

**A GUIDE TO THESIS PREPARATION  
FOR  
GRADUATE STUDENTS  
IN  
THE DEPARTMENT OF FOOD SCIENCE**

This guide has been prepared to aid graduate students in the Department of Food Science in the organization and preparation of the M.Sc. and Ph.D. thesis. The student should also consult the most recent editions of the Faculty of Graduate Studies *Thesis Guidelines* and the *Academic Guide* for additional regulations regarding the thesis and conditions which must be met before the degree is granted.

This guide is divided into five sections:

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January 2001

## SECTION 1

### THESIS OVERVIEW

This document has been created to assist Food Science graduate students in the organization, preparation and presentation of M.Sc. and Ph.D. theses.

In general, the master's thesis should demonstrate that the students have mastery of the field in which they present themselves and are fully conversant with the relevant literature. From both an M.Sc. and Ph.D. perspective, an essential feature of study is the candidates' demonstration of their competence to complete a research project and present their findings. For a Ph.D, the thesis must constitute a distinct contribution to knowledge in their major field of study and the material must be of sufficient merit to be, in the judgement of the examining committee, acceptable for publication.

There are two main thesis styles:

- i. **Traditional Style thesis** in which the major components – the overall introduction, literature review, materials and methods, results of the research and discussion are presented in discrete sections. In most cases, each section contains more detailed information than would normally be submitted for publication.
- ii. **Paper style thesis** is similar to the traditional style thesis in a broad sense except that the research results are packaged as discrete units or chapters either as published manuscripts, or in a form suitable for publication in scientific journals. In this thesis style, each section or chapter has its own abstract, introduction, materials and methods, results and discussion. In addition, to tie the sections together, there is an initial overall abstract, general introduction, literature review and general discussion.

The choice of thesis style depends partly on the type of study that was done, i.e. whether discrete chapters are more applicable or the material is best described as a single entity. The style is chosen in consultation with the student's advisory committee before writing begins.

## SECTION 2

### GUIDELINE FOR TRADITIONAL STYLE THESIS

#### A. PARTS OF THE THESIS

A thesis in the TRADITIONAL STYLE is composed of three major parts. Each part has several sections, which are arranged in the following order:

i. PRELIMINARIES

- a. Title Page
- b. Acknowledgements
- c. Table of Contents
- d. Lists of Tables and Figures
- e. List of Appendices
- f. List of Abbreviations (optional)
- g. Abstract

ii. TEXT

- a. Introduction
- b. Literature Review
- c. Materials and Methods
- d. Results and Discussion (separately *or* combined)
- e. Conclusions and Recommendations for further work
- f. Contributions to Knowledge (may be in point form)

iii. REFERENCE MATTER

- a. Literature Cited (Bibliography)
- b. Appendices

#### B. INDIVIDUAL SECTIONS

1. PRELIMINARIES

a. Title Page

The information on the title page must be complete, and center justified. Double spacing is used between the lines of the **TITLE** when more than one line is needed. No punctuation is allowed on the title page. The name of the degree should be given in its full and correct detail. The date should be that at which the thesis is submitted to the faculty of Graduate Studies and the copyright forms are signed. The following example gives correct capitalization and spacing:

## i. M.Sc. Thesis Title Page

The Origin of Coffee Breaks  
in Canadian Universities

BY

John Robert Smith

A Thesis  
Submitted to the Faculty of Graduate Studies  
In Partial Fulfillment of the Requirements  
for the Degree of

MASTER OF SCIENCE

Department of Food Science  
University of Manitoba  
Winnipeg, Manitoba

© Copyright by John Robert Smith 2000

## ii. Ph.D. Title Page

The Origin of Coffee Breaks  
in Canadian Universities

BY

John Robert Smith

A Thesis  
Submitted to the Faculty of Graduate Studies  
In Partial Fulfillment of the Requirements  
for the Degree of

DOCTOR OF PHILOSOPHY

Food and Nutritional Sciences  
University of Manitoba  
Winnipeg, Manitoba

□ Copyright by John Robert Smith 2000

Page ii of the thesis in a declaration of authorship and authorization to the University to use the thesis in accordance with normal practice:

iii. **Declaration and Authorization**

I hereby declare that I am the sole author of this thesis.

I authorize the University of Manitoba to lend this thesis to other institutions or individuals for the purpose of scholarly research.

John Robert Smith

I further authorize the University of Manitoba to reproduce this thesis by photocopying or by other means, in total or in part, at the request of other institutions or individuals for the purpose of scholarly research.

John Robert Smith

Page iii is a blank for signatures of users of thesis:

The University of Manitoba requires the signatures of all persons using or photocopying this thesis. Please sign below and give address and date.

b. Acknowledgments

This is a brief statement of thanks for any special or non-routine aid received, to include that received from the advisor, and from any other member of the Department. Any financial assistance in carrying out the research project must be

clearly acknowledged. The page is entitled ACKNOWLEDGEMENTS, the word appearing as a centered heading in capital letters without punctuation. The heading is typed 2 inches from the top of the paper and the text begins on the fourth line below the heading.

c. Table of Contents

This section will indicate by page number, the location of all sections of the thesis, from acknowledgements to appendices. It will be headed TABLE OF CONTENTS (centered) and will list the titles of sections and their subsections **exactly** as they appear in the body of the thesis, together with their page citations. Titles of main sections are typed in uppercase, all subsections in upper and lower case; that is, all words are capitalized except prepositions, conjunctions and articles unless one of these is the initial word. A line of periods extends from the last word of the title or sub-title to the page number. The column of page numbers is headed "PAGE". The line of periods should be vertically aligned on the right. The page numbers are aligned by the last digit of the number.

Titles of the main sections begin at the left-hand margin. Sub-titles are indented 1.5 cm. Second sub-titles are indented an additional 1.5 cm. Double space between main titles and between main titles and sub-titles. Single space between sub-titles. Whenever a title or sub-title is longer than one line, each line after the first is single-spaced and indented 1.5 cm. than the first line. No terminal punctuation is used for any line in the table of contents.

The following is an example of a Table of Contents using the NUMBERED SYSTEM of ordering:

TABLE OF CONTENTS	
	PAGE
ACKNOWLEDGEMENTS .....	ii
LIST OF TABLES.....	vi
LIST OF FIGURES .....	xii
LIST OF APPENDICES .....	xiii
ABSTRACT .....	xiv
1.0 INTRODUCTION .....	1
2.0 LITERATURE REVIEW .....	6
2.1 Introduction .....	6
2.2 Formation of Biogenic Amines in Food Products .....	7
2.2.1 Organisms with Decarboxylase Activity.....	8
2.3 Toxicology of Biogenic Amines .....	9
2.3.1. Histamine .....	9
2.3.2. Tyramine .....	11
2.3.3. Phenylethylamine .....	14
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2.3.5. Spermine and Spermidine .....	16
2.4 Toxicology of Biogenic Amines .....	17
3.0 MATERIALS AND METHODS .....	24
3.1 Preliminary Experiments .....	24

The following is an example of a Table of Contents using the FORMATTED SYSTEM of ordering:

TABLE OF CONTENTS	
	PAGE
ACKNOWLEDGEMENTS .....	ii
LIST OF TABLES .....	vi
LIST OF FIGURES .....	xii
LIST OF APPENDICES .....	xiii
ABSTRACT.....	xiv
INTRODUCTION .....	1
LITERATURE REVIEW .....	6
Introduction .....	6
Formation of Biogenic Amines in Food Products .....	7
Organisms with Decarboxylase Activity .....	8
Toxicology of Biogenic Amines .....	9
Histamine .....	9
Tyramine .....	11
Phenylethylamine .....	14
Putrescine and Cadaverine .....	15
Spermine and Spermidine .....	16
Toxicology of Biogenic Amines .....	17
MATERIALS AND METHODS.....	24
Preliminary Experiments .....	24

d. List of Tables and Figures

If both tables and figures are used, they are listed separately. Tables are listed first. Both tables and figures are designated by Arabic numerals. A separate series is used for each.

The column of numbers designating tables is headed by the word TABLE and the column of numbers designating figures is headed by the word FIGURE. The column of page numbers are headed by the word PAGE. These headings are double-spaced below the main heading. Those designating tables or figures are typed next to the margin and are aligned vertically by the period following each number. Page numbers are typed at the right margin and are vertically aligned by the last digit of the number.

Beginning in the third space after the period, the title of the table or the figure is typed, using the identical wording that appears in the table or the figure caption itself. The first letter of the initial word of the title should be capitalized, and all other words except articles, conjunctions and prepositions will be capitalized. Titles of more than one line are single spaced and indented four spaces. A line of periods extends from the title to the page number. The line of periods should be vertically aligned on the right. Line spacing between titles is double.

LIST OF FIGURES	
FIGURE	PAGE
Figure 1. Location of Bed and Breakfasts in Southern Turkey .....	38
Figure 2. Relative Rankings of Quality of Food Prepared at Home and Food Prepared at Fast Food Establishments .....	53

e. List of Appendices

This list is designed in a similar manner to the LIST OF FIGURES/TABLES except the column containing appendix numbers is headed by the word "Appendix."

## f. Abstract

All copies of the thesis must contain a short abstract. This section is headed by the word “ABSTRACT” centered 2” below the top of the page, in capital letters without punctuation. The abstract should give in essay form a short statement of the thesis problem, a brief exposition of the methods used, and a condensed summary of the findings. The statement of the problem and summary of findings are most important. Literature citations, tables and illustrations are not permitted in the abstract.

It should be approximately 350 words (approximately one typed page, double spaced) and under no circumstances more than 700 words.

## 2. TEXT

Each major division of the thesis (introduction, literature review, materials and methods, results, discussion, references, appendix should begin on a new page with the heading typed in capital letters and centered at the top of the page. **Tables and figures should be prepared within the body of the thesis.** If the section contains subdivisions, those of the second order should carry a centered heading in capital and lower case letters. The second order heading is typed three lines below the preceding text or heading. Those of the third order follow the same arrangement. No terminal punctuation is used after any of these headings. The text will always begin two lines under any of these headings. Subtitles of the third order (fourth order headings) should be treated as paragraph headings, should follow the capitalization rules of other subheadings, should be run into the paragraph, bolded and followed by a period and two spaces.

### a. Sample Headings and Subheadings

#### I. FIRST ORDER OR MAJOR DIVISION HEADING

##### A. Second Order Subdivision Heading

##### 1. Third Order Subdivision Heading

a. **Fourth order subdivision heading.** This heading is run into the paragraph it begins.

Section numbers and letters are generally included but may be omitted while maintaining the same format.

## **b. Introduction**

This section should contain a statement of the problem investigated, so that the reader can proceed with the nature and aim of the study in mind. A brief review of past work is usually necessary in order to validate the importance of the problem, i.e., the reason for the author's interest in the problem.

## **c. Literature Review**

This section is a detailed exposition of all past work on the problem. The literature review, however, should be as concise as possible and only deal with material **directly pertinent** to the research project, in effect to be a **short critical** review of the literature rather than an attempt to 'cover the entire field of research.'

It is recommended that the literature review be no longer than 30 pages of double-spaced typing; in most cases 15 pages should be sufficient.

## **d. Materials and Methods**

All standard methods, materials, sampling techniques, etc., used in the study must be included in this section. For commonly-used published methods (e.g. protein determination, reducing sugar determination, etc.), it is necessary to cite only the appropriate references, with an indication of any modifications made in the study to the published method.

## **e. Results**

This section must be a concise presentation of the actual findings from the research work. Tables and Figures must be used whenever possible, but the same information should not be presented in both forms.

## **f. Discussion**

This section must be a concise, general discussion of the research work, to include:

- i. Important results arising from the project and their interpretation.
- ii. Significance of these results to the field of study.
- iii. Speculation is permitted, but must be clearly indicated as such, and be kept to a minimum.
- iv. How do the results obtained in this study relate to the objectives of the work (as stated in the Introduction) and to the work of other people?

\*Note: Results and Discussion may be united into one section.

- g. **Summary/Contributions to knowledge/Suggestions for future work** (may be one section or three)

This section is a concise summary of the significant findings and conclusions of the study. Literature citations should be MINIMAL. This section **MAY** include a listing of the major contributions to knowledge and suggestions for further work.

### 3. REFERENCE MATTER

This is the last section of the thesis, except for the Appendix (if applicable). It should be headed either REFERENCES or LITERATURE CITED. This section must contain full details of all references cited by the author in the thesis, the heading should be centered in capital letters 2" from the top of the page. No terminal punctuation is used. The text will begin two lines below the heading.

The Department of Food Science requires that students follow the American Psychological Association (APA) author-year system. The author-number system may be used in a thesis if a student prefers and the supervisor agrees. However, the author-year system has a distinct advantage in the preparation of a thesis, especially if it contains numerous references. If the thesis is revised, additions or deletions to the bibliography can be made easily without affecting other references and their citations in the text.

In the author-year system, references are cited in the text by author and year of publication e.g. "Scanlon (1995) investigated...." If there are two authors for the reference both are given in the citation e.g. "Scanlon and Sapirstein (1995) studied...." If three or more authors are involved, the citation in the text reads "Scanlon *et al.* (1995)." Commas or spaces may be used to separate authors and dates, but a consistent method must be adhered to e.g. "Meat is a prime target for bacteria/spoilage.... (Holley, 1998) or (Holley 1998)" Semi-colons are used to separate multiple citations. For example, "Blank (1996) investigated.... but these findings have been disputed (Ismond, 1998; Arntfield, 1999)."

In the bibliography, the references should be arranged in alphabetical order by author's surname and year. All authors of a multi-author publication are listed surname first, followed by initials and year of publication. This is followed by the name of the publication, volume number and page numbers. *Except* for single word titles, the titles of journals *should be abbreviated*. A list of standardized abbreviations can be found in the Biosis Serial Sources (Biosciences Information Service, Philadelphia, Pa, 1999). References with the SAME FIRST AUTHOR should be listed in the following order:

- i. Single-authored articles for that given individual.

- ii. Articles with more than one author are arranged in alphabetical order of the surname of second or third author.
- iii. Two or more articles by the same author(s) to be listed chronologically
- iv. Two or more articles in the same year by the same author(s) to be designated by the lower case letters a, b, c, e.g. Izydorczyk, 1999 a, Izydorczyk, 1999 b.

\*NOTE: Line spacing is single within references and double between references. The following examples indicate the correct format for specific situations:

- a. ARTICLE IN A JOURNAL:
  - i. One Author:
    - Durum, W.D. 1982. Wheat quality effects on cooking times of pasta. *J. Food Sci.* 80:12-18.
  - ii. Giese, J. 2000. Electronic noses. *Food Technol.* 54(3\*):96-99,102.  
\*issue number is required for this journal and for citations where pagination is interrupted (discontinuous pages)
  - iii. Two Authors:
    - Livanou, T. P. and Nikas, A.A. 1972. A quick test for protein bound iodine based on the dry ash method. *Int. J. Food Sci. Technol.* 9:116-123.
- b. BOOK:
  - Nielsen, S.S. 1998. *Food Analysis*. Aspen Pub. Inc., Gaithersburg, MA. 630pp.
- c. CHAPTER IN A BOOK:
  - Dauphinee, J. A. 1968. Sodium chloride in physiology, nutrition and medicine. Pages 382-386 in: *Sodium Chloride: the Production Properties of Salt and Brine*. Kaufmann, D.W. ed. Hafner Pub., New York, NY.
- d. THESIS:
  - Smith, J.C. 1988. Study of the Functional Structure of Wheat Gluten. Ph.D. Thesis, University of Manitoba, Winnipeg, MB. 242 pp.
- e. PAPER PRESENTED:
  - Parrish, F.C., Young, R.B. and Miner, B.E. 1972. Effect of postmortem conditions on certain properties of bovine muscle. Presented at the 32<sup>nd</sup> Annual Meeting of the Institute of Food Technologists, Minneapolis, MN, May 22-24.
- f. PATENT:
  - Roth, T.L. 1982. Coating of frozen foods. U.S. Patent 3,607,313. 8 pp.

- g. SECONDARY SOURCE: (Allowed but not encouraged)  
Wehrmann, K.H. 1981. Apple flavor. Ph.D. Thesis, Michigan State University, East Lansing, MI. Quoted in Wehrman, K.H. 1988. *Newer Knowledge of Apple Consitution* p.141. Academic Press, New York, NY.

- h. INTERNET SOURCE:

USDA, ARS, National Genetic Resources Program 1998.  
*Germplasm Resources Information Network-(GRIN)*. [Online Database] National Germplasm Resources Laboratory, Beltsville, Maryland. URL: [www.ars-grin.gov/cgi-bin/npgs/html/coop.pl?86256](http://www.ars-grin.gov/cgi-bin/npgs/html/coop.pl?86256) (25 November) ← date accessed.

#### 4. APPENDICES

If this section is needed, it follows the literature cited. It includes supplementary illustrative material, original data and statistical tables too lengthy for inclusion in the text or not immediately necessary for an understanding of the subject.

## SECTION 3

### GUIDELINES FOR THE PAPER STYLE THESIS

#### A. INTRODUCTION

Any M.Sc. or Ph.D. graduate student in the Food Science Department, with the approval of the Advisory Committee, may submit a thesis in a format containing published manuscripts or manuscripts fully prepared for submission to a scientific journal.

#### B. PARTS OF THE THESIS

A thesis in the paper style is composed of four major parts. Parts containing sections are arranged in the following order:

- i. PRELIMINARIES:
  - a. Title Page
  - b. Acknowledgements
  - c. Table of Contents
  - d. List of Figures
  - e. List of Tables
  - f. Abstract
  - g. Forward
  - h. Introduction
  - i. Literature Review
- ii. MANUSCRIPTS – Each composed of:
  - a. Abstract
  - b. Introduction
  - c. Materials and Methods
  - d. Results\*
  - e. Discussion\*\* Results and Discussion maybe combined.
- iii. GENERAL DISCUSSION AND CONCLUSIONS\*  
\*Discussion and Conclusions may be separate sections.
- iv. REFERENCE MATTER:
  - a. Literature Cited
  - b. Appendices

Manuscripts which have been published or accepted by a journal prior to thesis submission may be included in the body of the thesis, provided that in the opinion of the Advisory Committee, the research described in the manuscripts was conducted by the student while registered in the Faculty of Graduate Studies at the University of Manitoba, under supervision of the advisor.

#### ORDERING HEADINGS WITHIN A PAPER STYLE THESIS

See guidelines for the Traditional Style Thesis.

#### C. PRELIMINARIES

- i. Title Page, Acknowledgements, Table of Contents, List of Tables and Figures, Abstract.

See guidelines for the Traditional Style Thesis.

- ii. Foreword (optional)

This section contains a statement indicating which journal formats are being used for the preparation of the manuscripts within the thesis.

- iii. Introduction

This section contains a statement of the problem investigated, so that the reader is informed of the nature and aim of the study. A brief review of past work is usually necessary in order to validate the importance of the problem, i.e. the reason for the author's interest in the problem.

- iv. Literature Review

The literature review is written in a "traditional thesis style." This section contains a comprehensive coverage of past work on the problem. Only significant observations and conclusions or pertinent literature need be included. Review all areas that will be discussed in the body of the thesis (i.e. in the manuscripts) even though some duplication will occur with the literature review.

#### D. MANUSCRIPTS

The major heading within manuscripts in a paper style thesis are **ABSTRACT, INTRODUCTION, MATERIALS AND METHODS, RESULTS, and DISCUSSION**. Each manuscript in the thesis will include these sections. (Note: Results and Discussion may be combined.)

Individual manuscripts are headed by "CHAPTER#" or "MANUSCRIPT#" centered on the first line of the page in **bold** upper case

letters without punctuation followed by the title of the manuscript centred on the page in **bold** upper and lower case letters. Space between heading and title is double. Manuscripts constitute the body of the thesis and should be complete and prepared in accordance with instructions given to authors by the selected journal. **Tables and figures should be prepared within the body of the thesis.** However, references should be listed only in a final literature cited section at the end of the thesis. Reprints from the journal will not be allowed as part of the thesis.

Writing the **MATERIALS AND METHODS** sections of a manuscript style thesis in the concise manner recommended by a journal is difficult to reconcile with the detailed presentation of the traditional thesis. This can be achieved, however, by presenting the details of procedures and methods in an Appendix. If a method has been published, the reference is cited, followed by the Appendix which contains the details. Thus, the reader is not required to consult additional references to obtain a clear picture of the methodology.

#### E. GENERAL DISCUSSION AND CONCLUSIONS

A thesis written in manuscript style should contain a general discussion section which interrelates information presented in each manuscript of the thesis. This section should contain a critical discussion of the findings presented in relation to previous research cited in the literature review section. Recommendations for further study in the field of investigation should be included.

#### F. REFERENCE MATTER

##### **Literature Cited**

The format in this section should be the author-year system. References are listed in alphabetical order according to the author's surname, followed by the year, complete title, journal name, volume number and inclusive page numbers. All literature citations found in the thesis, including those in the manuscripts, should be listed in this section. See section on "Reference Matter" for a "traditional" thesis (p14).

#### G. APPENDICES

The appendix must contain all the necessary supporting data and procedures that are usually excluded from publications in scientific journals but are required in a thesis.

## SECTION 4

### TECHNICAL INFORMATION

All theses must be lucid, well-written and free from typing, spelling and grammatical errors. The last draft should be carefully edited before final printing to ensure it is free of errors. Spelling checkers are not infallible. For instance they will approve both “own” and “won”.

#### **Abbreviations**

Abbreviations can be used in the abstract and the text. If used in the abstract, they must be defined in the abstract. If used in the text, they must be defined in the text. If more than two abbreviations are used, supply a list of abbreviations after “List of Appendices” and before the “Abstract”.

#### **Font**

The text should have a pitch of 10 characters per inch or 12 point size on the laser printer. Students are encouraged to use non-proportionally spaced fonts such as Times Roman and Helvetica rather than proportional fonts such as Courier.

#### **Line Spacing**

Lines should be double spaced. (except where noted such as Figure captions and References)

#### **Pagination**

Each page in the thesis must be assigned a number, and the pages must be consecutively arranged. Although the title page does not bear a typed number, it will be counted as page (i). Preliminary pages, from this title page through the abstract, will be numbered consecutively in small Roman numerals (ii, iii, iv, etc.), typed in the upper right hand corner of the page, 2.5 cm from the top and 2.5 cm from the right edge.

Beginning with the first page of the text and including all separately page numbered figures and tables, the bibliography, and appendices, consecutive Arabic numerals are typed in the upper right hand corner of the page, 2.5 cm from the top and 2.5 cm from the right edge. The Introduction will begin on page 1.

#### **Justification**

All text should be fully justified.

#### **Margins**

Throughout the thesis, including tables, the left margin should be 4 cm and top, right and bottom margins 2.5 cm. All figures should conform to these dimensions as closely as possible. Uniform margins improve the appearance of the bound thesis. **No heading should be placed at the end of a page without text beneath.**

## Units

Systeme International d'Unités (SI) units and abbreviations should be used in the thesis (see Table 1). In the paper style thesis, the units should conform to the editorial style of the journal.

Table 1. Some SI Units

K	Kelvin		
C	Celcius	L	litre
		mL	millilitre
d	day	µL	microlitre
h	hour		
		mol	mole
min	minute	M	molar
s	second	N	normal
		µV	microvolt
m	meter		
cc	cubic centimeter		
cm	centimeter		
g	gram		
kg	kilogram		
mg	milligram		
µg	microgram		

## Figures

All figures should be understandable by referring to the legend or caption. Readers should not have to refer to the text for clarification. If figures (graphs, charts, maps or photographs) are used, they must be included in all copies of the thesis. Several figures or tables may be combined on a single page. All features and lettering must be clear and legible.

All figures should be functional. As a rule, they should not repeat material presented in tables unless this is necessary for analysis or clarification. Where a graph summarizes data from tables, and the data may be a useful resource for other researchers, the table should be placed in an appendix at the end of the thesis.

Material larger than page size may be folded horizontally to make a page 8(x11 (allowing a 4 cm left margin for binding). Larger material may be folded horizontally and vertically to a size not larger than 6.5(x 10(. A linen tab can be used to provide a 4 cm binding margin. Bear in mind the bindery will trim the pages slightly when the thesis is bound.

Figures which are too large to be folded into the regulation binding, and figures which are not attached to the binding will not be accepted. Where possible, large figures should be reduced by a photocopier or by photographic methods.

Graphic and line drawings should be prepared by computerized drawing and plotting programs. If this is not possible, they should be drawn with black India ink on white paper. Lettering guides should be used for all letters, and letter size should be in proportion to the size of the figure.

Black and white or colour photographs should be printed on photographic printing paper cropped to 8.5(x11(. Colour photographs should be used wherever possible.

Where appropriate, colour images may be reproduced by a colour laser printer. Reproduction must be of a suitable high quality to ensure that details are not lost.

Photographs should be numbered as figures. If a legend describing a photograph cannot be placed below the figure, it should be typed on the back-side of a blank numbered page so that the legend faces the illustration when the bound thesis is opened. When photographs are printed by a laser printer, the figure number should be printed in **bold** below the figure, followed by the legend (not bold). Several photographs can be combined on a single page.

Figures are numbered consecutively with Arabic numerals. The number in **bold** (e.g., **Figure 4.**) should be placed below the figure and left justified. The title and legend will follow the number. The first letter is typed two spaces after the period. If the legend consists of more than one line, the second and any following lines, are aligned with the title "Figure" (see below) and single spaced.

<p><b>Figure 1.</b> Phenylethylamine in vacuum-packaged and CO<sub>2</sub>-MAP fresh pork at -1.5°C determined by capillary gel electrophoresis</p>
---

Figures should be numbered consecutively in the order they appear in the text. Each figure should appear as closely as possible after the first citation in the text where it is mentioned.

### Tables

All tables should be understandable by referring to the legend or caption. Readers should not have to refer to the text for clarification. The student is referred to the most recent addition of Chemical Abstracts style manual. However, a few comments are pertinent:

No vertical lines are used in tables. Tables are usually typed parallel to the normal print line, i.e., portrait, but extensive data may be typed in landscape format.

Tables are numbered consecutively with Arabic numerals. The table number is typed in **bold** (e.g., **Table 2.**) above the table and left justified. The title follows immediately after. The first letter is typed two spaces after the period. If the title consists of more than one line, the second and any subsequent lines are indented four spaces and single spaced.

If footnotes are used, they should be typed below the table. All footnotes should be single spaced and indented three spaces. Each footnote is referred to in the table by a superscript lower case letter or by a symbol.


Tables should be numbered consecutively in the order they appear in the text. Each table should follow as closely as possible after it is first cited in the text of the thesis.

**Placement of Tables and Figures. Computer generated figures and tables with corresponding legends may be printed on a page containing text and located as close as possible to the citation in the text. Separation of text from figures and tables should be one blank line. If the Table or Figure is large, it may be placed on a separate page.**

**Tables**  
All tables should be understandable by referring to the legend or caption. Readers should not have to refer to the text for clarification. The student is referred to the most recent addition of Chemical Abstracts. However, a few comments are pertinent:

No vertical lines are used in tables. Tables are usually typed parallel to the normal print line, i.e., portrait, but extensive data may be typed in landscape format.

Tables are numbered consecutively with Arabic numerals. The table number is typed in **bold** (e.g., **Table 2.**) above the table. The title follows immediately after. The first letter is typed two spaces after the period. If the title consists of more than one line, the second and any subsequent lines are indented four spaces and single spaced.



**Figure 1.** the effect of temperature and light on seed production ....

If footnotes are used, they should be typed below the table

## Thesis Printing

The approved thesis must be printed in black ink on good quality White Bond paper with a hard, bright and even surface. Acid-free paper is preferred. Dot Matrix printers are not acceptable unless of letter quality. The thesis may be reproduced from printed originals by photocopy machines.

**Copies**

At least four copies of the approved thesis are required. These are distributed as follows:

1. Two unbound copies to the Faculty of Graduate Studies (along with the original thesis approval form signed by all committee members).
2. Two unbound copies to the Department of Food Science (one for the library and one for the advisor).
3. Any additional copies required by the student, advisor, committee members etc. to the Department of Food Science for binding. The Department does not pay for binding the latter copies.

The candidate must complete and sign copyright and release forms (available at the Faculty of Graduate Studies) and should refer to Faculty of Graduate Studies Thesis Guidelines for information on copyright, National Library of Canada and Dissertation Abstracts International, and Policy of Withholding Theses Pending Patent Applications.

**Deadlines for Submission of Theses to the Faculty of Graduate Studies**

The *University of Manitoba Graduate Calendar* should be consulted regarding deadlines for submission of the thesis to the Faculty of Graduate Studies.

## SECTION 5

### FINAL EXAMINATION FOR THE M.Sc. AND Ph.D. DEGREES

The final examination proceeds in two stages:

1. examination of the candidate's thesis, and
2. oral examination of the candidate on the subject of the thesis and any matters relating thereto.

When the thesis is distributed to the examining committee members a Thesis Title and Appointment of Examiners form must be submitted to the Faculty of Graduate Studies. It is the responsibility of the Faculty of Graduate Studies to distribute the Ph.D. thesis to all examiners. With approval of the advisor, a master's candidate may distribute the thesis to examiners.

#### **Oral Examination of the M.Sc. Thesis.**

The advisor arranges the time and place of the examination. The Chair is arranged by the Head of Department of Food Science. At the oral examination, the student gives a 30 minute (approximately) presentation, highlighting and interpreting the research findings. Questioning by committee members follows, beginning with the external examiner and ending with the student's advisor. Each examiner is initially allowed approximately 2-3 questions (10 minutes). Then the audience may pose questions. Finally, the audience is asked to retire, leaving the examining committee a chance to ask further questions of the candidate.

#### **Oral Examination of the Ph.D. Thesis.**

The advisor arranges the time and place of the oral examination but these arrangements must be confirmed by the Faculty of Graduate Studies which selects the Chair. In addition, the choice of the External Examiner is the responsibility of the Faculty of Graduate Studies, usually following a recommendation by the student's advisor.

At least two weeks prior to the oral examination, the student must submit to the Faculty of Graduate Studies, the following information in an **electronic form**:

1. Biographical data –where and when born, outstanding points in career, awards, etc.
2. List of degrees obtained – where and when.
3. The exact title of the thesis.
4. An abstract of the thesis (not more than 350 words).
5. List of the student's publications.

The first part of the oral examination consists of an oral presentation by the candidate which should include a summary of the salient points of the research and

should be presented concisely within 30 to 40 minutes. This is followed by questioning and examination of the candidate by the Examination Committee for normally less than one hour. The Chair will usually permit questions from the audience at this stage. Following this, the audience is requested to leave and further questions may be put to the candidate by the Examination Committee. The candidate then withdraws from the examination room when the examiners begin to consider their report. The examiners may at this stage require the candidate to make whatever revisions to the thesis they see fit, and such revisions must be completed before the Oral Examination Committee's report is submitted. The committee may exercise its discretion on such matters as who must approve the required revisions, time limits for completion of the revisions, the necessity for a second oral examination and other such matters.

It is the responsibility of a designated member of the Oral Examination Committee (normally the student's thesis advisor) to ensure that all revisions are carried out before copies of the thesis are submitted to the Faculty of Graduate Studies.