

# STUDYGUIDE

Species specific course:

## **Rodents and Rabbit**

Introduction to Laboratory Animal Science



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## Contents

Objective of the course .....	3
Competence.....	3
Workload.....	3
Course material .....	3
Program.....	4
1. Introduction rodent & rabbit specific course .....	4
2. Anesthesia.....	4
3. Practical rodent & rabbit handling & behaviour.....	4
4. Diseases of laboratory animals .....	5
5. General anatomy for LAS, with special focus on mice, rats, guinea pigs, hamsters and rabbit .....	6
6. Physiology.....	6
7. Management & care I: environmental controls, hygiene, nutrition.....	7
8. Management & care II: housing, welfare .....	7
9. Genetic standardization.....	8
10. Demonstration basic techniques – sampling and humane killing .....	9
11. Practical basic techniques – administration and surgery .....	9
12. LAS assignment .....	9
Final examination.....	11
Certificate.....	11
Schedule .....	12
<a href="#">Modules</a> art. 23.2.b function Species specific4.....	<a href="#">13</a>

## **Objective of the course**

The objective of this course is to present basic and appropriate biology, care, health and management of rodents and rabbits, recognition of pain, suffering and distress in these animals and minimally invasive procedures without anaesthesia to be applied on these animals. This course meets the standards for the species-specific education and training requirements for persons designing projects and procedures for rodents and rabbits.

## **Competence**

For the function 'designing procedures and projects' the Dutch government requires competency.

On December 18, 2014 the new legislation regarding animal experimentation was implemented. Due to this implementation the course on Laboratory Animal Science has been adapted. The course contains now two parts, a basic course (Introduction to laboratory animal science) and a species specific course. The basic course certificate and, at least, one species specific certificate will give the required competence.

From August 1, 2015 the competence is limited. You are not allowed to perform any procedure on animals, unless there is supplementary education. From now you are competent when you are skilled (competence profile, species and skill(s) stated).

After successful completion of the new basic course and after successful completion of the present course on rodents and rabbit, you will be competent to design procedures and projects and to execute simple procedures on these animals. Further skills have to be obtained by working under supervision until competence is demonstrated. Only then are you allowed to work with animals independently.

## **Workload**

The number of credits that can be obtained after successful completion of the course is 1.4 ECTS (European Credit Transfer and Accumulation System). The length of the course is one week (fulltime, 09.00-17.30 hrs). Participation in all parts of the course is mandatory.

## **Course material**

During the course the book Principles of Laboratory Animal Science, revised edition, 2001, L.F.M. van Zutphen, V. Baumans and F. Ohl (eds.) (ISBN 13: 978-0-444-50612-2) will be used. Further teaching material will be provided on a memory-stick.

## Program

<b>Title</b>	<b>1. Introduction rodent &amp; rabbit specific course</b>
<b>Content</b>	During this interactive lecture an overview of all topics to be presented during the entire course period will be given. The current national legislation governing the use of rodents and rabbits in research will be introduced. The natural history of the most common laboratory rodents and rabbits will be presented. In dependence on the natural social structure of these animals implications for housing and testing of these animals will be discussed. Special attention will be paid to welfare related questions.
<b>Key Text</b>	<ul style="list-style-type: none"> <li>a) Movie: The Laboratory Rat: A Natural History (<a href="http://www.ratlife.org">http://www.ratlife.org</a>)</li> <li>b) Origin of the Laboratory Mouse and Related Subspecies. Chapter 1 in (The Laboratory Mouse; Edited by: professor Hans J Hedrich and Professor Gillian Bullock; ISBN: 978-0-12-336425-8).</li> <li>c) History, Strains and Models. Chapter 1 in (The Laboratory Rat A volume in Handbook of Experimental Animals; Edited by: Georg J Krinke; ISBN: 978-0-12-426400-7).</li> <li>d) On usb-stick 'Laboratory animals and animal experiments': BIOLZOOT-12 translation v2. ppt: 3. The laboratory animals: general part.</li> </ul>
<b>Form</b>	Lecture
<b>Testing your competence</b>	<ol style="list-style-type: none"> <li>1. Name the differences in social structure between wild house mice and mice kept in the laboratory.</li> <li>2. How would you decide on enrichment items for laboratory rats?</li> <li>3. When would you decide on mice as model organism?</li> </ol>

<b>Title</b>	<b>2. Anesthesia</b>
<b>Content</b>	This lecture attempts to provide a basic level of knowledge in anesthesia for research workers with special emphasis on those areas that are of practical importance when anesthetising laboratory animals. The general principles of peri-operative care, anesthetic techniques and anesthetic management are discussed including injection- and inhalation anesthesia. The pathophysiology of pain and knowledge concerning different techniques providing analgesia are reviewed.
<b>Key Text</b>	Van Zutphen, L.F.M., Baumans, V., Beynen A.C. (2001) Principles of Laboratory Animal Science: chapter 15, Anesthesia, analgesia and euthanasia
<b>Form</b>	(Interactive) lecture
<b>Testing your competence</b>	<ol style="list-style-type: none"> <li>1. What is pre-emptive analgesia</li> <li>2. Describe the pillars of anesthesia</li> <li>3. Name the advantages and disadvantages of inhalation anesthesia.</li> </ol>

<b>Title</b>	<b>3. Practical rodent &amp; rabbit handling &amp; behaviour</b>
<b>Content</b>	In this practical first of all you will learn procedures for handling and restraining mice, rats, Guinee pigs and rabbits. This practical prepares you for the practical on basic techniques. Important to understand that

	<p>95% of a procedure is restraining the animal in the right way. Working safely and humanely with laboratory animals requires a core competency in handling and restraint methods. Proper restraint and handling techniques are essential for clinical examination and injections while limiting the amount of stress and/or discomfort to the animal and to the handler.</p> <p>Then we will move on to the practical part on mouse and rat behavior. Behaviour is frequently studied in laboratory mice and rats and is one of the most important read-out parameters for the welfare of these animals.</p> <p>In this practical you will carry out simple behavioural investigations in mice and rats focusing on social behavior and animals' preferences.</p>
<b>Key Text</b>	<ul style="list-style-type: none"> <li>a) Handbook "Principles of Laboratory Animal Science" (course book), chapter 3 "Biology and husbandry of laboratory animals".</li> <li>b) Videos on usb-stick on handling/restraining</li> <li>c) <a href="http://film.oslovet.norecopa.no/">http://film.oslovet.norecopa.no/</a></li> <li>d) Handbook "Principles of Laboratory Animal Science" (course book), chapter 4 "Behaviour, stress and well-being".</li> <li>e) Whishaw, Ian Q., ed. The Behavior of the Laboratory Rat: A Handbook with Tests: A Handbook with Tests. Oxford University Press, 2004.</li> <li>f) Film 'The laboratory rat: a natural history' (<a href="http://www.ratlife.org/">http://www.ratlife.org/</a>)</li> </ul>
<b>Form</b>	Lecture and practical
<b>Testing your competence</b>	<p>Every species and even different strains (can) have their own specific way of handling and restraining.</p> <p>Restraining is handling an animal in such a way that nor you neither the animal will be harmed when performing a technique.</p> <p>Name possible consequences (for the animal and for the handler) if animals are not handled and/or restraint properly.</p> <p>How would you train yourself in handling when using a certain species and/or strain for the first time in an experiment?</p> <p>What is an ethogram?</p> <p>Which behavioural test can be used in order to draw conclusions on animal needs?</p> <p>Name parameters that might influence animal behaviour in the laboratory.</p>

<b>Title</b>	<b>4. Diseases of laboratory animals</b>
<b>Content</b>	<p>Diseases in animals can be a consequence of experimental setup or occur as an unintended effect during the study. This lecture will focus on how to handle when animals die or are diseased as an u. In particular, the risks of disease at different levels will be discussed as well as how to recognize disease and come to a diagnosis.</p> <p>Furthermore, the most common infectious diseases of laboratory animals are given, with a special focus on zoonosis. Measurements to reduce the infection risks as well as how to handle in case of infection the potential effects on the studies. ...re.</p>
<b>Key Text</b>	<ul style="list-style-type: none"> <li>• Natural Pathogens of Laboratory Mice, Rats, and Rabbits and</li> </ul>

	<p>Their Effects on Research; Baker, Clin. Microbiol. Rev. 1998</p> <ul style="list-style-type: none"> <li>• Confronting Zoonoses, Linking Human and Veterinary Medicine; Kahn, Emerging Infectious Diseases, 2006</li> <li>• Code of Practice: Welzijnsbewaking van proefdieren</li> <li>• Robbins &amp; Cotran Pathologic Basis of Disease, 9e (for reference only)</li> <li>• <a href="http://dora.missouri.edu/">http://dora.missouri.edu/</a></li> </ul>
<b>Form</b>	Interactive lecture
<b>Testing your competence</b>	<ol style="list-style-type: none"> <li>1. How to handle when laboratory animals are ill or diseased?</li> <li>2. What are the different (levels of) risks when animals are diseased?</li> <li>3. What are actions with regard to pathology, clinical and microbiological diagnostics that can be considered?</li> <li>4. What can be consequences of diseases in laboratory animals?</li> <li>5. What is the importance of collection of samples and how can they be used to diagnose disease?</li> <li>6. Give an example of how a natural pathogen in lab animals can interfere with research.</li> <li>7. Give an example of how rodents might be used as model to study human disease.</li> <li>8. List the transmission routes of pathogens and indicate what measurements can be taken to reduce the risks of spreading.</li> </ol>

<b>Title</b>	<b>5. General anatomy for LAS, with special focus on mice, rats, guinea pigs, hamsters and rabbit</b>
<b>Content</b>	<p>‘One of the prerequisites for responsible use of animals in biomedical research is a thorough knowledge of the biological characteristics of the species to be used. The choice of animal species, sex, age and strain largely depend on whether their anatomical characteristics are suited to the research demands’.</p> <p>In this lecture the general anatomy of mammals, birds and, fish will be discussed shortly, after which special attention will be given to the anatomy of mice, rats, rabbits, guinea pigs and hamster in relation to biomedical research, in order to provide a basis for the creation of the decision tree for finding the optimal animal model.</p>
<b>Key Text</b>	<p>Principles of laboratory animal science, chapter 3 ‘Biology and husbandry of laboratory animals’.</p> <p>Handboek Proefdierkunde, hoofdstuk 3; Biologie en Zoötechniek</p>
<b>Form</b>	Lecture
<b>Testing your competence</b>	<ol style="list-style-type: none"> <li>4. What feature places a rabbit outside the order of rodents?</li> <li>5. Is it possible to withdraw/retrieve gall from a rat?</li> <li>6. Which locations can be used in mice to withdraw blood?</li> <li>7. What are the differences between the wall of the forestomach parts and the ‘real’ stomach?</li> </ol>

<b>Title</b>	<b>6. Physiology</b>
<b>Content</b>	<p>Stress, defined as any deviation from homeostasis, induces a behavioural and physiological response that may impact on a wide array of animal experiments. In this lecture, the basic principles of</p>

	homeostasis and physiological response to stress will be discussed. Specific topics that will be addressed are: <ul style="list-style-type: none"> <li>- Autonomic nervous system and sympathetic and parasympathetic response</li> <li>- Impact on cardiovascular system</li> <li>- Neuroendocrine response to stress</li> <li>- Impact on animal studies</li> </ul>
<b>Key Text</b>	a) Handbook “Principles of Laboratory Animal Science” (course book), chapter “Behaviour, stress and welfare”, Environment and Physiology.
<b>Form</b>	Lecture
<b>Testing your competence</b>	8. How is stress defined? 9. Which physiological systems are affected in response to stress? 10. What is the impact of a sympathetic and neuroendocrine response to stress? 11. Why is it important to consider stress in animal experiments?

<b>Title</b>	<b>7. Management &amp; care I: environmental controls, hygiene, nutrition</b>
<b>Content</b>	Gnotobiology is the study of organisms or conditions that are either free of microorganisms or associated only with known or specified microorganisms. Just as other aspects of environmental standardization, microbiological standardization is necessary to prevent unwanted and unknown interference with experimental results. Moreover, microbiological contamination can lead to disease and even death of the animals. Other risks are the contamination of humans, or biological products made with the use of animals. Procedures and techniques to obtain laboratory animals of the desired microbiological quality and to maintain this quality (e.g. by using barriers) will be discussed.
<b>Key Text</b>	<ul style="list-style-type: none"> <li>• Handbook “Principles of Laboratory Animal Science” (course book), chapter 8 “Microbiological standardization”.</li> <li>• Hardy, P. “Gnotobiology and Breeding Techniques”. Chapter 4.6 in “The Laboratory Mouse” (Second Edition). Academic Press, 2012.</li> </ul>
<b>Form</b>	Lecture
<b>Testing your competence</b>	<ol style="list-style-type: none"> <li>1. Why is microbiological standardization in laboratory animals so important?</li> <li>2. What is the undesired effect of rederivation to get germfree animals?</li> <li>3. Explain why the test results of a MAP-test can be false negative.</li> <li>4. How long does it take to obtain rederived mice by using the technique of embryo transfer?</li> </ol>

<b>Title</b>	<b>8. Management &amp; care II: housing, welfare</b>
<b>Content</b>	In this interactive working group assignment students and lecturer will discuss housing and care of laboratory animals, assessment of

	discomfort, clinical signs indicating the humane endpoint and the best method to kill animals (least distress and not interfering with experimental results). On the basis of three hypothetical experiments the above mentioned topics will be discussed: 1. Accommodation of the animals; 2. How to assess discomfort? and 3. Selection of the most appropriate method of euthanasia?
<b>Key Text</b>	<ul style="list-style-type: none"> <li>• “Principles of Laboratory Animal Science; chapter 4 (Behaviour, stress and wellbeing)</li> <li>• Council of Europe Convention ETS 123 for the protection of vertebrate animals used for experimental and other scientific purposes. Appendix A: Guidelines for accommodation and care of animals.</li> <li>• EU Working Party Report: Recommendations for euthanasia of experimental animals Parts 1&amp;2</li> <li>• FELASA Working Group Report: Pain and distress in laboratory rodents and lagomorphs</li> <li>• Environmental enrichment for laboratory rodents and rabbits: requirements of rodents, rabbits, and research. V. Baumans, ILAR Journal Vol. 46.2 (2005)</li> <li>• EU Directive 2010/63/EU on the protection of animals used for scientific purposes; Annex IV: Methods of killing animals.</li> </ul>
<b>Form</b>	Interactive working group assignment
<b>Testing your competence</b>	<p>For each of the three hypothetical experiments</p> <ol style="list-style-type: none"> <li>1. What is the most appropriate way to house the laboratory animals?</li> <li>2. How do you assess distress, pain in the laboratory animals?</li> <li>3. What is the most appropriate method to euthanize the laboratory animals?</li> <li>4. Which clinical symptoms should be used to define the (humane) endpoint of the animal experiments?</li> <li>5. In general: how do you prevent avoidable discomfort in laboratory animals?</li> </ol>

<b>Title</b>	<b>9. Genetic standardization</b>
<b>Content</b>	The extent to which genetic standardization of laboratory animals is needed depends on the goal of the animal experiment. Some experiments require a more uniform responsive laboratory animal population, while for other experiments a certain variation is preferred. Besides genetic standardization, the genetics and breeding of the major classes of laboratory animal populations are discussed as well as the way in which one can verify that the test animals still fulfil the necessary genetic standards.
<b>Key Text</b>	<p>Chapters 7 (2001) from <i>Principles of Laboratory Animal Science. A Contribution to the Humane Use and Care of Animals and to the Quality of Experimental Results</i>. Revised (2nd) Edition. Edited by Van Zutphen LFM, Baumans V &amp; Beynen AC, Elsevier Science Publishers, Amsterdam, The Netherlands.</p> <p>Chapter 7 (2009) from <i>Handboek Proefdierkunde. Proefdieren, dierproeven, alternatieven en ethiek</i>. Vijfde druk. Onder redactie van: Van Zutphen LFM, Baumans V &amp; Ohl F, Reed Business, Amsterdam, The Netherlands.</p>
<b>Form</b>	One lecture
<b>Testing your</b>	We advise the animal researcher to go through module 8 (Strains of

<b>competence</b>	mice and rats) from the interactive website <a href="http://www.3rs-reduction.co.uk/">http://www.3rs-reduction.co.uk/</a> developed and launched by Michael F.W. Festing. Module 8 is (like all the modules of this website) mostly self-explanatory, with a lot of feedback, and there are a couple of ‘test yourself’-questions. For a (Dutch) review of this website see ‘Van Lith HA (2013). Voor u getest: de nieuwe interactieve website ‘ <a href="http://www.3Rs-reduction.co.uk/">www.3Rs-reduction.co.uk</a> ’. Biotechniek 52(4), 9-12’.
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<b>Title</b>	<b>10. Demonstration basic techniques – sampling and humane killing</b>
<b>Content</b>	In this demonstration a brief description of some basic procedures concerning sampling of blood, feces and urine will be discussed.
<b>Key Text</b>	<ul style="list-style-type: none"> <li>a) Handbook “Principles of Laboratory Animal Science” (course book), chapter 16 “Experimental procedures”.</li> <li>b) Videos on usb-stick on handling/restraining</li> </ul>
<b>Form</b>	Lecture and demonstration
<b>Testing your competence</b>	<p>Which methods of blood sampling do you know?  How do you decide on a certain sampling technique ?  When would you anesthetize your animals for sampling and when not? How would you sample urine and feces of mice? How would you do that when animals are kept in groups?</p>

<b>Title</b>	<b>11. Practical basic techniques – administration and surgery</b>
<b>Content</b>	This practical contains a brief description of some basic procedures concerning the administration of drugs. Basic principles of surgery and some administration procedures will be shown. Administering substances to animals, for whatever reason, can have a significant impact on their welfare. If carried out incorrectly, not only can animal welfare be compromised, but the scientific goals of study can be affected. In practice participants will be instructed in the administration of substance (injections (ip, sc, iv), oral) to mice and rats. Basic principles of suturing and iv-injection will be practiced on an artificial model.
<b>Key Text</b>	<ul style="list-style-type: none"> <li>a) Handbook “Principles of Laboratory Animal Science” (course book), chapter 16 “Experimental procedures”.</li> <li>b) Videos on usb-stick on handling/restraining</li> <li>c) <a href="http://film.oslovet.norecopa.no/">http://film.oslovet.norecopa.no/</a></li> </ul>
<b>Form</b>	Lecture and practical
<b>Testing your competence</b>	<p>Which methods of administration do you know?  Which routes of administration do you know?  How do you decide on a certain method of administration?  Understanding a surgical procedure and the different steps needed.</p>

<b>Title</b>	<b>12. LAS assignment</b>
<b>Content</b>	As a group you have to analyze a given article with help of a questionnaire that is based on the ARRIVE guidelines: (Kilkenny C, Browne WJ, Cuthill IC, Emerson M, Altman DG (2010) Improving bioscience research reporting: the ARRIVE guidelines for reporting animal research.). Based on every aspect you learned about during the

	course you have to describe in detail how the experiments described in the article are performed. You will report this in a small presentation (10-15 min) at the end of the course and discuss your choices with the critical audience- the other students.
<b>Key Text</b>	<ul style="list-style-type: none"> <li>• Van Zutphen, L.F.M., Baumans, V., Beynen A.C. (2001) "Principles of Laboratory Animal Science: A Contribution to the Humane Use and Care of Animals and to the Quality of Experimental Results"</li> <li>• Additional literature (sought by the participants themselves)</li> </ul>
<b>Form</b>	Working group assignment

## **Final examination**

As a group you have to analyze a given article with help of a questionnaire that is based on the ARRIVE guidelines: (Kilkenny C, Browne WJ, Cuthill IC, Emerson M, Altman DG (2010) Improving bioscience research reporting: the ARRIVE guidelines for reporting animal research). Based on every aspect you learned about during the course you have to describe in detail how the experiments described in the article are performed. You will report this in a small presentation (10-15 min) at the end of the course and discuss your choices with the critical audience- the other students.

Each student gets a mark ranging from 0-10 points (0= unsatisfactory, 10=very good) depending on the quality. The examination involves the handbook, the lectures, discussions, demonstrations and practical's.

## **Certificate**

If the participant has met all legal requirements and has successfully passed the exam at the end of the course, the participant will receive a certificate for this species specific course on Rodents and Rabbit.

If you do not meet all legal requirements, like not holding a Master degree (yet), you will receive a written confirmation stating that you followed the course and successfully passed the exam. Together with the certificate for the basic course, after obtaining your Master degree, you can request the final certificate confirming that you meet all legal requirements of the Dutch legislation to be registered for the function "designing projects and procedures for rodents and rabbits".

## **More information**

Learning outcomes in accordance with the EC Training and Education Document relating to Directive EU/2010/63, and also see page 13.

[http://ec.europa.eu/environment/chemicals/lab\\_animals/pdf/Endorsed\\_E-T.pdf](http://ec.europa.eu/environment/chemicals/lab_animals/pdf/Endorsed_E-T.pdf)

## Schedule species specific course Rodents and Rabbit

	Time	Subject	Module	Teacher
Day 1	09.00-10.15	Introduction course (01)	3.1+3.2	
	10.30-12.30	Anaesthesiology (02)	5+6.2	
	13.15-17.00	Practical behaviour/handling (03)	3.1+3.2	
Day 2	09.00-10.45	Diseases of laboratory animals (04)	4	
	11.00-11.45	Anatomy (05)	3.1	
	11.45-12.30	Physiology (06)	3.1	
	13.00-15.00	Management & care I: environmental controls, hygiene, nutrition (07)	4	
	15.15-16.30	Management & care II: housing, welfare (08)	4	
Day 3	09.00-10.30	Genetic standardisation (09)	3.1+3.2+4	
	10.45-12.30	Demonstration basic techniques – sampling and humane killing (10)	6.2+8+22	
	13.15-17.15	Practical basic techniques – administration and surgery (11)	8+22	
Day 4	09.00-12.30	Additional lectures		
	13.15-17.00	Preparation presentation or room for additional individual program	All modules	
Day 5	09.00-12.30	Preparation presentation or room for additional individual program	All modules	
	13.00-15.30	Presentation article (12)	All modules	
	15.30-16.00	Course evaluation		

## **Modules art. 23.2.b function Species specific**

### **Module 3.1: Basic and appropriate biology – species specific (theory)**

This module provides an introduction to the basic principles of animal behaviour, care, biology and husbandry. It incorporates information in relation to anatomy and physiological features, including reproduction, behaviour and routine animal husbandry and enrichment practices. It is not intended to provide more than the minimum background information which is needed for someone to be able to begin work under supervision.

Following this module practical training, under supervision, should provide each individual with the expertise and skills needed for them to carry out their particular function. Practical training requirements will, inevitably, differ according to function.

#### **Learning Outcomes**

Trainees should be able to:

3.1.1. Describe basic anatomy, physiology, reproduction and behaviour of the relevant species.

3.1.5. Describe the dietary requirements of the relevant animal species and explain how these can be met.

3.1.6. Describe the importance of providing an enriched environment (appropriate to both the species and the science) including social housing and opportunities for exercise, resting and sleeping.

3.1.7. When relevant to the species, recognise that there are different strains, and that these can have different characteristics which can affect both welfare and science.

3.1.8. When relevant to the species, recognise that alterations to the genome can affect the phenotype in unexpected and subtle ways, and the importance of monitoring such animals very carefully.

3.1.9. Maintain and interpret accurate, comprehensive records of animals held in the animal facility, including the wellbeing of the animals

### **Module 4: Animal care, health and management – species specific (theory)**

This module provides information on various aspects of animal health, care and management including, environmental controls, husbandry practices, diet, health status and disease. It also includes relevant basic learning outcomes relating to personal health and zoonoses.

#### **Learning Outcomes**

Trainees should be able to:

4.1. Describe suitable routines and husbandry practices for the maintenance, care and welfare for a range of animals used in research, to include small laboratory species and large animal species where appropriate.

4.2. Describe suitable ~~environmental~~ and housing conditions for laboratory animals, how conditions are monitored and identify the consequences for the animal resulting from inappropriate environmental conditions.

4.6. Describe how to provide water and an appropriate diet for laboratory animals including the sourcing, storage and presentation of suitable foodstuffs and water

4.7. List the methods, and demonstrate an understanding of appropriate, safe and humane handling, sexing and restraint of one or more named species for common scientific procedures.

4.8. Name different methods for marking individual animals and state an advantages and disadvantage for each method.

4.9. List potential disease risks in the animal facility, including specific predisposing factors which may be relevant. Name methods available for maintaining appropriate health status (including use of barriers, different containment levels use of sentinels as relevant to the species).

4.10. Describe appropriate breeding programmes

4.11. Describe how genetically altered animals can be used for scientific research and the importance of monitoring such animals very carefully.

4.12. List the correct procedures for ensuring health, welfare and care of animals during their transport.

### **Module 5: Recognition of pain, suffering and distress - species specific**

This module prepares individuals to be able to identify normal condition and behaviour of experimental animals and enable them to differentiate between a normal animal and one which is showing signs of pain, suffering or distress which could be a result of factors including environment, husbandry or the effect of experimental protocols. It will also provide information regarding severity classifications, cumulative severity and the use of humane endpoints.

#### **Learning Outcomes**

Trainees should be able to:

5.1. Recognise normal or desirable behaviour and appearance of the individuals in the context of species, environment and physiological status.

5.2. Recognise and explain the origin of abnormal behaviour and signs of discomfort, pain, suffering, or distress, as well as signs of positive well-being and principles of how pain, suffering and distress can be managed.

5.3. Discuss factors to be considered and methods available for assessing and recording the welfare of animals e.g. score sheets.

5.4. Describe what a humane end point is. Identify criteria to be used to set humane endpoints. Define action to be taken when a humane endpoint is reached and consider possible options for refining methods to finish at an earlier endpoint.

5.5. Describe the severity classifications included in the Directive and give examples of each category; explain cumulative severity and the effect this may have on the severity classification.

5.6. Describe the circumstances when anaesthesia or analgesia may be necessary to minimise pain, suffering, distress or lasting harm

### **Module 7: Minimally invasive procedures without anaesthesia – species specific (theory)** **[Function Specific for Functions A and B]**

This module provides an introduction to the theory relating to minor procedures. It provides information about appropriate methods of handling and restraint and describes appropriate techniques for injection, dosing and sampling relevant to the species. It should provide information sufficient for individuals to understand what will be required of them before they go on to trained in the practical aspects of these skills whilst under supervision.

## **Learning Outcomes**

Trainees should be able to:

- 7.1. Describe appropriate methods and principles to be followed when handling animals (including methods of manual restraint and use of restricted environments).
- 7.2. Describe the biological impact of procedures and restraint on physiology.
- 7.3. Describe refinement opportunities for procedures and restraint
- 7.4. Describe techniques/procedures including, for example, injection, sampling and dosing techniques (routes/volumes/frequency), dietary modification, gavage, tissue biopsy, behavioural tests, use of metabolic cages.
- 7.5. Describe how to perform minor techniques (without anaesthesia) and relate appropriate sample volumes and sampling frequencies for the relevant species.
- 7.6. Describe the need for rigour and consistency in conducting scientific procedures and the correct recording and handling of samples.
- 7.7. Describe appropriate methods for the assessment of the welfare of animals with respect to the severity of procedures and know what appropriate action to take.
- 7.8. Recognize that refinement is an on-going process and know where to find relevant, up-to-date, information.
- 7.9. Describe the biological consequences of transport, acclimatization, husbandry conditions and experimental procedures on the species concerned and describe how these can be minimised.

## **Module 8: Minimally invasive procedures without anaesthesia – species specific (skills)** **[Function Specific for Function A]**

This module delivers practical elements of training relevant to Module 7. Practical training for minor procedures can be taught through a number of methods using different tools which are available and designed for the purpose (this is likely to include synthetic animal models and the use of cadavers). The module should be designed in such a way that it will enable the trainee to attain a level of proficiency such that, when commencing work under supervision, s/he should cause no pain, suffering, distress or lasting harm to the animal.

## **Learning Outcomes**

Trainees should be able to:

- 8.1. Select and explain the best methods for common procedures (such as blood sampling and application of substances) including route/volume/ frequency as appropriate.
- 8.2. Demonstrate that s/he can handle and restrain the animal in the best position for the technique.
- 8.3. Perform minor techniques under supervision, in a manner that does not inflict unnecessary pain, suffering, distress or lasting harm.