# Study Guide Thesis Animal Nutrition Group

## Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table of Contents</td>
<td>1</td>
</tr>
<tr>
<td>1 Introduction</td>
<td>2</td>
</tr>
<tr>
<td>1.1 Learning outcomes</td>
<td>2</td>
</tr>
<tr>
<td>1.2 Prerequisites</td>
<td>2</td>
</tr>
<tr>
<td>1.3 Supervision</td>
<td>2</td>
</tr>
<tr>
<td>1.4 This guide</td>
<td>2</td>
</tr>
<tr>
<td>2 Thesis</td>
<td>3</td>
</tr>
<tr>
<td>2.1 Start</td>
<td>3</td>
</tr>
<tr>
<td>2.2 General outline</td>
<td>3</td>
</tr>
<tr>
<td>2.3 Examination</td>
<td>4</td>
</tr>
<tr>
<td>3 Reports</td>
<td>4</td>
</tr>
<tr>
<td>3.1 Research proposal</td>
<td>4</td>
</tr>
<tr>
<td>3.2 Thesis report</td>
<td>5</td>
</tr>
<tr>
<td>4 Presentations</td>
<td>6</td>
</tr>
<tr>
<td>4.1 MaMi-presentation</td>
<td>6</td>
</tr>
<tr>
<td>4.2 Colloquium</td>
<td>6</td>
</tr>
<tr>
<td>5 Facilities</td>
<td>7</td>
</tr>
<tr>
<td>5.1 Working at Zodiac</td>
<td>7</td>
</tr>
<tr>
<td>5.2 Working in the laboratory</td>
<td>7</td>
</tr>
<tr>
<td>5.3 Working at the animal experimental facilities</td>
<td>7</td>
</tr>
<tr>
<td>6 References</td>
<td>8</td>
</tr>
<tr>
<td>7 Appendix</td>
<td>8</td>
</tr>
<tr>
<td>7.1 Student checklist</td>
<td>8</td>
</tr>
</tbody>
</table>

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1 Introduction

At the Animal Nutrition Group (ANU), a student can conduct research for a thesis with a workload of 18, 21, 24, 27, 30, 33 (Minor thesis), 36 or 39 ECTS (Major thesis). The aim of this thesis research is to train the students’ academic skills by means of an in-depth, scientific study on a subject of interest. With completion of the thesis, you have demonstrated that you can conduct a research or a research-based design project individually and independently.

1.1 Learning outcomes

After successful completion of your thesis, you are expected to be able to:

- demonstrate commitment, perseverance, initiative and creativity when investigating a research question or performing a design project
- work independently and efficiently
- demonstrate that you know when to ask help from your supervisor and how to handle any comments
- plan and keep to the time schedule
- delineate and define your research or design question
- build a sound theoretical and methodological framework
- collect data in a systematic and verifiable manner
- analyse the data critically and correctly
- develop a design or design alternative (in case of a research-based design project)
- present the major finding(s) in a comprehensible manner for a specific audience, both orally and in writing
- formulate sound conclusions based on a comprehensive discussion of the results
- evaluate and discuss the contribution of your results to the development of the thesis topic
- write a comprehensive, consistent and concise thesis report.

1.2 Prerequisites

Specific requirements (e.g. mandatory courses) for each MSc thesis can be found in the online Study Handbook. In addition, please check with your study advisor for any specific requirements. You should be officially registered as a Wageningen University MSc student. Compulsory courses for a Major thesis in animal nutrition are Animal Nutrition & Physiology and Feed Technology or Nutrient Dynamics. Compulsory course for a Minor thesis in animal nutrition are Animal Nutrition & Physiology (animal-related subject) or Feed Technology (technology-related subject).

1.3 Supervision

The first (main) supervisor is always a staff member of the responsible Chair Group, but frequently, a second or even a third Chair Group may be involved in the supervision of a MSc thesis. All Chair Groups of Wageningen University use a thesis contract which includes details of all agreements regarding supervision. Students have to contact their primary supervisor at least once a week, unless circumstances do not allow such a frequency. The actual frequency of meetings may vary depending on the nature of the thesis project. Although the thesis project is a learning experience, students are encouraged to act independently as much as possible when resolving problems and in difficult situations. However, one supervisor will always be available for feedback and support.

1.4 This guide

This study guide informs you about the planning and execution of your research. There are only general guidelines described. Together with your supervisor you will make detailed agreements about your thesis, activities, and documentation.

We wish you good luck with your research and hope that you will enjoy working in our group!
Please note, that you can only start your thesis if you have completed your BSc education and if you have participated in the required MSc courses as mentioned on our website www.anu.wur.nl/UK/Education/MScThesis/.

2 Thesis

2.1 Start
One or two weeks before the start of your thesis work you should make an appointment at the ANU secretariat to report the start of the thesis. The secretariat will need a signed thesis agreement. You can find this document at www.anu.wur.nl/UK/Education/MScThesis/. After the secretariat has received all the required information you will be added to the mailing list for ANU-thesis students (to receive invitations for MaMi-presentations and colloquia).
If your work requires access to the experimental facilities you should report this to the secretariat. They will activate the required permissions at your WUR-card. This will take approximately 1 week.
It is recommended to work at Zodiac during your thesis. There are workspaces available at the second floor of Zodiac, these are especially reserved for MSc thesis-students.
You are most welcome to join our tea and coffee breaks (approximately at 10 h and at 15 h).

2.2 General outline
A thesis will take approximately 13 to 27 fulltime weeks, depending on the number of ECTS of your thesis. You are expected to work a minimum of 40 hours per week. In case you would like to combine your thesis work with other activities (e.g. other courses), you should discuss the planning with your supervisor in advance.
A thesis can be divided in three stages. Please note that the timespan, order, and activities of these stages depend on the number of ECTS of your thesis, experimental work, availability of your supervisor, etc. Discuss with your supervisor at the start of your thesis how the activities can be planned in your project. Make a planning for the timespan of your thesis and have it approved by your supervisor. An intermediate evaluation is not standard but can be organised between student and supervisor halfway through the project. If you experienced any shortcomings in your supervision, then this is a good moment to discuss it and agree improvement. In case of severe problems regarding dedication, skills, knowledge or communication, your daily supervisor, together with the thesis examiner, may decide to terminate the thesis project. The thesis assessment form (see ANU website) can be used for the intermediate evaluation and provides a clear picture of what goes well and where improvement is needed. You need to achieve a grade of at least 5.5 for both categories ‘Research competence’ and ‘Thesis report’ in order to pass an MSc thesis project.

2.2.1 The initiation stage
In this stage you start reading background information about your thesis subject and reviewing relevant literature. You make a planning and write a research proposal (see § 3.1), which should be approved by your supervisor. You present your proposal to students and staff within the Animal Nutrition Group, during a MaMi-meeting (§ 4.1).

2.2.2 The execution stage
During the execution stage you perform the experiment and/or lab analyses and analyse the data. Make sure that you properly store samples and document the data. This makes writing of the final report much more easy.

2.2.3 The completion stage
In the last stage, you finalise your thesis. You summarise the results, interpret and discuss your data with the help of literature, and you draw conclusions. You complete the different sections of your report and present your colloquium. Preferably, you present your colloquium before you
complete your thesis report, so that you can use the discussions at your colloquium to improve your thesis. Finally, you have your oral examination.

2.3 Examination

The final examination is an in-depth discussion about the content of the thesis, in which knowledge, understanding, insight, but also creativity and scientific attitude are evaluated. The final examination will be held by the professor of the ANU group or his representative and the supervisor(s) of the student.

The final mark of the thesis will be based on several criteria; for a detailed overview of the criteria and their weighing factors, please see the "Thesis Evaluation Form ANU" at [http://www.anu.wur.nl/UK/Education/Documents+for+Students/](http://www.anu.wur.nl/UK/Education/Documents+for+Students/).

You may be requested to adjust the thesis according to remarks of your supervisor and/or examiner. The final mark will be fed into the system by the secretariat after submission of the final thesis, in which these additional remarks are incorporated. Thus, reserve 1 or 2 days of your time after the oral exam to finalise your thesis.

3 Reports

The research proposal and thesis report should be written in English. Make sure that your manuscripts clearly communicate your message to the reader. Write clearly and accurately but be as simple and concise as possible. Let other students or friends read your manuscripts before submission, in order to check whether your text is clear and logical. Make sure that you use proper spelling and grammar. For more information, you can consult literature on scientific writing (e.g. Malmfors et al. 2004; Editorial Board Animal Feed Science and Technology, 2007). For formatting of the research proposal and thesis report, use the formatting tools in Word (check online manuals) and Endnote or equivalent for cited literature.

3.1 Research proposal

The thesis research starts with the preparation of a research protocol. In some cases this research protocol will be part of a larger research proposal prepared by a staff member/PhD candidate. The research proposal is to be presented at one of the weekly MaMi-meetings (see §4.1). The proposal should contain the following elements:

**Administrative information:** Name and registration number, supervisor(s), course reference (code) and number of ECTS, date.

**Title:** Should describe the contents of the thesis work, but be as brief as possible. If applicable, indicate if it is a pilot study.

**Introduction:** Introduction should cover the following questions "What will I study? Why is it an important question? What do we know about it? How will this study advance our knowledge?". The introduction should address the following points:

- **Motivation** – put your research in a global context, formulate the problem
- **Theory** – summarise the current understanding of the problem you are investigating
- **Current and gap in knowledge** – state what has been done by summarising relevant literature and state what has not been done
- **Objectives, research questions and hypotheses** – what are the objectives of your research (related to the knowledge gap), research questions and hypotheses (related to the theory)

Consider the difference between the subject you are studying and the parameters that you will use to explore the problem. For example, the subject could be protein quality of algae. The parameters to gain insight in the protein quality could be in vitro N digestibility or the amino acid composition. Each parameter has limitations (e.g. predictive accuracy of in vitro method, loss of amino acids during acid hydrolysis) which you will ultimately describe in the discussion.

**Materials and methods:** Give a clear and complete description of the proposed experiment, including chemical and statistical analyses. Describe your material and methods in such a way that
a colleague within the field can reproduce your experiments. Materials and methods of a research proposal should address the following points:

- **Experimental design.** A flow chart illustrating your study design often helps. Make sure that your design is well related to your objectives.
- **Experimental methods.** Describe which variables are measured and how they are analysed.
- **Statistical model and analysis.** Make sure that your statistical analysis is consistent with the experimental design.
- **Time schedule.** Report all activities, including dates for presentations and hand in the final thesis.

**References:** If space allows, list of relevant references with at least two key publications.

### 3.2 Thesis report

Your final report should contain the following sections:

**Cover:** Including title and administrative information. Title should be clear, descriptive and short. All ANU thesis reports have a similar title page. Name of the author, course reference (code) and number of ECTS, supervisor(s), and date are all included on the cover page. The second page contains a message on copyrights. You will find examples of a thesis cover and a copyright format at [http://www.anu.wur.nl/UK/Education/Documents+for+Students/](http://www.anu.wur.nl/UK/Education/Documents+for+Students/).

**Table of contents:** With maximal 3 levels of the headings.

**List of Abbreviations, Tables and Figures:** For readability and rapid screening of main thesis outcomes.

**Abstract/summary:** Should be clear, descriptive and not longer than 600 words.

**Introduction:** See above.

**Optional: Literature:** See above regarding theory and state-of-the-art and knowledge. A literature review considering the scientific background of the thesis subject can be included. Discuss with your supervisor whether you should include a separate section to present your literature review.

**Materials and methods:** Should contain a detailed description of the materials studies, area description, research methodology, techniques and way of (data) processing.

**Results:** Report your data. Do not include any interpretations, preliminary conclusions, and references to literature in this section. Check the Instructions for Authors of scientific journals for common practice in formatting tables and figures.

**Discussion:** This section includes your interpretation of the results, including explicit reference to the research question and literature as mentioned in the introduction. Be clear in your conclusions whether, based on your findings, the hypothesis is accepted or rejected. Discuss in retrospect if the methods used in the project were adequate in relation to the research question. Analyse the strengths and the weaknesses of the methods and the results and discuss the results in relation to relevant literature. Identify conclusions that would hold true in further scrutiny.

**Conclusions and recommendations:** In the conclusion section you link the outcomes of your research to the objective(s) described in the introduction. A thesis will generally have not more than five substantial conclusions. Do not introduce new results or insights at this point. Give recommendations for further research.

**References:** Make a reference list according to the guidelines of a journal in your scientific discipline. The entire report must be carefully cross-checked to ensure that the spelling of author names and year of publication are correct and correctly referenced in the text.

**Acknowledgements:** Conducting thesis research is team work and this is the place to acknowledge those that have supported you.

**Optional: Appendices.**

The structure of your thesis report may differ from the outline above, depending on your project. You may for example combine the discussion and results section or omit the literature review section and integrate the literature in the introduction and discussion sections. Discuss with your
supervisor what structure can be used for your project. In agreement with your supervisor you may write a draft publication (with appendices for data) instead of a thesis.

**Note:** Plagiarism is considered to be a serious form of fraud. Consult the following website via the link for forms and avoidance of plagiarism: plagiarism. Examiners and supervisors may utilize plagiarism scanners to check any text presented to them by students.

You should submit your thesis to your supervisor and to your second examiner, at least 2 weeks before the oral examination. After your supervisor has approved the final thesis you can send a digital copy of your thesis (.pdf) to the secretariat (Yvonne.vanholland@wur.nl). The secretariat will print two copies of your thesis. One can be submitted to your supervisor, and the second copy can be kept by yourself.

## 4 Presentations

### 4.1 MaMi-presentation
Every Monday afternoon (in Dutch: MaandagMiddag) 12.00 h there is a weekly research meeting within the Animal Nutrition Group; the MaMi meeting. You are obliged to present your research proposal during a MaMi-meeting, preferably within 4 to 6 weeks from the start of your thesis. You can contact the MaMi-coordinator to plan your presentation. Guidelines for the presentation and summary can be found at [http://www.anu.wur.nl/UK/Education/Documents+for+Students/](http://www.anu.wur.nl/UK/Education/Documents+for+Students/). You should attend at least 6 MaMi-presentations doing a major thesis and 3 doing a minor thesis. Attendance of MSc students is recorded by the chairman of the MaMi and will be part of the thesis evaluation and examination.

### 4.2 Colloquium
You are obliged to present the results of your research during one of the colloquium-meetings. Every third Thursday of the month there is a possibility for the BSc and MSc student to present their colloquium. Dr. John Cone and Yvonne van Holland share the organization of the colloquia. So, if you have any queries or comments concerning anything to do with the colloquia, please contact one of us via email (John.cone@wur.nl or Yvonne.vanholland@wur.nl). You should attend at least 6 colloquia doing a major thesis and 3 doing a minor thesis. Attendance of MSc students is recorded by the chairman of the colloquium session and will be part of the thesis evaluation and examination. Guidelines for the presentation and summary can be found at [http://www.anu.wur.nl/UK/Education/Documents+for+Students/](http://www.anu.wur.nl/UK/Education/Documents+for+Students/). The colloquium is part of your thesis evaluation and will be graded.

#### 4.2.1 Colloquium planning
Please contact John Cone by email in an early stage, **at least 5 weeks** before the colloquium date, to plan your colloquium. Upon planning, a tentative colloquium program will be made for the coming month and you will be contacted in the first week of the month to answer the following questions:

- Is your registration for this month a definite one and approved by your supervisor?
- If yes, what is the title of your colloquium, approved by your supervisor?
- Is the colloquium confidential, yes or no? If yes, for what reason?

For the colloquia, a formal invitation letter will be written and send to people inside or outside Wageningen University, interested to participate in the ANU colloquia. A copy of the invitation letter will be send to you.

#### 4.2.2 Important issues
Room
• Presentations normally take place in Room A0108 but is definitely indicated on the invitation letter that will be prepared in the first week of the month.

Summary
• The two-page summary of your colloquium should be a self-supporting document; as such the paper should have a clear introduction to the subject to inform people who are not specialist in the field.
• The summary has to be approved by your supervisor(s).
• Speakers are obliged to hand in the approved summary at the secretariat by email (Yvonne.vanholland@wur.nl) on the Tuesday before the colloquium before 12.00 noon, so 2 days prior to the colloquium. Copies will be made to hand out during the colloquium; the colloquium chair will bring them to the colloquium.

Facilities
• Laptop and beamer facilities are arranged.
• We assume you will be using MS PowerPoint to give your presentation. Bring your own USB stick with your presentation on it to the colloquium.
• In addition send your PPT-file also to Dr. John Cone no later than 09.00 am on the day of the colloquium (john.cone@wur.nl). In case of failure we will bring a second USB-stick with all the files on it.
• If you need other software, please contact John Cone, or alternatively bring your own USB-stick with the software on it.

Presentation
• Each speaker has 30 min (20 min for the talk, plus 10 min for discussion).
• Guidelines concerning quality of presentations and the evaluation of the talks can be found at http://www.anu.wur.nl/UK/Education/Documents+for+Students/.

Supervisor
• At least one of your supervisors has to be present at the colloquium.

Language
• Bsc students present their colloquium in Dutch or English; MSc students present in the English language.

5 Facilities

5.1 Working at Zodiac
Zodiac is only open during weekdays from 7h until 18h. For working in the evening or weekend, use the facilities at the Forum building (Monday till Friday 8-23 h; Saturday and Sunday 10-17 h).

5.2 Working in the laboratory
To be able to carry out work in the ANU laboratory, strict laboratory rules have been established ensuring the safety of yourself and your colleagues. Your supervisor is responsible to inform the laboratory about your work. You are obliged to make an appointment with Saskia van Laar (Saskia.vanlaar@wur.nl) and discuss your work and the laboratory instructions (http://www.anu.wur.nl/UK/Education/Documents+for+Students/). You are not allowed to work in the lab without supervision so discuss with your supervisor and the laboratory coordinator (Saskia van Laar) when you can work in the lab.

Note: You are not allowed to work in the lab besides the opening hours. Only in special circumstances, under very strict conditions an exception can be made. You should make your request to work in the laboratory besides opening hours, at least 2 weeks in advance, at the coordinator of the laboratory (Saskia van Laar).

5.3 Working at the animal experimental facilities
The experimental facilities ‘Carus’ can only be entered when your WUR card has been activated. If you need access to these facilities you should contact the secretariat (see §2.1). You are not allowed to work in the experimental facilities without supervision.
Animal experiments can only be carried out once approval has been obtained from the Ethical Committee for Animal Experiments (DEC). Discuss with your supervisor whether there is approval of the DEC and whether the management of the experimental facilities has been informed.

6 References


7 Appendix

7.1 Student checklist
✓ Contact the ANU secretariat to make an appointment with one of the ANU academic staff members for a research subject (Yvonne.vanholland@wur.nl).
✓ Read the student guidelines
  • Download the “ANU Thesis contract” (see www.anu.wur.nl/UK/Education/MScThesis/) and have it signed by your supervisor(s).
  • If applicable, obtain access to Zodiac during evenings and weekends or the experimental facilities when required.
  • If applicable, read the laboratory guidelines
  • Attend 6 MaMi-presentations and 6 Colloquia (33/36 ECTS) or 3 MaMi-presentations and 3 Colloquia (18/33 ECTS).

Further questions can be addressed to the ANU Education contact person: Dr. Rene Kwakkel (Rene.kwakkel@wur.nl).