

Laboratory Animal Technician
TRAINING MANUAL

LATTM



Preface

THE AMERICAN ASSOCIATION FOR LABORATORY ANIMAL SCIENCE (AALAS) IS A nonprofit association that serves as a forum for the exchange of information and expertise in the care and use of laboratory animals. Since 1950, AALAS has been dedicated to the humane care and treatment of laboratory animals and has supported the advancement of science benefiting people and animals. AALAS members are people and organizations concerned with the humane care and use of animals in research.

First published in 1984, the *Laboratory Animal Technician Training Manual* is the second in the series of AALAS technician training manuals. The primary purpose of the series is to assist laboratory animal technical personnel in gaining the knowledge that will allow them to attain a high degree of professionalism in their field and to prepare for the AALAS technician certification examinations.

The material covered in this manual reflects the knowledge level and skills that are expected of laboratory animal technicians, based on the 2005 AALAS Job Analysis Survey, and must be mastered prior to taking the Laboratory Animal Technician (LAT) certification examination. The first chapters build the framework for animal research through the oversight of research studies, the organization of an animal facility, and the management of the animal environment. A new emphasis is aquatic animal health and environmental management. The chapters on basic sciences aim to impart an understanding of anatomy, physiology, genetics, and breeding, and to provide the tools to perform common calculations in animal research. The chapters on research and surgical techniques focus on the frequent duties of a laboratory animal technician – technical procedures, research methodologies, surgical support, administering and monitoring anesthesia, and animal care and monitoring during studies. Because many laboratory animal technicians also have responsibilities in animal health monitoring, disease processes are described through the classification and course of disease, the immune system response to disease, and the clinical signs of disease. The manual concludes with the types of emergencies likely to occur in an animal facility, considered from the perspective of responding effectively to these situations.

Each chapter of the manual includes References and Additional Reading sections with supplemental material, such as books or journal articles, that provide more in-depth information about the topics covered in the chapter.

LAT certification candidates should study this manual and the LAT Reference List, building upon prior knowledge acquired from the *Assistant Laboratory Animal Technician Training Manual* and the ALAT Reference List. Please refer to the Technician Certification page on the AALAS website (http://www.aalas.org/certification/tech_cert.aspx) for the list of resources to study for the LAT exam. Because these items are subject to change, it is important to view the current list when beginning to prepare for an AALAS technician certification exam.

Any suggestions or comments about this manual should be addressed to education@aalas.org.

Contents

Unit One			
General Principles of Laboratory Animal Science	7		
Chapter 1: Overview of Scientific Research	9		
Origins of Biomedical Research	9		
Funding for Biomedical Research	10		
Oversight of an Institutional Research Program	11		
Chapter 2: Policies, Guidelines, & Regulations in Animal Research	15		
Animal Welfare Act & Regulations	15		
Public Health Service Policy	17		
State & Local Regulations	19		
Guide for the Care & Use of Laboratory Animals	19		
AVMA Guidelines for the Euthanasia of Animals	21		
Importation & Transportation Regulations	22		
Occupational Health & Safety in the Care & Use of Research Animals	22		
Biosafety in Microbiological & Biomedical Laboratories	23		
Good Laboratory Practices	24		
AAALAC Facility Accreditation	27		
The IACUC's Role in Self-Regulation	27		
Chapter 3: Ethics in Animal Research	31		
Regulations & Ethics	31		
The Importance of Ethics	32		
Compliance & Ethics	33		
Reporting Questionable Animal Treatment	33		
Chapter 4: Administrative Responsibilities	35		
Recordkeeping	35		
Centralized & Decentralized Management Programs	37		
Cost Accounting & Budgeting	37		
Per Diem Rates	38		
Personnel Training	38		
		Time Management & Job Planning	41
		Delegation	41
		Interpersonal Relationships & Teamwork	41
		Institutional Policies	41
		Unit Two	
		Facility Design & Environmental Management	43
		Chapter 5: Laboratory Animal Facility Design & Environmental Management	45
		Animal Facility Designs	45
		Temperature & Humidity	48
		Ventilation	48
		Light, Noise, & Vibration	51
		Behavioral & Social Management	51
		Sanitation, Disinfection, & Sterilization	52
		Pest Management	60
		Safety & Hygiene	60
		Biosafety in the Research Environment	61
		Hazardous Materials & Waste Disposal	63
		Chapter 6: The Aquatic Environment	65
		Microenvironment	65
		Water Quality	67
		Filtration Systems	70
		Ultraviolet Light Sterilization	70
		Monitoring	71
		Macroenvironment	71
		Unit Three	
		Scientific Fundamentals	73
		Chapter 7: Anatomy and Physiology	75
		General Anatomic Organization	75

Cells	76	Chapter 11: Research Methodology	139
Tissues	76	Toxicology	139
Organs	77	Immunodeficiency Models	141
Integumentary System	77	Antibody Production	142
Skeletal System	78	Cancer Models	144
Muscular System	81	Behavioral Experiments	145
Circulatory System	82	Dietary Studies	146
Lymphatic System	86	Stereotaxis/Neurosurgical Research	147
Respiratory System	86	Bioimaging	147
Digestive System	88	Chapter 12: Surgical Instruments & Materials	149
Urinary System	90	Common Surgical Instruments	149
Reproductive System	91	Cleaning Surgical Instruments	154
Nervous System	92	Sterilizing Surgical Instruments & Materials	154
Endocrine System	93	Chapter 13: Aseptic Technique, Surgical Support, & Anesthesia	157
Chapter 8: Genetics & Breeding	95	Aseptic Technique	157
Colony Management	95	Maintaining Sterility	158
Genetics	95	Presurgical Care & Preparation	159
Genetic Engineering	96	Anesthesia	161
Genotype Characterization	97	Monitoring the Anesthetized Animal	162
Phenotype Characterization	98	Postsurgical Care	163
Gene Linkage	99	Assessing Pain & Distress	164
Strain & Stock Nomenclature	99	Recordkeeping	164
Mating Systems	100	Unit Five	
Breeding Schemes	102	Diseases & Emergencies	167
Breeding Cage Management	103	Chapter 14: Diseases & Health Conditions	169
Managing the Breeding Colony Environment	105	Classifying Disease	169
Weaning & Identification of Rodents	106	Causes of Disease	169
Retiring Breeders	106	Clinical Course of Disease	172
Recordkeeping	107	Body Defenses	173
Colony Preservation & Animal Biosecurity	108	Preventing Disease	176
Other Species Considerations	108	Recognizing Health Problems	178
Chapter 9: Calculations & Conversions	111	Clinical Signs of Disease	179
Basic Animal Facility Calculations	111	Traumatic Injury	182
Drug Dosages	113	Chapter 15: Emergency Situations	185
Solutions	115	Animal Emergencies	185
Unit Four		Emergency Supplies	188
Research & Surgical Techniques	119	Physical Plant or Facility Emergencies	189
Chapter 10: Common Technical Procedures	121	Disaster Plan	190
Syringes & Hypodermic Needles	121	Glossary	191
Injections	123	Index	213
Blood Collection	127		
Catheters & Implants	130		
Endotracheal Intubation	134		
Common Laboratory Tests	135		