



ECVPH Study Guide: preparing the examination

Contributors by 2009:

Lisa Boden
Sonia Menéndez González

Experiences by Lisa Boden

Lisa Boden is a veterinary epidemiologist at The Faculty of Veterinary Medicine at the University of Glasgow (where she completed her residency in 2008). She passed the exams in 2009 with a subspeciality in Population Medicine. Her major areas of research interest are in equine epidemiology and contact network analysis.

Email: l.boden@vet.gla.ac.uk

Disclaimer

This study guide is an outline of some of the topics that are likely to be covered by the ECVPH written and oral exams. It is not an exhaustive list and is not officially endorsed by the ECVPH education committee. It is merely a personal study guide that I developed for my own use in preparation for the exams (which I sat in 2009).

At present, this is in a skeletal form. I have not added references to publications in all cases. This is deliberate as I found that the process of the literature review was an essential and helpful part of the written and oral exam preparation. Additionally, it is important that this document reflects current scientific knowledge in the areas of population medicine and food science. As such, it should be used only as a starting point rather than a comprehensive guide. If it is found to be useful, I hope that the current residents/Diplomates may edit this document to develop a more useful study tool for the new residents of the College.

Lisa Boden

(Sonia Menéndez would like to express her agreement to this disclaimer and its application to the report of her own experience)

Population medicine (Epidemiology) specialty

The main texts that I used were Dohoo et al. 2003 and Thrusfield 2007. There are other excellent texts referenced on the ECVPH website. Additional sources of information were found in the OIE Terrestrial and Aquatic Animal Health Codes and current scientific publications. There is a similar structured approach (as described below) with additional reference material and example questions on the Massey (NZ) website for the Membership of the Australian College of Veterinary Science (MACVSc Epidemiology Chapter) and the University of Edinburgh Epiwiki. The example questions are relevant and useful for this exam process.

1. Causality

- a. Necessary vs sufficient
- b. Koch's postulates
- c. Mill's canons
- d. Evans' criteria
- e. Causal web

2. Questionnaire design

- a. Types of questionnaires
- b. Types of questions:
 - i. open vs closed
- c. Choice of wording
- d. Questionnaire structure
- e. Pre-testing

3. Measures of disease frequency

- a. Simple measures
- b. Incidence risk vs incidence rate
- c. Prevalence
- d. Mortality statistics
- e. Standardisation of risk and rates

4. Measures of association and measures of effect

- a. OR, RR, IRR
- b. AR, PAR, AF, PAF

5. Observational studies

- a. Descriptive
 - i. Case study, case series
- b. Analytical (using risk based and rate based approaches)
 - i. Cohort
 - ii. Case control
 - iii. Cross-sectional
 - iv. Other hybrid study designs (case-crossover)

6. Randomised controlled trials

- a. CONSORT statement

7. Validity in observational studies

- a. Internal vs external validity
- b. Bias
 - i. Selection bias
 - ii. Misclassification/measurement bias

8. Confounder bias

- a. What is it
- b. How do you control for it
- c. Interaction terms

9. Model building strategies

- a. Selection criteria
- b. Selection strategy
- c. Analysis
 - 1. Statistics
 - a. Types of data
 - b. Knowledge of parametric and non-parametric tests
 - c. Probability theory
 - d. Basic knowledge of linear, logistic, poisson regression, survival analysis
 - e. Effects of clustering

10. Meta-analysis

- a. Objectives
- b. Process
- c. Procedures

11. Ecological studies

- a. Ecologic and atomistic fallacies

12. Disease dynamics

- a. Herd immunity
- b. R0
- c. Deterministic and stochastic models
- d. Super-shedders
- e. Transmission parameter
- f. Impact of control strategies on R0 (F&MD case study)

13. Screening and diagnostic tests

- a. Lab-based concepts
 - i. Agreement between tests
 - 1. Quantitative outcomes
 - a. Coefficient of variation
 - b. Correlation coefficient
 - c. Concordance coefficient
 - d. Limits of agreement
 - 2. Qualitative outcomes
 - a. kappa
- b. Se, sp
- c. Predictive values
- d. Multiple tests
- e. Herd-level testing

14. Sampling

- a. Non-probability based sampling
- b. Probability based sampling
 - i. Simple random
 - ii. Systematic random
 - iii. Stratified
 - iv. Cluster
 - v. Multistage
- c. Sample size
 - i. To determine prevalence
 - ii. To demonstrate disease freedom

15. Monitoring and surveillance

- a. Difference between monitoring and surveillance
- b. Active vs passive sources of surveillance
- c. Probability-based sampling
 - i. Sample size to detect disease
 - ii. Study design
 - iii. Other key concerns
- d. Outbreak investigation

16. Control and eradication

- a. Generic concepts of control, eradication and elimination of disease
- b. Strategies available for control and eradication
- c. Important factors in control and eradication programs
 - i. Philosophy behind control versus eradication
- d. Application of diagnostic tests in control and eradication programmes
- e. Case study: BVD eradication programme

17. Disease freedom

- a. Requirements to declare a country, zone or compartment free from disease or infection
- b. Principles
- c. Early detection systems
- d. Examples of minimum health requirements for a country/region to be declared free of disease
- e. Sampling to demonstrate freedom from disease
 - i. Sample size
 - ii. Individual and herd level test se and sp
 - iii. Herdcalc, Freecalc

18. Import risk analysis

- a. Quantitative vs qualitative
- b. Risk assessment
 - i. Hazard identification
 - ii. Release assessment
 - iii. Exposure assessment
 - iv. Consequence assessment
- c. Risk management
- d. Risk communication

19. Biosecurity

- a. Zoning and compartmentalisation (Terrestrial code)
- b. Management and placement programs
- c. Farm layout
- d. Pest control
- e. Immunization
- f. Quarantine
- g. Decontamination

20. Important zoonoses and the concept of emerging diseases

- a. Legislation
- b. EFSA statistical analysis of temporal and spatial trends of zoonotic agents in animals and food
- c. Risk assessment of emerging zoonotic potential (Palmer et al. 2009)
- d. Specific examples of important zoonoses
 - i. Lyme disease
 - ii. Leptospirosis
 - iii. Brucellosis
 - iv. Trichinellosis
 - v. Other viral, bacterial and parasitic zoonoses

21. Spatial epidemiology

- a. GIS

22. Molecular epidemiology

- a. Awareness of new molecular techniques
- b. Difficulties of old diagnostic techniques
- c. Benefits of new molecular techniques
- d. Usefulness in monitoring and surveillance
- e. Changes in legislation
- f. Global early warning response system GLEWS

23. Animal health economics (see also Thrusfield)

- i. Key changes affecting decisions on animal health measures
- ii. Livestock productivity and effects of disease
- iii. Direct and indirect losses due to disease
- iv. Cost of disease and principle of marginal returns
- v. Types of analyses
 1. Partial budget analysis
 2. Enterprise budget
 3. Decision tree analysis
 4. Linear programming
 5. Dynamic programming
 6. Simulation models
 7. Cost-benefit analysis
 - a. Shadow prices
 - b. Shadow exchange rates
 - c. Externalities
 8. Cost-effectiveness analysis
- vi. Supply and demand curves
 1. Elastic vs inelastic curves

- vii. Choosing between investment options
 - 1. NPV
 - 2. Benefit cost ratio
 - 3. Internal rate of return

24. OIE diseases

- a. WTO sanitary and phytosanitary measures
- b. Outbreaks as a results of:
 - i. Live trade
 - ii. Live aquaculture trade
 - iii. Illegal or unofficial trade
 - iv. Trade of animal products
- c. Criteria for disease list
- d. Specific examples of multi-species and species-specific diseases

Food Science sub-speciality

References: Codex Alimentarius, White paper on food safety, scientific publications, EFSA website (http://www.efsa.europa.eu/EFSA/efsa_locale-1178620753812_home.htm) and European legislation (http://europa.eu/legislation_summaries/food_safety/index_en.htm) and the University of Glasgow website for the MVPH.

1. Food technology

- a. Food processing
 - i. Vacuum packaging
 - ii. Modified atmosphere packing
 - iii. Curing
 - iv. Smoking
 - v. Heat processing
 - vi. Chemical preservatives
 - vii. Meat processing
 - 1. Minced meat
 - 2. Meat preparations
 - 3. Meat products
 - 4. Mechanically separated meat
 - viii. Canning
- b. Testing for quality and safety of milk products
 - i. Raw milk
 - ii. Post-heat treatment
 - iii. Post-packaging

2. Meat science

- a. White meat supply chain
- b. Red meat supply chain
- c. Carcase quality
- d. Risk categories
 - i. SRM categories
- e. Meat quality
 - i. Appearance
 - ii. Taste
 - iii. Factors affecting meat quality
 - iv. Dark firm dry meat
 - v. Pale soft exudative meat
 - vi. Cold shortening
 - vii. Tenderness and conditioning

3. Food chain

- a. Legislation
- b. Regulatory and scientific organisations
- c. Ante-mortem inspection and Food Chain Information
 - i. Legislation
 - ii. Requirements
 - iii. Aims of new food chain legislation
 - iv. Food chain information and OV responsibilities
 - v. Practical challenges
- d. Animal identification/traceability
- e. HACCP
- f. Food safety pre-requisites (GAP, GHP, GMP)
- g. Process control charts
- h. Food safety objectives

4. Residues in food

- a. Legislation
- b. WTO agreement on SPS measures
- c. Persistent organic pollutants
- d. Veterinary drugs
- e. Mycotoxins
- f. Feed additives/substances used in animal feed

5. Antimicrobial use and resistance

- a. EFSA opinion on foodborne antimicrobial resistance as a biological hazard
- b. MRSA
- c. Extended-spectrum beta-lactamases in bacteria associated with animals
- d. Development of antimicrobial resistance monitoring programme

- e. Risk assessment for antimicrobial resistance arising from use of antimicrobials in animals
- f. Rationale for withdrawal of antimicrobial growth promoters (agp)

6. Parasites in food

- a. Cysticercosis and taeniosis
- b. Hydatid disease
- c. Toxocara canis
- d. Toxoplasmosis
- e. Anisakis
- f. Gyrodactylus salaries
- g. Trichinella

7. Viruses in food

- a. Examples of viruses in foods
- b. Special features of viruses
- c. Risk assessment
- d. Methods of detection
- e. Control and prevention

8. Bacteria in food

- a. Knowledge of specific bacteria (a few examples – but there are other important ones)
 - i. Campylobacter
 - ii. E. coli
 - iii. Salmonella
 - iv. Clostridium perfringens
 - v. Listeria
- b. Legislation
- c. Definition of microbiologic criterion

9. Microbial risk assessment

- a. General definitions
- b. General principles
- c. CAC model
 - i. Risk assessment
 - ii. Risk management
 - iii. Risk communication
 - iv. Documentation
 - v. Reassessment

10. Animal welfare and legislation

- a. Principles of animal welfare according to Terrestrial code

- b. Basic welfare and ethical issues
- c. Legislation
- d. Animal welfare in slaughterhouses
- e. Markers of stress in pigs
- f. Methods of slaughter
- g. EFSA opinion on welfare aspects of stunning and killing
- h.** Animal welfare in transport
- i. Impact of modern farming practices on welfare issues

Experiences by Sonia Menéndez

Sonia Menéndez carried out her Residency at the Federal Veterinary Office (Berne, Switzerland) from January 2006 until December 2008, and took her examination in 2009. Her subspeciality is Population Medicine, but she also has experience in the field of food safety. Since September 2009 she is working for the Veterinary Public Health Institute (University of Berne, Switzerland).

Email: smgmenendez@gmail.com

Getting started: what should I study and to which extent?

It is worth to start with planning what you intend to study/review for preparing the examination. As a basis, take the requirements of the Residency programme and what you did during the Residency to fulfill them (your Residency log book). For the preparation of the exam you will not be able to review all what you did over three years, and of course you do not need to do so, because many things are now familiar to you and others are used in daily practice (data management, literature search, etc.). The point is to refresh important topics. From your log book you can select the most important works you were involved/books or publications read/documentation of attended courses/and other material helpful for your study.

As I see it, you are expected to know the basics about many different topics. For advanced topics, it is assumed you are not a specialist, but be familiarized with the key concepts or the keywords. In many occasions, keywords are what it is asked for, not a detailed explanation of the methodology. Of course, there are exceptions to this rule and some questions may be 'too complicated', but that's it!

For the preparation of the oral examination plan 2 weeks for each topic (literature review, planning your strategy or the points you would like to present, preparing and practicing the presentation). One of the topics is your choice, so take a theme you know well and you feel confident with. The other topic is given to you 2 weeks before the examination date. My best advice for the examination itself is 'do not get nervous'. Take your time to speak properly and clear in order to be understood; your talk should last 15 minutes, but do not panic if you need a bit longer (2-3 minutes is acceptable, but try to comply with the time requirements). The questions posed afterwards refer to the topic itself, to related topics, and to non-related topics. I would like to remark that the point is not only to demonstrate technical knowledge, but also to show the ability of being critical and of justifying your opinion. If you do not understand the question posed, do not hesitate to say it. Try to imagine that you are discussing to your normal colleagues. Keywords are usually enough as an answer, rather than long responses.

I personally organized the topics to prepare as follows:

- Epidemiology: based on the structure of Thrusfield's book, and complemented with documents of courses attended and own work. Internet can be an useful source of information (I used it for GIS for instance).
- Further epidemiological topics: I searched on Internet, in reviews or in papers some more information about GIS, animal health economics, modeling, spatial-temporal clustering, time-series. You may have other topics that attracted your attention or that you think you have not covered enough. Keep in mind: get familiarized with keywords, but you do not need to know the very details.
- Biostatistics: based on the books by Thrusfield, Kirkwood and Watson, and complemented with documents of courses attended and own work.
- Food safety: generalities on food chain, concepts related to quality management, microbiological criteria, processing, knowledge about the main food-borne hazards (bacteria, virus, parasites, toxins, mycotoxins, etc.), EU legal framework. Very useful source of information: EFSA webpage (http://www.efsa.europa.eu/EFSA/efsa_locale-1178620753812_home.htm) (zoonoses report, scientific opinions on food-borne hazards and antimicrobial resistance (do not forget this topic), links to EU legislation –they can be also accessed through: http://europa.eu/legislation_summaries/food_safety/index_en.htm -). For an overview of food-borne hazards I referred to the books by Blackburn, Sinell and Smulders –many other topics on food safety issues are also dealt with-, but there are many other books on that.
- Animal health and welfare: review of important animal diseases (zootic and non-zoonotic) based on OIE disease cards. A basic microbiology book may help to have the taxonomy in mind (which may be helpful to put each pathogen in the 'right place'). Special attention to diseases currently being actively dealt with in the EU (e.g. bluetongue), subject to surveillance or eradication programmes (e.g. tuberculosis, brucellosis), re-/emerging diseases (e.g. FMD, CSP, rabies). An overview of the EU legislation can be obtained from: http://europa.eu/legislation_summaries/food_safety/index_en.htm. Basics of outbreak investigation, reporting systems (EU, OIE), control measures, etc. are obtained from the same information sources.
- Risk analysis: based on the Handbook on import risk analysis for animals and animal products by N. Murray-OIE (I and keywords of II), and guidelines of CAC and OIE (web access), as well as documents of courses attended and own work. A look to published risk assessments is always interesting.

Indicated sources:

(more references are provided in the literature list on the ECVPH webpage, and of course, do not forget the documentation you gathered during your Residency)

Thrusfield, M. (2007) Veterinary epidemiology. 3rd. edition, Blackwell Publishing.

Kirkwood, B.R. and Sterne, J.A.C. (2003) Essential medical statistics, 2nd. edition, Blackwell Publishing.

Petrie, A. and Watson, P. (2006) Statistics for veterinary and animal science, 2nd. edition, Blackwell Publishing.

Blackburn, W. & McClure, P.J. (2002) Foodborne pathogens. Hazards, risk analysis and control. Woodhead Publishing Ltd and CRC Press LLC

Sinell, H.J. (2003) Einführung in die Lebensmittelhygiene. 4.Auflage. Parey Verlag, Stuttgart.

Smulders, F.J.M. and Collins J.D. (editors) Food safety assurance and veterinary public health series (5 volumes). Wageningen Academic Publishers.

Office International d'Epizooties (2004) Handbook on import risk analysis for animals and animal products. Volume 1. Introduction and qualitative risk analysis. Volume 2. Quantitative risk assessment.

ECVPH Residency requirements: to compare with your activities

Cluster	Titel	Activities that you did to fulfill the requirements
	CORE EDUCATION (25% time)	
A	Systems, products, hazards and controls	
	Introductory etiology, epidemiology, diagnostics and control of infectious and non-infectious diseases of livestock populations (specifically including zoonoses)	
	Optimization of animal welfare during production, transport and slaughter	
	Principles and concepts of population medicine and (quantitative) veterinary epidemiology	
	Principles and concepts of food science	
	Principles and operation of food safety and food quality management	
B	Information and data management	
	Biostatistics as they relate to VPH and disease and control problems encountered	
	Familiarity with information and communication technology as related to VPH	
	Data handling and management for VPH	
	Scientific writing and presentation of results from investigation	
C	Principles and concepts of veterinary public health	
	Veterinary and scientific ethics, professionalism in VPH	
	General concepts and principles of VPH	
	Principles and concepts of human and animal health economics	
	Principles, concepts and methods of risk assessment	
	Awareness of EU and international legislation in relation to VPH	
	POPULATION MEDICINE (25% time)	
A	Quantitative vet. epidemiology and risk analysis	
	Principles and procedures for field trial design and study design, conduct and interpretations (data collection, data processing, interpretation and management)	
	Concepts, principles and applications of quantitative veterinary epidemiology (diagnostic test evaluation, sampling procedures, observational analytical studies, questionnaire-based surveys, disease modelling)	
	Qualitative and quantitative risk analysis (risk assessment, risk management, risk communication)	
	Population dynamics of infections and intoxications, including disease modelling	
B	Risk management	
	Concepts, principles and applications of disease control programs, good hygiene practices, sanitation and disinfection procedures	
	Intervention studies and decision support modelling	
	Application of animal health economics, decision support modeling, decision tree analysis	
	Issues related to epidemiology for policy makers, EU and national legislation regarding animal health and welfare, public health and food safety	
C	Monitoring, surveillance and quality management	
	Further etiology, epidemiology, diagnostics and	

	control of infectious and non-infectious diseases of livestock populations (specifically zoonoses)	
	Hazard identification, recognition of disease problems as they occur in livestock populations, outbreak investigation	
	Design, implementation and evaluation of monitoring and surveillance systems (including zoonoses and food-borne diseases)	
	Principles and applications of tracking and trading of animal diseases	
	Concepts, principles and applications of pre-harvest quality management programs (GMP, HACCP, ISO, total quality management)	
	OTHERS	
	2 modules of Population Medicine to advanced level (20% time)	
	Research project (Population Medicine)	
	Electives (Food Safety, 10% time)	