

European Master of Small Animal Veterinary Medicine

Master Thesis Instructions

1. Learning objectives of the thesis

- Formulate a precise question, hypothesis, or goals of the thesis
- Select an appropriate method to address the above
- Collect data and present them in an orderly and comprehensive fashion
- Analyze the data in respect to the question/hypothesis/goal of the study
- Apply suitable statistical methods (when applicable)
- Compare the data to the published knowledge on the subject
- Draw appropriate conclusions from the study
- Present a list of literature references
- Write a well-structured clearly formulated report on all of the above

2. Supervision

The supervising structure is the Examination Board of the EMSAVM.
One of its members will be the supervisor of your thesis.

3. Steps to be taken

- 3.1. Consider a suitable topic for your thesis according to the different options listed in the next section.
- 3.2. Do some preliminary reading/exploring of the selected subject.
- 3.3. Formulate a brief proposal of your project. Please download and use the respective PDF form for your planned work:
[Proposal form for a Literature Review](#) [Proposal form for a Research Study](#)
- 3.4. Send this outline to the Master program coordinator at the ESAVS Office (no later than 1 year (= 2 semesters) before the proposed end of studies).
- 3.5. The program coordinator will forward your proposal to the program director, who will evaluate suitability of your topic and outline and assign you a supervisor
- 3.6. Prepare a draft of your thesis according to the instructions for preparing a master thesis (see below) and send this draft to your supervisor (no later than the beginning of the proposed last semester).
- 3.7. The supervisor reads your work and gives advise (there may be more than one contact)
- 3.8. Prepare a final version and send to the advisor for grading.



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4. Possible subjects:

4.1. Clinical studies

- Retrospective/prospective clinical study. For example: a series of cases with an unusual presentation, a series of cases of an unusual/rare disease.
- Such studies may include laboratory research, for example defining a genetic defect of a new disease.
- Epidemiological study: for example on the occurrence of certain infections in your area based on serological surveys.
- Treatment study: e. g. testing of a drug, testing a surgical technique.
- Evaluation of a diagnostic test (diagnostic imaging, laboratory....) for a certain lesion/disease.

4.2. Experimental studies

Could be anything but must be relevant to small animal veterinary medicine. Such studies are mostly conducted at a university, other government research laboratories or industry. In this case your work will be supervised by senior scientists. The writing of the research report or publication follows exactly the same outline as described for clinical research papers.(see section 7) Be aware that most experimental work nowadays needs an ethical approval from a local animal welfare agency.

4.3. Literature review

An in depth literature study on a certain (your favored) subject to illuminate the state of the art of knowledge on this subject. For example: lymphatic tumors in cats, emerging infectious diseases in small animals, Alzheimer disease-like lesions and dementia in small animals

5. General format of the thesis

- The volume/length: the general rule: "As long as necessary, as short as possible" also applies to the thesis. Somewhere between 6000 - 10000 words (excluding literature list) would be an appropriate size.
- The language is English. The quality of the English language should be acceptable.
- The thesis is submitted in an electronic form as a word document.
- Graphs, tables and images are incorporated in the text.

6. Instructions for writing a thesis based on a literature review

6.1. Identify the subject

- This may be your favored subject, something you have picked up during your coursework or reading. You may also discuss a potential subject, for example with the course masters of the ESAVS or former teachers at the university. A review is in part descriptive with the purpose of giving a condensed insight into the state of knowledge on a certain subject but also analytical in that you read the literature in a critical way.



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- One possible way to write a review is by presenting a rare case of your own and then to make a critical review of all similar cases which have been reported in the literature.
Another approach is to ask a specific question, for example: Does Alzheimer's disease also occur in dogs and cats?

6.2. Literature search

Of course, you can go to a library but you can also search the literature very effectively online. Be careful, there is a plethora of information on the internet but also a lot of junk. There are a number of databases in the internet which are useful and trustworthy. Some databases are specifically devised for veterinary purposes for example: CABI, Ovid etc. But these have to be paid for (unless you can use the resources of a university library or some other organization).

Other databases are for free, for example IVIS: <http://www.ivis.org/home.asp>
or Pubmed: <http://www.ncbi.nlm.nih.gov/pubmed>.

Another useful tool for your literature search is the new ESAVS [eLibrary](#) (access is included in your course fees) which includes 27 vetmed Journals.

6.3. Organize the papers of interest

- Set a time period for the literature you are reviewing. Usually a period of the past 10 years would be sufficient. In particularly productive/dynamic areas the past 5 years may be sufficient.
- Make a selection of the papers that you think are relevant.
- Make notes on each relevant article.
- Abstract the most important information.
 - The methods used.
 - The conclusions drawn.
 - Are the results convincing?
 - Does it contain controversial information as compared to other papers?
- Make a brief summary of each article based on these notes.
- Categorize: When you have read through all articles and abstracts you will have a good overview of the subject. The next step is to put all papers into categories. For example if you are doing a review on an infectious disease the following categories could be appropriate: agent, pathogenesis, epidemiology, clinical signs, clinical diagnosis, laboratory findings, pathology, treatment....
- Look for related papers within the category, make sub-categories if needed.

6.4. Writing your review

- Title and title page
 - Title should reflect the subject and scope of your review.
 - Under the title your name and address.
 - Underneath the name of the supervisor.
 - An official template for the title page will be provided
- Introduction
 - Introduce the reader to the subject. Give a brief definition of the subject.
 - Explain which aspects of the subject you are going to review.
 - Argue why your review is useful/necessary
 - Indicate any previous reviews and how yours is different.
 - Indicate the period covered by your review.
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- Main body
 - The structure of this part depends on the particular subject as discussed above: you divide this part of the thesis into several sections according to need.
 - You demonstrate that you have a deep understanding of the subject and that your review reflects the state of the art.
 - Now you can make good use of your notes to construct the sections according to the categories in which you classified the various papers.
 - It is now a question of putting your notes together into a coherent piece of writing.
 - Connect the aspects that belong together in a narrative way. Always start with the big picture or more general statements and go subsequently into more detail.

Use your own words! The University of Luxemburg / ESAVS will scan each master thesis for plagiarism with a powerful software tool. If plagiarism is found, several actions might be taken all the way to rejection of the thesis. So do not just change one or two words in a sentence and take special care to clearly reference each statement.

- Point out the differences in observations/views on specific aspects e.g. “whereas author X thinks that....., author Y believes.....”.
 - Point out where you think there are gaps in the knowledge.
 - If you have your own observations on the subject, incorporate them.
 - Always make clear whether you are quoting a study or whether you are presenting your own views.
 - Refer to the publications you are discussing/ quoting by putting the name of the first author (usually adding”et al” since most publications have multiple authors) plus the year the paper was published in brackets after your quote. The full title and name of the journal of the quoted references is presented in your list of references.
- Conclusions and discussion
 - Present a summary by extracting the most important points from your review.
 - Make general conclusions.
 - Point out where knowledge is still deficient.
 - Point out the major controversies (if present).
 - Give directions for future research.
 - Literature references
 - Make an alphabetical list of your references. There are several formats to do this in. The main important thing is to be consistent.
 - Illustrations
 - These may be tables, diagrams, graphs or images. It is true that: “One picture is better than a thousand words” but don’t overdo it.
 - Tables and graphs should be easy to read.
 - Images (like radiographs, histology...) should be of good quality both in resolution and contrast. The captions should be short and contain precise descriptions of what can be seen.
 - If you are showing images from another source than your own, always indicate the source and get the permission of the original producer if your thesis is going to be submitted for publication.



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6.5. Examples of literature reviews are available in the attachment:

- Review example 1: review on the clinical diagnosis of Ehrlichiosis in dogs
- Review example 2: presents a case report of a very rare histiocytic tumor in a cat and reviews all previously reported cases of histiocytic tumors in cats and compares them to canine histiocytic tumors which are immunologically much better characterized. The literature review is in this case covered in the discussion.
- Review example 3: is a very extensive review (75 references) on all aspects of FIP.
- Review example 4: this review on leptospirosis is more narrow than example 3 in that it focuses only on clinical signs.

7. Instructions for writing a Master thesis based on clinical research

7.1. Identify the subject

- Research is exploration of the unknown that may generate new knowledge
- If this knowledge is significant enough this work may be published in the scientific literature. Publication of your work would be nice but is not a requirement.
- For the master thesis you write a research report which, in essence, is pretty much the same thing as writing a research paper. You have to define a subject, ask a question or create a corresponding hypothesis, design a study selecting appropriate methods to investigate your question/hypothesis. This study produces results which you have to analyze. From this analysis you have to draw conclusions which are then discussed.
- In a clinical situation you can do useful research by analyzing spontaneous material (as opposed to experimental generation of data). You can extract data from your clinical work which can be from many different areas as indicated at the beginning of this document (“possible subjects”).
- Irrespective of the nature of your research, your work should reflect a standard scientific approach as outlined here below.

7.2. Collect and analyze the data

- In retrospective studies get all the clinical records of the cases that you are going to use in your study.
- Make a list of inclusion criteria: minimal essential information that is necessary to be able to use or reject the case.
- For prospective studies make a protocol of all the things that need to be done and recorded for each case.
- Make lists/tables/notes of all data and organize them in an orderly fashion.
- Analyze your findings in respect to the question you asked or in respect to your hypothesis.
- Identify the new knowledge that your study generated.
- Compare your findings with what has been published on the subject before.
- Think of interesting points to be discussed.

7.3. Study the literature

The same procedures as explained in section 6.2 apply



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7.4. Write the thesis

- Title and title page
 - The title should reflect the content and scope of your thesis.
 - It should be as short as possible and give an impression about the content.
 - Underneath the title put your name and address.
 - Underneath your affiliations the name of your supervisor.
 - An official template for the title will be provided.
- Introduction
 - You briefly introduce the readers to the subject of your work and give an overview of the literature on previous work that has been published on the subject.
 - Based on that background information you explain where the knowledge is still deficient and formulate a question to be investigated and/or the objectives of your study.
 - You also briefly describe the methods you are going to use to answer your question or meet your objectives.
 - Refer to the publications you are discussing/ quoting by putting the name of the first author usually adding"et al." (since most publications have multiple authors) plus the year the paper was published in brackets behind your quote.
 - The full title and name of the journal of the quoted references is presented in your list of references.
- Materials and methods
 - In this section you describe what you did. This description must be detailed enough and when needed contain appropriate literature references so that others could repeat your study.
 - In clinical studies, you present your cases, the inclusion criteria, the methods you used to get the information (e.g. analysis of clinical records), the techniques you used to examine your cases (e.g. hematology, X-ray..), the statistical methods you used to evaluate the results.
- Results
 - Here you describe all the findings in an orderly and systematic way according to the previous section (materials&methods).
 - All the relevant data, observations, and findings are presented either verbally or in tables, graphs etc.
 - Tables and graphs should be as simple as possible; they could replace a lot of descriptive text but must be clearly explained in the captions.
 - Images are also an important part of the result section. The captions for the images must be short and precise.
- Discussion
 - This is really the most important part of your report. Here you discuss your findings in respect to the question you formulated.
 - Start with a brief recapitulation of the problem.
 - Then analyze your results: what do your results mean? Did you answer the question?
 - Point out where knowledge is still deficient and mention the major controversies (if present)



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- How do your findings compare with what has been reported in the literature?
- You discuss all important further questions that your work generated in an orderly fashion, one aspect after the other.
- At the end, make final conclusions and give directions for future research.
- Abstract
 - Here you summarize your study in not more than 100-200 words. The abstract should contain a description of the problem, the methods used, the most important findings and the conclusions.
- Reference list
 - Make an alphabetical list of all the references you quoted in your thesis. There are several formats to do this in. The main important thing is to be consistent.
- Illustrations
 - These may be tables, diagrams, graphs or images. It is true that: "One picture is better than a thousand words" but don't overdo it.
 - Tables and graphs should be easy to read. Images (like radiographs, histology...) should be of good quality both in resolution and contrast.
 - If you are showing images from another source than your own, always indicate the source and get the permission of original producer in case the thesis is intended to be submitted for publication.

7.5. Examples of clinical studies

- Clinical study example 1: This is a case series on a peculiar form of neosporosis in dogs presenting clinical and MRI findings.
- Clinical study example 2: This is a straight forward otitis externa treatment study in cats to evaluate efficacy of a certain ointment as monitored by clinical and bacteriological examinations.
- Clinical study example 3: A case series describing the first hereditary PDA in Chihuahuas
- Clinical study example 4: This study researches the use of a specific technique (Doppler ultrasound) to diagnose a certain disease (granulomatous meningoencephalitis)
- Clinical study example 5: This is a multicenter study pooling 30 cases of a rare cutaneous T cell lymphoma with the purpose of improving the clinical diagnosis of this lesion.

8. Publications as alternative to a thesis manuscript

- 8.1. A reprint of a publication of a research paper or a literature review can be submitted instead of a thesis manuscript. The level of such a publication must be well above the one of a case report.
- 8.2. The paper must be either published or accepted for publication or must have received a favorable review and be currently in revision.
- 8.3. The work must be accomplished during the master program of the candidate.
- 8.4. The publication must be in English.
- 8.5. The paper must be published in a peer-reviewed journal.
- 8.6. A publication submitted as thesis will receive a standard grade (15/20).
An upgrade (not mandatory) is possible this by expanding the thesis: the publication remains the core but a more extensive introduction and discussion as well as supplementary files may be added.



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Additional guidelines for writing your thesis can also be found in the recommendations on preparing medical articles by various sources:

- <http://www.icmje.org/recommendations/browse/manuscript-preparation/preparing-for-submission.html>
- <https://pubmed.ncbi.nlm.nih.gov/17297211/>
- <https://pubmed.ncbi.nlm.nih.gov/19710971/>