American College of Zoological Medicine

Certifying Examination

Job Task Analysis Report 2024

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Executive Summary

Beginning in June 2022, the American College of Zoological Medicine (ACZM) conducted a Job Task Analysis study to define the role of a board-certified specialist in the health and welfare of zoological species. The ACZM worked with Veterinary Specialty Exams, LLC (VSE) to develop and conduct the Job Task Analysis study that would describe the knowledge requirements of competent Diplomates. Results of the Job Task Analysis study provide the basis for making a valid claim of appropriate test score inference.

The ACZM appointed a committee of subject matter experts (SMEs) to provide content expertise. The committee consisted of 8 members with diverse specializations, areas of employment and geographic locations. The committee spent considerable time discussing the knowledge and skills required of a day-one ready Diplomate. Through this process, the committee created updated content outlines for the four sections represented on the Certifying examination.

The new content outlines were used to develop online surveys. The surveys contained multiple scales to rate each task required of board-certified specialists in Zoological Medicine. The ACZM also included several demographic questions to gather confidential data describing the survey respondents. VSE administered the survey instrument using the Qualtrics XM® platform.

An email invitation to take the survey was sent to 288 ACZM Diplomates. 92 individuals completed one of the Certifying Examination surveys, for a response rate of 32%. Approximately 99% of respondents indicated that the survey completely or adequately covered the important knowledge areas required to be an ACZM Diplomate.

VSE conducted a follow-up webinar, using Zoom web conferencing, to review the initial survey results and all comments from the respondents. The goal of this meeting was to establish exclusion criteria to differentiate between the important and unimportant tasks, based on respondents' ratings. The committee finalized the list of tasks and established domain weights, which will serve as the new blueprints for the examination. Adoption of the content outlines and the examination blueprints establishes the link between the knowledge necessary to become a board-certified specialist in zoological medicine and successful performance on the certifying examination.

Introduction

Survey Overview: The Content Validation Model

The foundation of a valid, reliable, and legally defensible professional certification program is a well-constructed Job Task Analysis study. The Job Task Analysis study establishes the link between test scores achieved on certification exams and the competencies being tested. Therefore, pass or fail decisions correlate to competent performance. When evidence of validity based on examination content is presented for a specific professional role, it is critical to consider the relative importance of the competencies being tested. *The Joint Standards for Educational and Psychological Testing (AERA, APA, and NCME, 2014)* state:

> Standard 14.10
> When evidence of validity on test content is presented, the rationale for defining and describing a specific job content domain in a particular way (e.g., elements, knowledge, skills, abilities or other personal characteristics) should be stated clearly.
>
> Standard 14.14
> The content domain to be covered by a credentialing test should be defined clearly and justified in terms of importance of the content for the credential-worthy performance in an occupation or profession. A rationale should be provided to support a claim that the knowledge or skills being assessed are required for credential-worthy performance in an occupation and are consistent with the purpose for which the licensing or certification program was instituted.

Purpose of the Job Task Analysis Study

The American College of Zoological Medicine (ACZM) worked with Veterinary Specialty Exams, LLC (VSE) to develop a certifying examination to meet the above-mentioned standards. A Job Task Analysis study was conducted, beginning in June 2022, which included developing a survey that described the requirements for a competent board-certified specialist in the health and welfare of zoological species. Based on the Job Task Analysis, ACZM determined the content for its certifying examination.

This report provides an overview of the survey design, analysis, and results. Survey results of demographic data are also displayed. In addition, the implications of these results on examination development are discussed.

ACZM Certifying Examination Content Outline - Aquatics

I. Clinically relevant biology
   A. Apply clinically significant differences among species
      i. Anatomical
      ii. Physiological
      iii. Ecological
   B. Apply knowledge of taxonomy and phylogeny
   C. Understand appropriate/natural behaviors and social structures

II. Environmental factors
   A. Evaluate and manage potential hazards and understand differential effects across taxonomic groups.
      i. Biological
      ii. Chemical
      iii. Physical
   B. Apply taxon-specific environmental management relative to clinically relevant ecology
      i. Address environmental conditions in relation to animal health and welfare
      ii. Evaluate husbandry and life support systems
         1. Water quality (including filtration systems)
         2. Air quality (including ventilation systems)
      iii. Describe and apply principles of sanitation and disinfection
   C. Apply principles of epidemiology
      i. Disease surveillance
      ii. Risk analysis

III. Preventive Medicine and Wellness
   A. Describe and utilize principles of nutrition
      i. Dietary requirements and formulation
      ii. Food handling, storage and safety
      iii. Food sourcing and sustainability
   B. Implement behavior and welfare management
      i. Optimize welfare including all aspects of the Five Freedoms and Five Domains
      ii. Promote species-specific natural behaviors
      iii. Recognize and manage inappropriate behaviors
      iv. Environmental enrichment
      v. Behavioral training

vi. Objective criteria for welfare assessment

C. Develop and implement pest control programs
D. Develop and implement preventive medicine/wellness programs
    i. Biosecurity
    ii. Health examination
    iii. Vaccination
    iv. Parasite management
    v. Quarantine
    vi. Life stage- and taxon-specific strategies
    vii. Animal acquisitions and dispositions
    viii. Morbidity and mortality review
    ix. Population and reproductive management
E. Implement end of life care
    i. Objective criteria for euthanasia decisions
    ii. Species-appropriate euthanasia techniques

IV. Restraint
A. Understand and apply appropriate use of different types of restraint (e.g., behavioral, chemical, physical)
B. Understand and apply appropriate use of tranquilizers, sedatives, anesthetics, and other restraint/analgesic agents
    i. Mechanisms of action
    ii. Administration and routes
    iii. Clinical pharmacokinetics
    iv. Clinical pharmacodynamics and potential adverse effects
C. Understand and manage the safety implications for humans, non-target species, and the environment
D. Understand and apply appropriate use of capture, immobilization, and anesthetic monitoring equipment
E. Manage patient risks involved with capture and anesthesia
F. Understand and apply the principles of monitoring during restraint
    i. Clinical applications
    ii. Interpretation
    iii. Intervention
G. Understand and apply principles of safe animal transport

V. Medicine and Surgery
A. Gather and evaluate case history
B. Perform physical examinations

C. Describe the principles, collection, applications and limitations of diagnostic testing (on individual and population level)
    i. Clinical and anatomic pathology (including serology and molecular testing)
    ii. Diagnostic imaging
    iii. Microbiology
    iv. Toxicology
    v. Other modalities (e.g., electrodiagnostics)
D. Assess and plan case management
    i. Understand the pathophysiology of diseases and identify differential diagnoses
    ii. Understand and administer appropriate non-surgical therapies
        1. Mechanisms of action, clinical pharmacokinetics, pharmacodynamics
        2. Complementary and alternative therapies
        3. Adverse and unintended effects
        4. Hospitalization, individual and population/enclosure management
    iii. Understand principles, application and appropriateness of surgery
        1. Soft tissue and orthopedic procedures
        2. Endoscopy and minimally invasive
        3. Risk and outcome assessment

VI. Mortality and Crisis Management
A. Mortality events and post-mortem analysis
    i. Conduct gross necropsy and recognize common pathology
    ii. Select and obtain appropriate postmortem samples
    iii. Recognize and interpret important histopathologic findings
    iv. Incorporate findings into current case/event management
    v. Conduct morbidity and mortality review and apply to population management
B. Understand and develop management strategies for crisis situations (e.g., incident command)

VII. Conservation and One Health
A. Understand and apply principles/terms of one health
    i. Host range shift (e.g., spillover)
    ii. Population declines or shifts
        1. Extinction events
        2. Loss of biodiversity
        3. Invasive species

iii. Hazards of exposure to non-target animals, humans, and environment
    1. Regulatory considerations
    2. Mitigation of risks
    3. Disposal (biohazardous wastes, drugs and wastewater)
iv. Antimicrobial stewardship

B. Understand the epidemiological triad and disease emergence
i. Environment
    1. Climate change
    2. Land use change and encroachment
    3. Resource management (energy, water, waste)
    4. Toxicology
    5. Pollution and environmental degradation (e.g., oil spills, air quality)
ii. Animal
    1. Inter-species disease transmission
    2. Unusual mortality events
    3. Animals as sentinels
iii. Human
    1. Food safety, drug residue and withdrawal times
    2. Public health
    3. Zoonoses
    4. Wildlife human interface, physical dangers, escape protocols

VIII. Scientific research, regulatory affairs and communication

A. Understand animal care and use research policy (IACUC)
B. Understand national (United States) and international regulations
C. Understand research methodologies
i. Develop an appropriate study design
ii. Apply basic principles of statistical analysis
iii. Identify and critique appropriate and relevant scientific literature
D. Understand well-being strategies for a veterinary team
E. Communicate information to zoological medicine to the public, media, policymakers, students and other professionals

ACZM Certifying Examination Content Outline - General Zoo

I. Clinically relevant biology
   A. Apply clinically significant differences among species.
      i. Anatomical
      ii. Physiological
      iii. Ecological
   B. Apply knowledge of taxonomy and phylogeny
   C. Understand appropriate/natural behaviors and social structures

II. Environmental factors
   A. Evaluate and manage potential hazards and understand differential effects across taxonomic groups
      i. Biological
      ii. Chemical
      iii. Physical
   B. Apply taxon-specific environmental management relative to clinically relevant ecology
      i. Address environmental conditions in relation to animal health and welfare
      ii. Evaluate and manage life support systems (e.g., water, land, air)
      iii. Describe and apply principles of sanitation and disinfection
   C. Apply principles of epidemiology
      i. Disease surveillance
      ii. Risk analysis

III. Preventive Medicine and Wellness
   A. Describe and utilize principles of nutrition
      i. Dietary requirements, formulation and delivery
      ii. Food handling, storage and safety
      iii. Food sourcing and sustainability
   B. Implement behavior and welfare management
      i. Optimize welfare including all aspects of the Five Freedoms and Five Domains
      ii. Promote species-specific natural behaviors
      iii. Recognize and manage inappropriate behaviors
      iv. Environmental enrichment
      v. Behavioral training
      vi. Objective criteria for welfare assessment
   C. Develop and implement pest control programs

D. Develop and implement preventive medicine/wellness programs
    i. Biosecurity
    ii. Health examination
    iii. Orodental management
    iv. Vaccination
    v. Parasite management
    vi. Quarantine
    vii. Life stage- and taxon-specific strategies
    viii. Animal acquisitions and dispositions
    ix. Morbidity and mortality review
    x. Population and reproductive management
E. Implement end of life care
    i. Objective criteria for euthanasia decisions
    ii. Species-appropriate euthanasia techniques

IV. Restraint
A. Understand and apply appropriate use of different types of restraint (e.g., behavioral, chemical, physical)
B. Understand and apply appropriate use of tranquilizers, sedatives, anesthetics, and other restraint/analgesic agents
    i. Mechanisms of action
    ii. Administration and routes
    iii. Clinical pharmacokinetics
    iv. Clinical pharmacodynamics and potential adverse effects
C. Understand and manage the safety implications for humans, non-target species, and the environment
D. Understand and apply appropriate use of capture, immobilization, and anesthetic monitoring equipment
E. Manage patient risks involved with capture and anesthesia
F. Understand and apply the principles of monitoring during restraint
    i. Clinical applications
    ii. Interpretation
    iii. Intervention
G. Understand and apply principles of safe animal transport

V. Medicine and Surgery
A. Gather and evaluate case history
B. Perform physical examinations
C. Describe the principles, collection, applications and limitations of diagnostic testing (on individual and population level)

i. Clinical and anatomic pathology
ii. Diagnostic imaging
iii. Microbiology
iv. Toxicology
v. Other modalities (e.g., electrodiagnostics)

D. Assess and plan case management
i. Understand the pathophysiology of diseases and identify differential diagnoses
ii. Understand and administer appropriate non-surgical therapies
1. Mechanisms of action, clinical pharmacokinetics, pharmacodynamics
2. Complementary and alternative therapies
3. Adverse and unintended effects
4. Hospitalization, individual and population/habitat management
iii. Understand principles, application and appropriateness of surgery
1. Soft tissue, orthopedic and orodental procedures
2. Endoscopy and minimally invasive techniques
3. Risk and outcome assessment

VI. Mortality and Crisis Management

A. Mortality events and post-mortem analysis
i. Conduct gross necropsy and recognize common pathology
ii. Select and obtain appropriate postmortem samples
iii. Recognize and interpret important histopathologic findings
iv. Incorporate findings into current case/event management
v. Conduct morbidity and mortality review and apply to population management

B. Understand and develop management strategies for crisis situations (e.g., incident command)
i. Mitigation strategies (e.g., habitat modifications/closures, procedural modifications, evacuation plans)
ii. Communication and reporting structure (e.g., incident command)

VII. Conservation and One Health

A. Understand and apply principles/terms of one health
i. Host range shift (e.g., spillover)
ii. Population declines or shifts
1. Extinction events
2. Loss of biodiversity
3. Invasive species

iii. Hazards of exposure to non-target animals, humans, and environment
    1. Regulatory considerations
    2. Mitigation of risks
    3. Disposal (biohazardous wastes, drugs and wastewater)
iv. Antimicrobial stewardship

B. Understand the epidemiological triad and disease emergence
    i. Environment
        1. Climate change
            a. Human and animal migration
            b. Phenology
            c. Major weather events
        2. Land use change and encroachment
        3. Resource management (energy, water, waste)
        4. Toxicology
        5. Pollution and environmental degradation (e.g., oil spills, air quality)
    ii. Animal
        1. Inter-species disease communication
        2. Unusual mortality events
        3. Animals as sentinels
    iii. Human
        1. Food safety, drug residue and withdrawal times
        1. Public health
        2. Zoonoses
        3. Wildlife human interface, physical dangers, escape protocols

VIII. Scientific research, regulatory affairs and communication
A. Understand animal care and use research policy (IACUC)
B. Understand national (United States) and international regulations
C. Understand research methodologies
    i. Develop an appropriate study design
    ii. Apply basic principles of statistical analysis
    iii. Identify and critique appropriate and relevant scientific literature
D. Understand well-being strategies for a veterinary team
E. Communicate effectively to multiple audiences (public, media, policymakers, students and other professionals)

ACZM Certifying Examination Content Outline - Wildlife

I. Relevant biology and ecology
   A. Apply clinically significant differences among species
      i. Anatomical
      ii. Physiological
      iii. Ecological
   B. Apply knowledge of taxonomy and phylogeny
   C. Apply knowledge of appropriate/natural behaviors and social structures

II. Environmental factors
   A. Evaluate and manage potential hazards and understand differential effects across taxonomic groups.
      i. Biological
      ii. Chemical
      iii. Physical
   B. Apply knowledge of animal and ecosystem ecology relevant to wildlife health and management
      i. Apply knowledge of environmental conditions in relation to animal health and welfare
      ii. Apply knowledge of biosecurity principles
      iii. Apply knowledge of wildlife management techniques
   C. Apply principles of epidemiology
      i. Measures of disease (e.g., prevalence, incidence, R0)
      ii. Disease surveillance and outbreak investigation
      iii. Risk analysis
      iv. Population implications of intervention (treatment, vaccination, culling, etc.)

III. Population Medicine
   A. Understand and apply principles of ecosystem health
      i. Ecosystem stability and resilience
      ii. Habitat assessment and management
      iii. Ecosystem disturbance (contaminants, climate change, human activities)
      iv. Legal and illegal harvest
   B. Understand and apply principles of captive wildlife management, rehabilitation, and reintroduction programs
      i. Nutrition
      ii. Husbandry, stress reduction, and preservation of natural behaviors

iii. Disposition decision making (euthanasia, release, captive placement)
iv. Health examination
v. Parasite management
vi. Quarantine and biosecurity

C. Understand and apply principles of invasive and injurious species management
D. Understand and apply principles of study design and interpretation
i. Evaluate and implement appropriate study design
ii. Principles of statistical analysis and modeling
iii. Evaluate scientific literature
iv. Understand and evaluate ethics, implications, and implementation of invasive and non-invasive monitoring techniques
E. Understand and apply principles of preventative medicine
i. Biosecurity between sites
ii. Translocation and culling
iii. Morbidity and mortality investigation
iv. Population and reproductive management
v. Wildlife and livestock interface
vi. Pharmaceutical intervention in wild populations
F. Understand and apply principles of euthanasia
i. Objective criteria for euthanasia decisions
ii. Species-appropriate euthanasia techniques

IV. Restraint
A. Evaluate and incorporate natural history, biology, and ethics with regard to appropriate capture and restraint techniques
B. Select and utilize tranquilizers, sedatives, anesthetics, and other restraint/analgesic agents
i. Mechanisms of action
ii. Administration and routes
iii. Clinical pharmacokinetics
iv. Clinical pharmacodynamics and potential adverse effects
C. Understand and manage the safety implications for humans, non-target species, and the environment
D. Understand and apply appropriate use of capture, immobilization, and anesthetic monitoring equipment
E. Manage patient risks involved with capture and anesthesia
F. Understand and apply the principles of monitoring during restraint
i. Clinical applications
ii. Interpretation
iii. Intervention

G. Understand and apply principles of safe animal transport

V. Medicine and Surgery
   A. Obtain and evaluate case history
   B. Identify expected physical examination findings and abnormalities
   C. Describe the principles, collection, applications and limitations of diagnostic testing (on individual and population level)
      i. Clinical and anatomic pathology (including serology and molecular testing)
      ii. Diagnostic imaging
      iii. Microbiology
      iv. Toxicology
      v. Other modalities
   D. Assess and plan case management
      i. Understand the pathophysiology of diseases and recognize differential diagnoses
      ii. Understand and administer appropriate non-surgical therapies
         1. Mechanisms of action, clinical pharmacokinetics, pharmacodynamics
         2. Complementary and alternative therapies
         3. Adverse and unintended effects
         4. Hospitalization, individual, population, and habitat management
      iii. Understand principles, application and appropriateness of conventional and field surgery
         1. Soft tissue and orthopedic procedures
         2. Endoscopy and minimally invasive techniques
         3. Risk and outcome assessment
      iv. Understand ethical issues associated with interventions for medical, management, and research purposes

VI. Mortality and Crisis Management
   A. Manage mortality events and apply post-mortem analysis
      i. Conduct gross necropsy and recognize common pathology
      ii. Select and obtain appropriate postmortem samples
      iii. Recognize and interpret important histopathologic findings
      iv. Conduct morbidity and mortality review and apply to population management
   B. Understand and develop management strategies for crisis situations
      i. Mitigation strategies (e.g., habitat modifications/closures, procedural modifications, evacuation plans)

ii. Communication and reporting structure (e.g., incident command)

VII. Conservation and One Health
- A. Understand and apply principles/terms of one health
  - i. Host range shift (e.g., spillover)
  - ii. Population declines or shifts
    1. Extinction events
    2. Loss of biodiversity
    3. Invasive species and disease risks
  - iii. Hazards of exposure to non-target animals, humans, and environment
    1. Regulatory considerations
    2. Mitigation of risks
    3. Disposal (biohazardous wastes, drugs and wastewater)
  - iv. Antimicrobial stewardship
- B. Apply the epidemiological triad and evaluate disease emergence
  - i. Environment
    1. Climate change
       a. Human and animal migration
       b. Phenology
       c. Major weather events
    2. Land use change and encroachment
    3. Resource management (energy, water, waste)
    4. Toxicology
    5. Pollution and environmental degradation
    6. Loss of ecosystem services
  - ii. Animal
    2. Inter-species disease transmission
    3. Unusual mortality events
    4. Animals as sentinels
  - iii. Human
    1. Food safety, drug residue and withdrawal times
    2. Public health
    3. Zoonoses
    4. Wildlife human interface and physical dangers

VIII. Scientific research, regulatory affairs and communication
- A. Design and implement animal care and use research policy (IACUC)
- B. Understand and interpret national (United States) and international regulations
- C. Design and implement well-being strategies for a veterinary team

D. Communicate effectively to multiple audiences (public, media, policymakers, students and other professionals)

ACZM Certifying Examination Detailed Content Outline - ZCA

I. Clinically relevant biology
   A. Apply clinically significant differences among species.
      i. Anatomical
      ii. Physiological
      iii. Ecological
   B. Apply knowledge of taxonomy and phylogeny
   C. Understand appropriate/natural behaviors and social structures

II. Environmental factors
   A. Evaluate and manage potential hazards and understand differential effects across taxonomic groups.
      i. Biological
      ii. Chemical
      iii. Physical
   B. Apply taxon-specific environmental management relative to clinically relevant ecology
      i. Address environmental conditions in relation to animal health and welfare
      ii. Evaluate and manage husbandry and life support systems (e.g., enclosures, heating, humidity, lighting, substrate)
      iii. Describe and apply principles of sanitation and disinfection
   C. Apply principles of epidemiology
      i. Disease surveillance
      ii. Risk analysis

III. Preventive Medicine and Wellness
   A. Describe and utilize principles of nutrition
      i. Dietary requirements, formulation and delivery
      ii. Food handling, storage and safety
      iii. Food sourcing and sustainability
   B. Implement behavior and welfare management
      i. Optimize welfare including all aspects of the Five Freedoms and Five Domains
      ii. Promote species-specific natural behaviors
      iii. Recognize and manage inappropriate behaviors
      iv. Environmental enrichment
      v. Behavioral training
      vi. Objective criteria for welfare assessment

C. Develop and implement pest control programs
D. Develop and implement preventive medicine/wellness programs
    i. Biosecurity
    ii. Health examination
    iii. Orodental management
    iv. Vaccination
    v. Parasite management
    vi. Quarantine
    vii. Life stage- and taxon-specific strategies
    viii. Animal acquisitions and dispositions
    ix. Morbidity and mortality review
    x. Population and reproductive management
E. Implement end of life care
    i. Objective criteria for euthanasia decisions
    ii. Species-appropriate euthanasia techniques

IV. Restraint
A. Understand and apply appropriate use of different types of restraint (e.g., behavioral, chemical, physical)
B. Understand and apply appropriate use of tranquilizers, sedatives, anesthetics, and other restraint/analgesic agents
    i. Mechanisms of action
    ii. Administration and routes
    iii. Clinical pharmacokinetics
    iv. Clinical pharmacodynamics and potential adverse effects
C. Understand and manage the safety implications for humans, non-target species, and the environment
D. Understand and apply appropriate use of capture, immobilization, and anesthetic monitoring equipment
E. Manage patient risks involved with capture and anesthesia
F. Understand and apply the principles of monitoring during restraint
    i. Clinical applications
    ii. Interpretation
    iii. Intervention
G. Understand and apply principles of safe animal transport

V. Medicine and Surgery
A. Gather and evaluate case history
B. Perform physical examinations

C. Describe the principles, collection, applications and limitations of diagnostic testing (on individual and population level)
    i. Clinical and anatomic pathology (including serology and molecular testing)
    i. Diagnostic imaging
    ii. Microbiology
    iii. Toxicology
    iv. Other modalities (e.g., electrodiagnostics)
D. Assess and plan case management
    i. Understand the pathophysiology of diseases and identify differential diagnoses
    ii. Understand and administer appropriate non-surgical therapies
        1. Mechanisms of action, clinical pharmacokinetics, pharmacodynamics
        2. Complementary and alternative therapies
        3. Adverse and unintended effects
        4. Hospitalization, individual and population/habitat management
    iii. Understand principles, application and appropriateness of surgery
        1. Soft tissue, orthopedic and orodental procedures
        2. Endoscopy and minimally invasive techniques
        3. Risk and outcome assessment

VI. Mortality and Crisis Management
A. Mortality events and post-mortem analysis
    i. Conduct gross necropsy and recognize common pathology
    ii. Select and obtain appropriate postmortem samples
    iii. Recognize and interpret important histopathologic findings
    iv. Incorporate findings into current case/event management
    v. Conduct morbidity and mortality review and apply to population management
B. Understand and develop management strategies for crisis situations
    i. Mitigation strategies (e.g., habitat modifications/closures, procedural modifications)
    ii. Communication and reporting structure (e.g., reporting notifiable diseases)

VII. Conservation and One Health
A. Understand and apply principles/terms of one health
    i. Host range shift (e.g., animal escapes, feral/injurious populations)
    ii. Population declines or shifts (e.g., illegal procurement of wild animals)
        1. Extinction events

2. Loss of biodiversity
3. Invasive species

iii. Hazards of exposure to non-target animals, humans, and environment
1. Regulatory considerations
2. Mitigation of risks
3. Disposal (biohazardous wastes and drugs)

iv. Antimicrobial stewardship

B. Understand the epidemiological triad and disease emergence

i. Environment
1. Climate change
a. Human and animal migration
b. Phenology
c. Major weather events
2. Land use change and encroachment
3. Resource management (energy, water, waste)
4. Toxicology
5. Pollution and environmental degradation (e.g., oil spills, air quality)

ii. Animal
1. Inter-species disease communication
2. Unusual mortality events
3. Animals as sentinels

iii. Human
1. Food safety, drug residue and withdrawal times
2. Public health
3. Zoonoses
4. Wildlife human interface, physical dangers, escape protocols

VIII. Scientific research, regulatory affairs and communication

A. Understand animal care and use research policy (IACUC)

B. Understand national (United States) and international regulations

C. Understand research methodologies

i. Develop an appropriate study design

ii. Apply basic principles of statistical analysis

iii. Identify and critique appropriate and relevant scientific literature

D. Understand well-being strategies for a veterinary team

E. Communicate effectively to multiple audiences (owners, public, media, policymakers, students and other professionals)

Table 15: Exam Specifications by Content Domain

Domain	Aquatics	General Zoo	Zoological Companion Animal
I. Clinically Relevant Biology	10-14%	9-13%	14-18%
II. Environmental Factors	11-15%	7-11%	7-11%
III. Preventive Medicine and Wellness	17-21%	19-23%	15-19%
IV. Restraint	11-15%	15-19%	14-18%
V. Medicine and Surgery	20-24%	20-24%	20-24%
VI. Mortality and Crisis Management	6-10%	9-13%	6-10%
VII. Conservation and One Health	6-10%	4-8%	5-9%
VIII. Scientific research, regulatory affairs and communication	5-9%	5-9%	7-11%

Table 16: Exam Specifications by Content Domain (Wildlife)

Domain	Wildlife
I. Relevant Biology and Ecology	9-13%
II. Environmental Factors	10-14%
III. Population Medicine	14-18%
IV. Restraint	12-16%
V. Medicine and Surgery	9-13%
VI. Mortality and Crisis Management	14-18%
VII. Conservation and One Health	13-17%
VIII. Scientific research, regulatory affairs and communication	7-11%