MSc Thesis & MSc Research Practice Course Guide Wageningen University

Part B: Chair group specific regulations – Animal Nutrition Group (ANU)

Version: August 2024

Thesis and research practice coordinators of the Animal Nutrition Group are:
Dr Myrthe Gilbert
Dr Dennis Oonincx
Dr Nikkie van der Wielen
Contact: anu.thesis@wur.nl

Table of Contents

1 Introduction 3
Course profile and prerequisites 3
Learning outcomes 3
People involved in your thesis or research practice at ANU 4

2 How to find a topic for your thesis or research practice 4

3 Before the start of your thesis or research practice 5
Start a case 5
Enter the Learning Agreement 5
Upload Documents 6
Approval of the supervisor 6

4 During your thesis or research practice 6
General outline 6
The initiation stage: research proposal and MaMi-presentation 7
Thesis Rings 7
At 1/3 through the project: progress evaluation meeting 8
The execution stage 8
Communication with your supervisor(s) 8

5 Towards the end of your thesis or research practice 9
The completion stage 9
Oral presentation - colloquium 9
Oral examination 9

6 Assessment of the thesis or research practice 10

7 Reports and writing 10
General guidelines and help for report writing 10
Research proposal 11
Thesis or research practice report 12
Considerations regarding animal use in experiments 14
Use of generative artificial intelligence 14
Confidentiality 15
Reflection report (research practice only) 15

8 Facilities 15
Brightspace page for ANU students 15
Working at Zodiac 15
Working in the laboratory 15
Working at the animal experimental facilities 16
Data and statistical analyses 16

9 Data management 16

10 Where to find relevant information and documents 17

11 Provide feedback so we can improve 17

12 References 18

13 Appendices 19
Student checklist 19

Guidelines supervision thesis or research practice 19

1 Introduction

Welcome to the Animal Nutrition Group (ANU). This guide is part B of the MSc Thesis & MSc Research Practice Course Guide of Wageningen University. This part B is an addition to the general part A course guides and contains the ANU-specific, and therefore leading, guidelines for organising your thesis or research practice at ANU.

Contact ANU:
Postal address: Wageningen University, Animal Nutrition Group, P.O. Box 338, 6700 AH Wageningen, The Netherlands
Visiting address: Zodiac (Building 122), De Elst 1, 6708 WD Wageningen, Netherlands
Secretariat ANU: room E0210
Phone number: +31 (0)317 484082, general e-mail address: office.anu@wur.nl
Website: www.wur.eu/anu

Course profile and prerequisites

The thesis and research practice at ANU adhere to the Wageningen University profile. The aim of these courses is to train the students' academic skills by means of an in-depth, scientific study on a subject of interest. A research practice can replace the internship in your study programme, which especially prepares for a career in science. With completion of the thesis or research practice, you will have demonstrated that you can conduct a research project or a research-based design project individually and independently.
Depending on the study track you follow in your MAS-specialization, you can either conduct an MSc thesis, an MSc research practice and/or an MSc internship at ANU. At ANU, you can conduct research for a thesis with a workload of 36 or 39 ECTS (major thesis) and of 24, 27, 30, or 33 ECTS (minor thesis). You can also conduct a research practice at ANU, with a workload of 24 - 39 ECTS.
Specific requirements (e.g. mandatory courses) for each MSc thesis and research practice can be found in the online Study Handbook (see '10. Where to find relevant information and documents'). In addition, please check with your study advisor for any specific requirements, in particular when you want to do a minor thesis. Note that you can only start your thesis or research practice if you have completed your BSc education and that you should be officially registered as a Wageningen University MSc student. In general, compulsory courses for a thesis and research practice of ≥36 ECTS at ANU are Animal Nutrition & Physiology (ANU-30806) and Feed Technology (ANU-31306) or Nutrient Dynamics (ANU-30306). Compulsory courses for a thesis or research practice of 24-33 ECTS at ANU are Animal Nutrition & Physiology (animal-related subject) or Feed Technology (technology-related subject).

Learning outcomes

General learning outcomes of the MSc thesis and research practice are provided in part A of the MSc Thesis Course Guide and MSc Research Practice Course Guide of Wageningen University. In addition, we stress the importance of taking initiative in achieving your learning outcomes. 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.

People involved in your thesis or research practice at ANU

At ANU, several persons are involved in your thesis or research practice.
ANU thesis coordinator: this is your first contact point when considering a thesis or research practice at ANU. See for more information 'How to find a topic for your thesis or research practice?'
ANU supervisor: this is generally an ANU staff member with expertise on your topic of interest. Often, the daily supervision is delegated to a PhD candidate supervised by the respective staff member. The ANU staff member or PhD candidate is your main supervisor and contact point during your thesis or research practice. Specific agreements regarding supervision can be recorded in the 'Learning Agreement ANU'. The ANU supervisor is also assessor of your thesis or research practice.
Additional or external supervisor: sometimes, (part of) the research is conducted in collaboration with another chair group or other (industrial/academic) partner. In this case, you will be co-supervised by an additional or external supervisor. Specific agreements regarding supervision can be recorded in the 'Learning Agreement ANU'.
ANU examiner: this is an ANU staff member, who will assess your final report and lead the oral examination.
Colloquium assessors: in addition to your ANU supervisor, two independent ANU PhD candidates will advise on the grade of your oral presentation (i.e. colloquium) using the colloquium rubric.

2 How to find a topic for your thesis or research practice

The thesis and research practice topics for MSc students at ANU vary considerably and can cover a whole range of animal species, research techniques and disciplines of animal nutrition. Most of our students take part in our research projects and their work contributes significantly to project results. All available MSc thesis or research practice subjects can be consulted via one of the MSc thesis coordinators (see above for names). If you have a question, you can contact the thesis coordinator via anu.thesis@wur.nl.

You should start the process of finding a thesis topic approximately 6 months prior to the foreseen start date of your Thesis or Research Practice, by filling in the intake form (https://forms.office.com/r/kvpUaW5nrL). After completing the intake form, you will receive an invitation for an appointment with one of our ANU thesis coordinators. If you have other obligations, such as practicals, suggest some alternatives. During this meeting, you will discuss the research you are interested in and the next steps in the organisation of the thesis or research practice. Generally, these next steps include scheduling a meeting with a potential supervisor to further discuss the research topic and starting date. After that meeting, you either agree on the topic or not. If you agree, please notify the coordinator (via anu.thesis@wur.nl). If you do not agree, contact the coordinator (via anu.thesis@wur.nl) to find another suitable topic and supervisor.

3 Before the start of your thesis or research practice

After you have organised your thesis or research practice topic and starting date, you arrange an appointment with your supervisor (preferably at least 3 weeks before the starting date) to discuss the content, planning, supervision, and assessment. Agreements are recorded in the Learning Agreement. You can find the Learning Agreement forms on our website. When you and your supervisor(s) have completed the forms and agree on the contents of the Learning Agreement, you can to create a case in OSIRIS and transfer the information to OSIRIS. Please follow the instructions below.

Start a case

1. Go to: https://wur.eu/tir-start
2. Take the following steps in Osiris Student:
    a. Select whether it is a:
        1. Thesis
        2. Research Practice
        3. Internship
    b. Select the **main and administrative supervisor**: this is always one of the following ANU staff members: Jurgen van Baal, Guido Bosch, Jan Dijkstra, Walter Gerrits, Myrthe Gilbert, Wouter Hendriks, René Kwakkel, Dennis Oonincx, Leon de Jonge, Wilbert Pellikaan, Sonja de Vries, or Nikkie van der Wielen.
    c. Select the **correct course code** and select **Academic Year** in which you start- if you do not know which course code is in your approved study program then you should contact your study advisor! (A Case started with a wrong course code causes problems for graduation and can only be corrected by starting a new case and by contacting an Osiris key-user with a withdrawal request for the wrong Case)
    d. Select the **correct study program** and in case of multiple programs, the one most relevant to this thesis or Research practice.

Enter the Learning Agreement

! Download the Learning Agreement from the ANU Website and complete it as much as possible, then send it to your main supervisor. When both parties agree on the completed Learning Agreement, the Learning Agreement needs to be entered in the Case in Osiris.

You take the following steps:

1. Open the previously started Case
2. Select the **additional supervisor(s)** (max 2, besides the main Supervisor) – only people with WUR accounts!
3. Select for the **course coordinator(s):**
    - Coordinator 1. Select: name of the MSc thesis coordinator at the moment of intake
    - Coordinator 2. Select: Yvonne van Holland
4. Select the **number of Credits** which are agreed upon
5. Copy/Paste the following fields from the Learning Agreement in the Case:
    a. Admission courses
    b. Planning – make sure that if the thesis or research practice is interrupted that the timeline is adjusted and agreed upon beforehand. You need to elaborate on this in Osiris.
    c. Description of the project – **Please start with a title!**

d. Arrangements regarding supervision
e. Arrangements regarding facilities
f. Arrangements regarding report
g. Arrangements for individual situations

6. Submit the Learning Agreement to the Main and Administrative Supervisor

Upload Documents

After submitting the Learning Agreement, you can go to '**Other Documents'** to upload files:

1. Please upload the earlier drawn up Learning Agreement
2. Always name the files: **Lastname**, **Firstname** *(from student!)*– **type of file** (i.e. Learning Agreement, Project Proposal, etc.)

Approval of the supervisor

The supervisor has 3 options:

1. Minor changes are needed: supervisor enters the changes, the new version goes to you for approval.
2. Major changes are needed: supervisor rejects: you adjust all necessary sections and submit again.
3. No changes are needed: supervisor approves; the administrative start is done😃.

When the case is created and approved by your supervisor then the secretariat will receive a message and they will add you to the mailing list for ANU students (to receive invitations for MaMi-presentations and colloquia) and they will assign you to Brightspace and enrol you to a Thesis Ring.
If the approval of your case is delayed then you can also contact the secretariat (office.anu@wur.nl) that you will start a thesis or research practice.
If your work requires access to the experimental facilities at Carus, you should ask your supervisor (or the secretariat) to send you the application form and protocols/information. Hand in or send the completed form (do not forget the initials and signature!) to the secretariat. They will arrange the process of activating your WUR-card. This will take a few days.

4 During your thesis or research practice

General outline

The time investment of your thesis or research practice depends on the number of ECTS. You are expected to work about 40 hours per week. One ECTS equals a time investment of 28 hours. This means that a 36 ECTS thesis generally takes 25.2 weeks of 40 hours/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 roughly be divided in three stages: initiation, execution, and completion; see '5 Towards the end of your thesis or Research practice' for the completion stage). 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.

You can work at Zodiac during your thesis or research practice. There are workspaces available at the top floors of Zodiac, which are especially reserved for MSc thesis or research practice students. Furthermore, you are most welcome to join our tea & coffee breaks (approximately at 10.00 h and at 15.00 h).

The initiation stage: research proposal and MaMi-presentation

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 chapter 7. Reports and writing), which should be approved by your supervisor. You present your proposal (MaMi) to ANU staff and fellow students, during a MaMi-meeting (in Dutch: Maandag Middag, which means Monday afternoon).

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 subscribe for a date to present your proposal via the Brightspace page 'Thesis & Research Practice Animal Nutrition' – 'Colloquia & MaMi'. The MaMi-coordinator is one of the PhD candidates of ANU. You have 20 min for your MaMi (15 min for the presentation, 5 min for discussion). MaMi guidelines and general guidelines for the presentation can be found on our website and in Brightspace.

You should attend at least 6 MaMi-presentations during a 36 ECTS thesis/research practice and 3 during a 24-33 ECTS thesis/research practice. Attendance of MSc students is recorded for each MaMi session and will be part of the thesis evaluation and examination. Furthermore, you are requested to provide feedback on the presentation of a fellow student at least two times, once on the presentation skills and once on content and defense of the presentation .

Share your MaMi slides before the presentation with your supervisor for feedback. After your MaMi presentation, you will receive feedback from your supervisor and 2 fellow MSc students (see 'MaMi and Colloquia guidelines' on our website). This feedback and attending other MaMi-presentations and colloquia should provide sufficient training to develop the colloquium independently (see 'Oral presentation – colloquium').

Thesis Rings

A Thesis Ring is a group of students that share their written work and orally discuss the quality of the work together in meetings, chaired by an ANU staff member or a PhD candidate. By participating in the Thesis Rings you will learn to review each other's documents and how to give and receive feedback. Writing reports of good quality and providing constructive feedback in teams are important skills in almost every profession after your university training, often in a setting where teams are composed of colleagues with varying backgrounds and cultures. Within the Thesis Ring, the development of these skills is facilitated by allowing students to review each other's texts and discuss aspects of scientific writing. The person chairing the meeting also supervises the process and the quality of given feedback. The Thesis Ring will allow you to improve the quality of your research proposal, your report and it also provides you a broader view on the field of animal nutrition.

You are obliged to actively participate in all meetings of your Thesis Ring group and submit at least 2 documents during the course of your thesis or research practice. Thesis ring meeting occur once every 2 weeks and are held at Zodiac. Physical presence is required and attendance is recorded by the chairperson of the meeting. In case you are outside The Netherlands for your thesis, you will be allowed to attend digitally. You can discuss this with your supervisor. If needed for your research activities, you can ask permission

from your supervisor to skip a meeting. In case of such exceptions communicate this to the Thesis Ring chairs via anu.thesisring@wur.nl and include your supervisor in the CC. When your case in Osiris is approved then the secretariat will assign you to a Thesis Ring. If that process takes to long, then please contact he secretariat: office.anu@wur.nl. The secretariat will enrol you in a ring and give you access to the Brightspace page 'Thesis & Research Practice Animal Nutrition'. There you can find more information and documents regarding the Thesis Rings.

At 1/3 through the project: progress evaluation meeting

A progress evaluation (go/no-go) meeting is planned between you and your supervisor, which is generally timed at ~1/3 through the project. This is a two-way feedback meeting, so if you experienced any shortcomings in your supervision, then this is a good moment to discuss them and agree on improvements. In case of severe problems regarding your dedication, skills, knowledge, or communication, your supervisor, together with the examiner, may decide to terminate the project. The thesis assessment form and rubric (see ANU website) can be used for the progress evaluation and provides a clear picture of what goes well and where improvement is needed. The progress evaluation will also be registered in OSIRIS.

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 easier.

Communication with your supervisor(s)

You discuss your preferred frequency of (online) meetings with your primary supervisor at the start of your thesis or research practice and this is recorded in the learning agreement. For instance, you can agree on having (bi-)weekly meetings or to schedule meetings upon your request. The role of the supervisor is to coach and to advise, and your supervisor is available for feedback and support. For effective communication with your supervisor(s), you are advised to:

- Make appointments with the supervisor at least 1-2 weeks in advance;
- Be explicit regarding the aim of the meeting: What do you want to discuss? Do you want to get feedback from your supervisor (before the meeting)? When do you send information to be read/discussed? Make an agenda before each meeting and notes after each meeting.
- Use supervision-time as efficiently as possible. Allow supervisors sufficient reading time, so agree with your supervisor when you should submit your document and when you can expect feedback. Furthermore, be clear about your wishes concerning feedback; for example, which specific questions do you have or which sections of the report do you wish to have feedback on.

Discuss timely with the thesis coordinator when the supervision or the project does not meet your expectations.

5 Towards the end of your thesis or research practice

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 and make recommendations. 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.

Oral presentation - colloquium

The colloquium is part of your thesis evaluation and will be assessed according to the colloquium evaluation form and rubric. Guidelines for the oral presentation, the colloquium evaluation form and the rubric can be found on our website and in Brightspace 'Thesis & Research Practice Animal Nutrition'.

You are obliged to present the results of your research during one of the colloquium-meetings. Use the feedback obtained at your MaMi-presentation and the presentations of fellow students to develop your colloquium independently. Your colloquium should last 20 min, leaving 10 min for questions.

You should attend at least 6 colloquia during a 36 ECTS thesis/research practice and 3 during a 24-33 ECTS thesis/research practice. Attendance of MSc students is recorded for each colloquium session. Students attending the colloquia are expected to play an active role by providing feedback to the presenters and asking questions to the presenters after the presentations. In case you are outside The Netherlands for your thesis, you need to discuss participation in the MaMi sessions with your supervisor.

Colloquium planning

You can schedule your colloquium via the Brightspace page 'Thesis Animal Nutrition' – 'Colloquia & MaMi' in consultation with your supervisor. Please make sure to do this in time, to guarantee a spot on your preferred date. Make sure to complete all fields for your registration, at the latest on the Monday prior to the requested session. If not all fields are completed, the registration is disregarded! The secretariat sends the invitation by email on the Wednesday prior to the session, based on the information collected from Brightspace. Your supervisor should be present during your presentation, so check your supervisors availability before scheduling your colloquium. The location will be indicated in the invitation, usually it is in Zodiac Room A0107.

Oral examination

The final examination is an in-depth discussion about the content of your thesis or research practice and other aspects of animal nutrition. In this meeting, your knowledge, understanding, insight, but also creativity and scientific attitude are evaluated. During the oral examination of a research practice, your reflection report may be discussed as well.

The oral examination takes approximately 45-60 minutes and is held by your supervisor and an examiner. Bring a copy of your report with you to the exam. At the end of the oral examination, you will receive your assessment and grade, based on the Wageningen University assessment form for the MSc thesis or research practice (see our website). See '6 Assessment of the thesis or research practice' for information regarding how your final grade is composed. You may be requested to make final adjustments to your report after the oral examination, based on remarks of your supervisor or examiner. Your final grade

will be recorded in OSIRIS after submission of your final thesis in which these final adjustments are incorporated. Thus, reserve 1 or 2 days of your time after the oral examination to finalise your thesis.
Organize the oral examination in consultation with your supervisor. An ANU examiner must also be present during the oral examination, so start well in advance to ensure a timely date. Generally, you should submit the final version of your thesis or research practice report (the latter including the reflection report) 2 weeks prior to the oral examination. However, discuss the exact planning with your supervisor and examiner.

6 Assessment of the thesis or research practice

The final assessment of your thesis or research practice consists of the grading of different criteria related to your performance (40%), report (50%), presentation (5%) and oral examination (5%), and reflection report for a research practice (pass/fail). You need to achieve a grade of at least 5.5 for performance, the report, the presentation and the oral examination to pass. The responsibilities of the supervisor and examiner in the assessment are described in chapter 5 of the MSc Thesis or MSc Research Practice Course Guide of Wageningen University (part A). Grading is done (partially) before your oral examination by your supervisor and examiner independently, using the Wageningen University thesis or research practice assessment forms and corresponding rubrics (see ANU website). In practice, you will receive your thesis or research practice grades after the oral examination, after a short discussion between your supervisor and examiner to evaluate your oral examination and final grade. As mentioned earlier, you may be requested to make final adjustments to your report after the oral examination, based on remarks of your supervisor or examiner. Once you have included these final adjustments and submitted this to your supervisor and examiner, they will upload this in OSIRIS and finalize the grades in OSIRIS.

7 Reports and writing

During your thesis or research practice, you have to write a number of reports: a proposal, a report, and, in case of a research practice, a reflection report. In the following paragraphs, you find general guidelines for writing, and the specific elements which each report should/could contain.

General guidelines and help for report writing

Your documents should be written in English, with proper spelling and grammar; correcting English is not a task of your supervisor. The materials and methods and results section are generally written in the past tense. In the introduction and discussion, facts are usually presented in present tense and findings in past tense (see scientific papers for examples). Make sure that your manuscripts clearly communicate your message to the reader. Write clearly and accurately, but be as simple and concise as possible, similar to the scientific papers that you use for your literature review and/or papers from your supervisor. It might help to ask a fellow student to read your text before submission to your supervisor (for instance, by submitting your draft section to your Thesis Ring group), to check for clarity and logic. For more information, you can consult literature on scientific writing (e.g. Malmfors *et al*. 2004; Editorial Board Animal Feed Science and Technology, 2007; Hengl

and Gould, 2002; see Brightspace for more information) and check scientific papers for examples.
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. Students can choose their own format for their reports (e.g. font size and font type), but the report should be clearly readable. A suggestion is to use font Calibri, size 11 p, margins 2 - 2.5 cm and linespacing 1.15.
Supervisors will give feedback on draft versions of your report (research proposal, thesis report, reflection report). As a rule of thumb, feedback on a specific part of the report is given at max. twice (and once on the reflection report). It is, therefore, wise to first discuss and agree on the outline and setup of (parts of) the report before you actually start writing a first draft. Please be aware that also the quality of your first draft, and the way you handle feedback on this draft, contribute to the final grading. Note that if you experience problems during the writing process, you can contact the Wageningen Writing lab.

Research proposal

The thesis or research practice starts with the preparation of a research proposal. In some cases, your research will be part of a larger research project with a proposal prepared by a staff member/PhD candidate. When this is the case, it is still important that you write your own proposal in your own words and with a specific focus on your (sub)topic. The research proposal has to be presented at one of the weekly MaMi-meetings (see 'The initiation stage: research proposal and MaMi-presentation'). The proposal should contain the following elements indicated below, but assure you check the structure and outline with your supervisor as it is possible to deviate from this guideline. Note that the proposal is included in the appendix of the final thesis document.

Title: Title of your research project.
Administrative information: Your name and student registration number, course reference (code) and number of ECTS, names of your supervisor(s), and date of completion.
Background: In this section, you motivate the relevance of your research in a global context (e.g. animal welfare, climate change, food security). It therefore could cover general questions like "What is the problem? What do we know about it? How will this study advance our knowledge? What would advancement in knowledge bring?".
Literature review: This section includes at least the following three aspects. Firstly, describe the theoretical framework of your research topic, meaning a description of the basic elements and underlying biological mechanisms. For example, if it is about inulin potentially improving gut health describe what inulin exactly is, how can a healthy and impaired gut be defined (e.g. differences in specific parameters), and how inulin theoretically supports good gut health. Secondly, it includes a synthesis of current knowledge. Data from the literature are collected and presented in a table. For example, a table could include type of inulin, dosage, treatment duration, animal characteristics, response parameters measured, main outcomes and reference. Thirdly and based on the current knowledge, it includes an identification of the gap(s) in knowledge (what has not been done), which should also logically link to the specific focus of your thesis. Consider the difference between the topic you are studying and the parameters that you will use to explore the problem. For example, the topic 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 can address in the

literature review but also in the Discussion of your thesis report. The above three aspects are mandatory and form the basis to understand your specific research topic. Discuss with your supervisor if you wish to expand your literature review with more general or other information.

Overall aim, research questions, and hypotheses: Define the Overall aim, which is related to the knowledge gap. Define the research questions that you want to answer in your research. Quite often, studies are hypothesis-driven. In that case, a research question is followed by a clear and testable hypothesis. What do you expect based on your theoretical framework and current knowledge? Alternatively, studies can be data-driven or technology-driven. In those cases, only formulate research questions that can be answered with the data generated. When in doubt, discuss this with your supervisor.

Materials and methods: Give a clear and complete description of the proposed experiment, including chemical and statistical analyses. Describe your materials and methods in such a way that a colleague within the field can reproduce your experiments. Follow the level of detail that you also see in scientific journal articles. Materials and methods of a research proposal should address the following points:

- Experimental design. Describe the basic design of your work. For animal studies, this often includes a description that dietary treatments were tested in a cross-over design or Latin square design. You may have a dose-response study. Make sure that your design is well related to your overall aim and research questions. A flow chart illustrating your study design often helps.
- Experimental materials and methods used. Describe in detail the research methodology, techniques, materials used, chemical analyses etc. Such specific aspects can vary considerably among thesis research projects. Use articles from scientific journals that had a quite similar research approach as examples how to structure the sections of this part of your proposal.
- 'Statistical analyses' is a common section of the Materials and methods, which may also include data processing. Make sure that your statistical analyses are consistent with the research questions and experimental design. This means that for each research question, you use a statistical procedure to support the research answer.

Time schedule: Report all activities, including dates for presentations and submission of the final thesis.

References: List of relevant references cited.

Thesis or research practice report

Please carefully check the assessment forms and rubrics to know which aspects of the final report is graded in which way. This should help you in writing the different parts of the report. **The report should, as a rule of thumb, not exceed 40 pages (using the suggested format, see 'General guidelines and help for report writing'), which equals ca. 25,000 words (excluding reference list). A focussed, information-dense, concise report of 25 pages considered to be of higher quality than a report describing similar information but 40 pages in length. Thus, strive for quality rather than volume of text.**

All ANU thesis reports have similar title pages. You will find the 'Thesis cover format' on our website. Your final report should contain the following:

Cover: Containing the title (clear, descriptive and short), name of the author and date of completion.

Title page: Including the title and administrative information. Name of the author, student registration number, course reference (code) and number of ECTS, supervisor(s), and date are all included on the title page.
Copyright page: The third page contains a message on copyrights.
Preface: It is up to the student to include a preface or not.
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: Should be clear, descriptive following a journal's guideline.
Keywords: Check journal guidelines and relevant scientific papers for identifying keywords.
Introduction: The Introduction should be based on your proposal, i.e. make a synthesis of your Background, Literature review, and Overall aim, research questions and, if applicable, hypotheses. Check journal guidelines and relevant scientific papers as examples for writing this section.
Materials and methods: See above for proposal writing.
Results: Report your data. Do not include any interpretations, preliminary conclusions, and references to literature in this section. Check also relevant scientific papers or the 'Instructions for Authors' of scientific journals for common practice in formatting tables and figures.
Discussion: This section includes your interpretation of and critical reflection on 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 and describe the meaning of your findings for the scientific field (advanced insights related to theory/current knowledge) and for practice (linking back to context of your work). Try to structure the Discussion so that you have clear topics for each section or paragraph with concluding key message(s) and/or recommendation(s) for further research.
Conclusions: In the Conclusion chapter, you link the outcomes of your research to the aim(s) described in the Introduction. A thesis or research practice will generally have not more than five substantial conclusions. Do not introduce new results or insights at this point. Use the key messages from your Discussion to construct this chapter.
Recommendations: Give recommendations for further research, which generally come from the Discussion (see above). You can also combine the recommendations with your discussion or conclusions, but make sure the recommendations are explicitly mentioned.
Statement on animal use in experiments: If your thesis or research practice includes involvement in animal experimentation (data collection, laboratory analyses or using data), shortly evaluate the validity of the animal use based on the 3Rs (see below).
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 a thesis or research practice is teamwork and this is the place to acknowledge those who have supported you.
Appendices: The appendices include at least the following Proposal and Use of generative artificial intelligence (see below and Part A). Detailed protocols can also be included. Check with your supervisor what to include.

Note: 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. 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 a serious form of fraud. Therefore, ensure that you use your own words/text and do not copy any text. You can find numerous definitions and examples of plagiarism online. 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 examiner **via OSIRIS** at least 2 weeks before the oral examination unless agreed upon otherwise. After your supervisor has approved the final thesis (which is generally after your oral examination), On request the secretariat can print and bind 1 or 2 copies of your thesis.

Considerations regarding animal use in experiments

Animal use for education and research is only allowed after approval of a national (CCD) committee, advised by an institutional (DEC) committee. Exceptions are animal studies that are, in the opinion of the Animal Welfare Officer, not considered to be animal experiments as referred to in the Dutch Act on Animal Experiments. The experimental procedures described in the protocol of such studies are deemed to cause less pain or distress than the insertion of a needle under good veterinary practice. WUR policy is to develop and implement alternatives to animal testing.
If your thesis or research practice includes involvement in animal experimentation (data collection, laboratory analyses or using data), in this section, you shortly evaluate the validity of the animal use based on the 3Rs.

- Replace An animal test is fully or partially replaced with computer models or laboratory tests on tissues. In some cases, so much information can be obtained in this way that fewer, or no test animals are needed.
- Reduce The aim is to obtain a reliable research result using as few test animals as possible. Statistical techniques are particularly important for achieving this. Improved research methods or test conditions can reduce unintended variants, allowing a reliable result to be obtained using fewer animals.
- Refine There are diverse ways of refining animal experiments. The welfare of test animals can be improved by adapting housing, introducing remote monitoring (telemetry) and/ or improving laboratory techniques so that less material (e.g., blood) is required. It is also possible to adapt protocols and procedures to improve the quality of animal-animal and human-animal relationships (e.g., between the test animal and its carer). Another way of improving the welfare of the test animal is to introduce measures that reduce boredom and prevent stress.

Use of generative artificial intelligence

As stated in Part A of the Thesis Course Guide, the use of generative artificial intelligence (AI) to create ready-made content in assignments is considered fraud but it is allowed for other purposes. More information for students about the proper use of AI can be found here: Student Support pages for (Generative) AI and Education: Information for Students. Your thesis report should contain an appendix on the use of AI. In this appendix, you state whether you used AI for your research and report, and if so, how. In case you did not use AI, this appendix can be one sentence in which you state that you

did not use AI. In all the other cases, you have to acknowledge your use and report how it affected your assignment. The appendix should contain a list of the prompts you used, a link to the conversation and an explanation of how you used the output of AI (i.e. in what way did the output of AI affect your text).

Confidentiality

If your MSc thesis or research practice is marked confidential then please state this clearly on the front page of your report.

Reflection report (research practice only)

The reflection report is a personal reflection on the academic skills that you were able to apply or learn (see chapter 4 of the MSc Research Practice Course Guide Wageningen University what this entails).
The reflection report should include:

- Motivation for the research practice
- A reflection on the general learning outcomes of the research practice
- A reflection on your personal learning goals, as set out in the learning agreement
- A reflection on the relation between your Master's program and your research practice, and your potential professional career and future work field

An important aspect of reflection is the ability to be specific, e.g. describe specific events, specific actions you took or behaviour you expressed, how that made you feel, what the result was of that action/behaviour. Prevent general phrases (e.g. 'I learned a lot', 'I enjoyed the experience'). Explain specifically what you learned/enjoyed and what 'a lot' means to you. A draft report can be discussed once with your supervisor. **The reflection report should be max. 1800 words (3 pages using the suggested format, see 'General guidelines and help for report writing'), so write concise.**

8 Facilities

Brightspace page for ANU students

You will be added to the Brightspace page 'Thesis & Research Practice Animal Nutrition' when the ANU secretariat is (automatically) notified via OSIRIS about the start of your thesis or research practice. On this Brightspace page, you can find information and documents for the Thesis Rings, statistical tutorials for SAS (statistical software) and the link to subscribe for your MaMi or colloquium.

Working at Zodiac

You can work at Zodiac during your thesis or research practice. There are workspaces available at the top floors of Zodiac, which are especially reserved for MSc thesis or research practice students. Zodiac is open during weekdays from 7-18 h. 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). Always check the respective website for (deviations in) the opening hours.

Working in the laboratory

To be able to work in the ANU laboratory, strict laboratory rules have been established to ensure 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 rules (see our website). 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 outside 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 outside opening hours at the coordinator of the laboratory (Saskia van Laar), at least 2 weeks in advance.

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 '3 Before the start of your thesis or research practice'). You are not allowed to work at the experimental facilities without supervision.
Animal experiments can only be carried out once a project license has been obtained from the Central Committee on Animal Experimentation (CCD). The CCD is advised by the Ethical Committee for Animal Experiments (DEC), which provides an ethical review regarding the proposed project to the CCD. Once a license has been granted by the CCD, the specific experiment has to be approved by the Animal Welfare Body (IvD). Discuss with your supervisor whether there is approval to conduct the animal study and whether the management of the experimental facilities has been informed.

Data and statistical analyses

Your supervisors will advise you on data and statistical analyses. Discuss with your supervisor which statistical software you wish to use. At ANU, most supervisors work with SAS. You should make yourself acquainted with both the appropriate way of ordering your data for analyses and relevant procedures (in SAS), using the available statistical tutorials for SAS on the 'Thesis & Research Practice Animal Nutrition' Brightspace page.

9 Data management

For research it is important that all data are traceable to its original source. Below you find an overview of data that should be stored. Discuss with your supervisor which documents you need to submit for storage before your oral examination and transfer these data to your supervisor before finalizing your thesis or research practice.
Stored data for research should at least contain: primary data, secondary data, protocols, statistical procedures and cited literature.

1. Primary data are data that cannot be calculated from other data. These data can be divided into the following subgroups:
    a. Experimental data from animal trials. Examples of this kind of data are weight of food, food refusals, animals' weights, urine and faeces production, pH of fermentation fluid, etc. These data should be stored in their most original form, such as scanned datasheets or printouts.
    b. Analytical data. These data are produced by conducting standard analytical work in the laboratory of the Animal Nutrition Group. Examples are weight of samples, dilution factors, calibration results, extinction and peak areas. The laboratory is responsible to store these data which is done at special

subdirectories, with limited accessibility, and in the LIMS database. Only the end results of the standard analyses should be stored (reported value).

c. In vitro data. These data are connected to *in vitro* work, such as the Boisen method, gas production and are not stored by the laboratory staff. The PhD candidate (together with the student) is responsible to record all primary data, such as weight of samples and residues, volume produced gas, etc. A standard format to store data for the gas production is available and should be used.

2. Secondary data are calculated values from the primary data and used within the statistical evaluation of the research work. Examples of secondary data are contents based on dry matter, digestibility, fractional degradation rate, *in situ* fractions. It is preferable to store these data in an Excel sheet that demonstrate the calculation from their primary results. Units of the values should be clearly identifiable in the spreadsheet.
3. Protocols containing relevant information about the design and how the experimental work was performed. Additionally, the labelling of sample material, also in relation to the LIMS code, should be explained.
4. Statistical programs used, should be stored in their original form (SAS-file). The output from the statistical analyses should be saved in their original form. If applicable, separate Excel files used as input files should also be stored.

10 Where to find relevant information and documents

Specific requirements (e.g. mandatory courses) for each MSc thesis and research practice can be found in the online Study Handbook: https://wur.osiris-student.nl/#/onderwijscatalogus/extern/start. Here you can also find contact information of your study advisor.

General information regarding education at ANU can be found on our website: https://www.wur.nl/en/Research-Results/Chair-groups/Animal-Sciences/Animal-Nutrition-Group/Education.htm.

This ANU MSc Thesis & Research Practice Course Guide part B is an addition to the general part A course guides: MSc Thesis Course Guide Wageningen University and MSc Research Practice Course Guide Wageningen University. These part A course guides and most other documents referred to in this ANU MSc Thesis & Research Practice Course Guide part B can be found on our website: https://www.wur.nl/en/Research-Results/Chair-groups/Animal-Sciences/Animal-Nutrition-Group/Education/Documents.htm.

On the Brightspace page 'Thesis & Research Practice Animal Nutrition', you can find information and documents for the Thesis Rings, statistical tutorials for SAS (statistical software), the link to subscribe for your MaMi or colloquium, the MaMi evaluation forms, and the colloquium rubric and evaluation form.

11 Provide feedback so we can improve

The Animal Nutrition Group is continuously working on improvements in the organisation and supervision of the thesis and research practice of our students. Your feedback is

instrumental for improvements that future students can benefit from. Direct feedback from you is very welcome, but you will also be requested to complete evaluations from the University (PaCE) and from the study association "De Veetelers". The PaCE is a tool used to gather anonymous feedback from students and contains closed questions with a scale of 1 to 5 and open questions. The results are summarised once per year and the summary is sent to the lecturers, programme committees, programme directors and others involved in the course. After completion of the thesis or research practice, you will receive an invitation in your WUR email to complete the PaCE evaluation. Please accept this and help us to understand what we do well and what can be improved!

12 References

Editorial board (2007). "Some suggestions and guidelines for preparation of manuscripts for submission for consideration for publication. *Animal Feed Science and Technology*, **134**: 181-188.

Hengl, T. and Gould, M., 2002. Rules of thumb for writing research articles. http://www.jipts.com/_Uploads/dbsAttachedFiles/Hengl_T_and_Gould_M_Rules_of_thumb_for_writing_research_articles_2002.pdf

Malmfors, B., Garnsworthy, P., Grossman, M., 2004. Writing and Presenting Scientific Papers, second ed. Nottingham University Press, Nottingham, UK.

13 Appendices

Student checklist

- ✓ Start the process of finding a thesis topic at least 6 months in advance, by filling in this intake form: https://forms.office.com/r/kvpUaW5nrL
- ✓ After completing the intake form, you will receive an e-mail to schedule an appointment with one of our thesis coordinators. If you have a question, you can contact the thesis coordinator via anu.thesis@wur.nl
- ✓ After the meeting with the thesis coordinator, schedule an appointment with the corresponding ANU academic staff member(s) for a research subject (if needed, schedule the appointment via the ANU secretariat, office.anu@wur.nl)
- ✓ Read the relevant course guides
- ✓ Download the "Thesis Learning Agreement ANU" or "Research Practice Learning Agreement ANU" (see our website), complete the form together with your supervisor
- ✓ Start a case in Osiris (see 3 Before the start of your thesis or research practice pag.6)
- ✓ Register for the Thesis Rings by contacting the secretariat: office.anu@wur.nl , actively participate in all meetings of your Thesis Ring group and submit at least 2 documents. Attendance is obligatory
- ✓ If applicable, obtain access to Zodiac during evenings and weekends or the experimental facilities
- ✓ If applicable, read the laboratory rules
- ✓ Attend 6 MaMi-presentations and 6 colloquia (36 ECTS) or 3 MaMi-presentations and 3 colloquia (24-33 ECTS)
- ✓ Evaluate at least two MaMi-presentations of fellow students (presentation skills, content & defense)

Further questions can be addressed to the MSc thesis coordinator via anu.thesis@wur.nl.

Guidelines supervision thesis or research practice

These guidelines describe several aspects of thesis or research practice work that the supervisors expect from the students. Though effective supervision is to some degree tailor-made, there are some general principles that supervisors of the Animal Nutrition Group adhere to. The following points provide some additional insight what to expect from your thesis/research practice and your supervisor in terms of the general process, responsibility, and feedback.

General process

- Three stages in the thesis/research practice process are defined as phase:
  - I. initiation stage. Generally focussed at description of study/research: context, theory, aim, research questions, and hypotheses. Incl. MaMi presentation (= proposal presentation) and go/no-go decision.
  - II. execution stage. Generally focussed at execution of the experiment and/or lab analyses, data analyses, interpretation and discussion of the results, and writing the report.
  - III. completion stage. Generally focussed at finalising your thesis report, colloquium presentation, and oral examination.
- Thesis and research practice output: MaMi presentation, colloquium presentation, scientific report and a reflection report in case of a research practice.

- The scientific report will be written as a scientific article + literature review (to be included in the appendices), unless the supervisor indicates otherwise. The journal guidelines to follow will be established at the start of the thesis.
- Within 6-8 weeks after the start, a go/no-go evaluation will take place. The decision will be based on general performance, the MaMi presentation, and some written work (phase I). This can be (part of) a background, literature review, and/or other parts of your research proposal. It does not have to be a final/complete section, as long as the document allows the supervisor to judge scientific quality. The go/no-go evaluation will be based on the same competences as the final grade (see evaluation form and rubric), acknowledging the early stage of the thesis process.
- Students are always (co)supervised by a senior supervisor, i.e. when PhD candidates act as supervisor, PhD candidates are coached by a senior supervisor.
- Thesis and research practice students are obliged to actively take part in the Thesis Rings.

What is expected from students?

- Students are expected to be pro-active, open for constructive (peer) feedback and willing to help others (e.g. peers).
- Students are responsible for timely planning and communication to their supervisor. They are offered feedback moments but are responsible their selves for initiation.
- Students are responsible to define their personal learning outcomes and activities and discuss these with their supervisors. For example, train your problem-solving skills by discussing your preferred solution for a problem rather than asking your supervisor how to solve the problem.

What is expected from supervisors?

- Clearly explain procedures, expectations, and student's responsibilities. Initiate an introductory meeting where you explain expectations. Refer to the website for detailed information on aspects of an MSc thesis or research practice: learning agreement, course guides, presentation guidelines, assessment form and rubric, and example reports. Agree on the journal guidelines to be followed. Plan the go/no-go meeting and agree on the tasks that will have to be fulfilled for the go/no-go decision.
- In case of thesis or research practice within a running project: Ensure a well-defined task for the student within the project. Discuss with the farm/laboratory about the time investments and supervision.
- In case of a 'free' project in the laboratory: Ensure there is a clear study design and detailed protocol. Make sure the required supplies are in place.
- Facilitate students to finish in time. The student is responsible for timely planning, but should not become victim of circumstances that are out of their control. In case of delays in results due to logistical problems with experiment/analyses, the student should be offered an alternative (e.g. finalize thesis with older dataset).
- Provide critical constructive feedback to allow students to develop themselves and successfully present and discuss (oral and written) scientific results, see below.

Feedback

Supervisors should provide students with sufficient critical constructive feedback to develop their scientific attitude, get the best out of themselves, and successfully complete their deliverables. To enable fair comparisons between students and to ensure the final output are still the work of the students themselves, however, supervision and feedback

should be standardized and limited. The formal moments of supervisors' feedback are defined below. This does not mean that there are not more contact moments. It is assumed that there is a daily supervisor who has regular meetings with the student. This can also be e.g. a PhD candidate, supervisor on location (in case of collaboration with external parties) or technical staff (in case of lab experiment). In addition, all MSc-thesis or research practice students will participate in Thesis Rings, to get feedback on writing skills. Feedback by the supervisor is focused on development of research skills, scientific soundness of the work, theoretical underpinning, critical reflection, and clarity of reporting/presenting. Formal feedback is limited to the following aspects:

Presentations

1. Discussion MaMi presentation. Provide feedback on presentation slides/story line.
2. Evaluation MaMi presentation. This session might be organised by the MaMi chair, following the presentation session or you can have a meeting with your supervisor afterwards.
3. Quick check colloquium presentation: is the presentation suitable for presentation (to external contacts)? If not: provide feedback and offer rematch.
4. Evaluation colloquium presentation, preferably coinciding with final examination.

Report

1. Go/no-go evaluation. Discuss (parts of) the proposal and provide feedback.
2. Discuss outline thesis (including subsections in proposal, results, and discussion sections).
3. Discuss results, statistical analyses, tables & figures.
4. Discuss draft thesis (can be in separate sections/moments) and provide feedback.
5. If needed: quick check final report: is this sufficient for examination? If not: provide feedback and offer rematch.
6. Final examination and evaluation. Provide feedback using the assessment form and rubric.