyogenes				
Clostridium spp.				
Corynebacterium pseudo-tuberculosis				
Erysipelothrix rhusiopatiae				
Pasteurella spp.				
Staphylococcus aureus				

FELASA-APPROVED HEALTH MONITORING REPORT

Name and address of the breeder:

Restocked year:

Other ruminants introduced:

Name and address of Experimental unit:

Date of issue: Current sampling date: Current test date:

Species: **Calf, sheep, goat** Breed: Indentification:

	SPECIES	HISTORICAL RESULTS POS/TESTED	CURRENT TEST RESULTS POS/TESTED	LABORATORY	METHOD
PARASITIC INFECTIONS					
Gastrointestinal helminths					
Intestinal protozoa					
Live flukes					
Lungworm larvae					

(Continued)

Ectoparasites					
Hypoderma					
					Clinical findings

PARASITIC INFECTIONS MONITORED ON REQUEST OR WHEN ASSOCIATED WITH LESIONS OR CLINICAL SIGNS

Babesia spp.					
Neospora spp.					
Theileria spp.					
Toxoplasma spp.					