General guidelines for the submission of diploma theses of experimental character at the Faculty of Veterinary Medicine and Animal Science (FVM&AS) of the Poznan University of Life Sciences

I. Structure of the thesis

Title page
All information is presented on the web page:
http://jay.up.poznan.pl/index.php?option=com_content&view=article&id=728&Itemid=477&lang=pl.
The title of the thesis has to be identical to the title given in the form of *The diploma thesis chart (Attachment 3 to Regulation no. 126/2013 Form P.160_F2)*. The following information has to be provided: complete data on the author, the scientific supervisor and the reviewer of the thesis *(first name and surname, degree, scientific title)*, as well as the institution and year of the thesis preparation.

Summary/Abstract
The Summary presents concisely all the major elements of the thesis: the main assumptions, the research hypothesis, the aim, material and methods, results and the most important conclusions/concluding remarks. The Summary as a consolidated text may not exceed 1 page of the manuscript. The **Abstract in English** should accurately reflect the contents of the thesis summary in Polish.

List of abbreviations and acronyms used in the thesis
It contains an alphabetically arranged list of abbreviations and acronyms used in the thesis together with their full forms (and potentially the original equivalent, e.g. Latin).
For example CL – *corpus luteum* (yellow body); LH – luteinizing hormone

Table of Contents
It contains a list of titles of chapters and subchapters in the thesis together with their commencing page numbers. It is recommended to apply multilevel numbered lists as follows: chapters - 1., 2., 3. etc., 1.1., first level subchapters - 2.2., 3.3. second level subchapters, 1.1.1., 2.2.2., 3.3.3.

Introduction (review of literature)

It presents a general characteristic of a scientific problem being the subject of the thesis, specifying the reasons for undertaking the study. It is not recommended to expand the **Introduction** excessively by including general and commonly known information. It is necessary to provide a concise and relevant description of problems directly connected with the diploma thesis and present justification for undertaken research.

The author should present results of similar studies conducted by other authors and consider the current state of knowledge focusing on most important literature sources. Utilisation of older literature sources is justified e.g. when referring to methodology. If the research is novel in character and the available body of literature is very limited, it is suggested to use publications of a similar scope concerning other plant/animal species or the human.

When presenting results of research conducted by other authors specific literature citation format needs to be followed: depending on the number of authors the citation gives one author – Kowalski 2000, two authors – Kowalski and Nowak 2000, three authors – Kowalski et al. 2000. Important:
Direct quotations of texts written by other authors are not allowed.

When using detailed information cited by the author of a review paper coming from other source papers cited in that article the author needs to become acquainted with the contents of that source paper.

Research hypothesis and Aim of the thesis
Research hypothesis – provides a justification for the decision to investigate a given research problem in view of the current knowledge and potential solution to that problem.

Aim of the study – should be precisely specified and clearly refer to the subject of the thesis and the research hypothesis. The aim of the thesis may not be limited to an analysis or investigation, but it needs to include a characteristic of the phenomenon, determination of a dependence between traits, etc.

Material and methods
Material – a precise characteristic of analysed material, including e.g. the type of material, animal or plant species, source of origin, type and source of data; number of decision by the Local Ethics Committee for Experimentation on Animals – in reference to: <u>animals</u> (principles for selection of animals, number of groups, number of animals in a group); <u>samples for analyses</u> (sample collection guidelines, number of experimental groups, number of samples in the group, guidelines for storage); <u>recording of data/measurement of traits</u> (providing names of used devices/equipment, units and measurement accuracy).
In the case of data collections the original structure of the data base needs to be presented together with the methods to verify and process the data.

Methods - a detailed description of animal handling / sample handling throughout the entire experiment: <u>animals</u> (management conditions, duration of the experiment, nutrition, principles for observations, sample collection from live animals); <u>samples for analyses</u> (guidelines for material collection, guidelines for sample storage).

Moreover, the **Material and Methods** chapter needs to contain the following elements:
1) a detailed description of applied methods referring to published sources of information (individual stages of the method including used solutions, reagents – data on the manufacturer and catalogue number)
2) a description of equipment presenting the scope of their application in the study
3) information on individuals/institutions, whose or which data were used - if applicable
4) names and criteria of the applied statistical tests

5) verification of assumptions of the adopted methods and statistical models
6) information on used statistical packages.

The description of the methods should be sufficiently specific to facilitate recreation of the experimental conditions and performance of analogous experiments. The text in the chapter should be given using impersonal verbs and structures, e.g. *The analyses were conducted…; the sample was supplemented with ..*"

It is suggested to have the **Material and Methods** chapter supplemented with diagrams prepared and photographs taken by the author. A well-presented diagram (limited to one page only) makes the experimental design much more comprehensible and typically eliminates the need for a lengthy written description.

Results

It is a chapter presenting the effects of the original experiment/observations/studies. The author needs to present properly collected experimental results in the most comprehensible form possible. The form of data presentation (tables, graphs) depends on the character of the experiment, while the same data are not presented twice (e.g. both in a table and on a graph). It is recommended to clearly underline/stress the most interesting findings of the study.

Data presented in a graph or a table should be summed up in the text. This summary may not be a repetition of information represented in the graphical form, but rather needs to underline the most important aspects (identify trends, significance, etc.). This chapter may be divided into subchapters depending on the character/scope of conducted experiments and analyses, applied analytical methods, etc.

If the primary subject of the research was connected with image analysis (e.g. microscopic images, gels), it is necessary to present in the **Results** chapter a set of thoroughly described photographs including the scale and other necessary information.

It needs to be stressed here that a carefully considered data representation in the **Results** chapter will greatly improve its comprehensibility and will facilitate the discussion of results by the author. Data presentation in the form of a simple list of rough, unprocessed numerical figures needs to be avoided, as in the case of a multifactorial experiment it may generate a huge number of excessively extensive, frequently incomprehensible tables. However, the data need to be given in the annex to the thesis.

Discussion is one of the most difficult chapters to write. It not only requires a thorough knowledge of literature sources, but also skills to evaluate one's own results. The author confronts their own observations/results with previously published data, while also attempting to explain the observed dependencies or their lack.

It is necessary in the **Discussion** chapter to clearly refer to the presented research hypothesis. If problems were faced during the performance of the experiment, corrective measures, introduced optimisation of protocols, etc. need to be described. It is suggested to identify problems which would require a more thorough discussion. This is essential in theses covering several/many experimental factors.

In the **Discussion** chapter methodological issues need to be specified (e.g. results obtained on a similar material using other methods). The author should also indicate these elements of the experiment, which need to be improved (e.g. the number of samples, replications, modification of the experimental design) along with alternative directions for further studies.

Conclusions/Concluding remarks

According to a general definition, a conclusion is an *inference resulting from reasoning*. It should be assumed that not all experiments would provide grounds for the formulation of definite conclusions. In such a case it is better to sum up the research results or final remarks (critical observations and suggestions). The number of conclusions / concluding statements should be limited to the most important findings and in no case should be a repetition of the results.

Bibliography/Literature

It is a list of computer programmes/packages used in the research along with literature on the subject, comprising first of all source literature (original research papers), to a lesser extent including review papers, books, legal acts, maps, etc. Depending on the source type the following principles for citation of literature should be followed:

1) Papers (listed in the alphabetical order)

1. Kochan J., Tischner M. (2006) Zapłodnienie wspomagane koni. *Medycyna Weterynaryjna* 62: 262-265
2. Love C. C., Loch W. L., Bristol F., Garcia M. C., Kenney R. M. (1989) Comparison of pregnancy rates achieved with frozen semen using two packaging methods. *Theriogenology* 31(3): 613-622

2) Books and their chapters

1. Kosiniak-Kamysz K., Wierzbowski S. (2004) Rozród koni. DRUKROL, Kraków
2. Greń J. (1976) Statystyka matematyczna modele i zadania. Wydawnictwo Naukowe PWN, Warszawa
3. Wierzbowski S. (2004) Zasady pobierania nasienia pp. 45-65. In: Rozród koni. (ed.) Kosiniak-Kamysz K., DRUKROL, Kraków

Anex contains supplementary data, essential to document the conducted research. For example, it may comprise tables covering several pages, large-sized folded diagrams / figures, supplementary photographic documentation, etc. The author needs to refer to a respective annex number in the thesis text.

Declarations of the thesis author:
1. Declaration of the diploma thesis author on its originality, unaided preparation and integrity of copyright
2. Declaration of the author on the equivalence of the electronic and printed versions of the thesis
3. Declaration of the author on the transfer of the right to use the thesis in the antiplagiarism system

II. Detailed information

The text of the thesis should be typed using 12-point Times New Roman fonts, with 1.5 interline spacing, with the margins of 2.5 cm – top and bottom, and 1.5 cm – the right side and 3.5 cm – the left side of the page (text width – 16 cm). Paragraphs (indentation 1.25) should not be separated using extra spacing. The text should be justified. The main chapters (e.g. the Introduction) begin on new pages, while subchapters are continued on a given page.

Numbers composed of two, three and four digits need to be written with no space (e.g. 1126), while starting from 5-digit numbers a space at every 3 digits needs to be applied, starting from the right (e.g. 81 224, 2 345 876). Unless the text is written in English (**Abstract)**, after units and before decimal values a comma is used instead of a decimal point (e.g. 4,25).

Foreign names should be written in **italics** (e.g. *Sus scrofa domestica*)

Spaces need to be applied between an abbreviation and a number (pp. 315, *not* pp.315), between the surname and initial of the first name (Nowak J., *not* NowakJ.). Spaces may not be multiplied (w•ubiegłym•roku, *not* w•••ubiegłym••roku).

Dash (– em dash) is used e.g. to distinguish parenthetical information or clauses and it should be separated from the text with spaces.

Hyphen (-) is used in compound phrases, e.g. self-restraint, and between numbers representing a range, from ... to... (e.g. 41-59 cm, 21-25°C); the hyphen is not separated with spaces.

Figures include **graphs**, **diagrams** and **photographs.** They are numbered consecutively and the label is given under the figure as follows: Fig. 1. Variation in shape and size of *Malus domestica* seeds (no full stop at the end).

If figures the description is limited to the absolute minimum and all explanations are given in the caption or possibly in the legend to the figure. In the figure caption, particularly in the case of a photograph, the name of the author is given in parentheses, e.g. (photo J. Nowak). When referring to the figure in the text the abbreviation "Fig." is used, e.g. Conducted experiments showed considerable interpopulation variability… (Fig. 2), but: Figure 3 shows... .
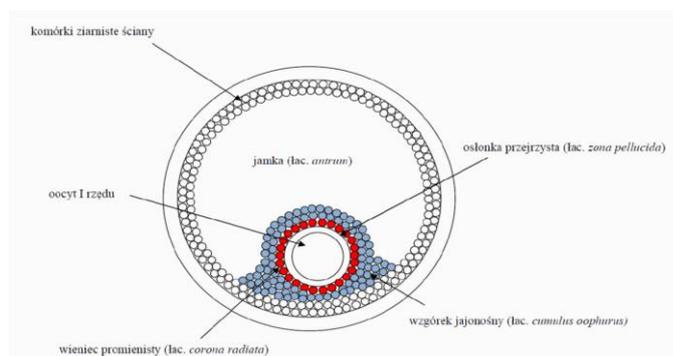
Example Figure

Fig. 1. A diagram of the structure of a mammalian ovarian follicle (based on Bielańska-Osuchowska 2002)

Tables in the text should be unified and – if possible – take the page width. If possible individual rows and columns should not be separated with lines. **Labels** in the first column start with a capital letter. The first column is typically aligned to the left, while the others are justified. When the whole column contains decimal fractions all the decimal points need to be aligned.

Labels (denotations) to numbers, signs or words in tables are placed directly under the table. All the table fields should be filled in. A dash (–) in rows marks absence of the phenomenon, while no information available is denoted with a point (·).

Numbering of tables and the title are placed over the table; there is no full stop at the end of the title. When referring to the table in the text the abbreviation "tab." may be used, e.g. Złotnicka Spotted pigs were characterised by the fastest growth rate (tab. 3) or (Table 3), *but* Measurement results are presented in Table 2. In the case of long tables exceeding 1-page length the numbering of individual columns needs to be given in the heading of the table and the column numbers need to be repeated on the next pages.

Presentation of the so-called probability of rejection of the zero hypothesis, typically expressed as p. Information on the statistical significance of parameter estimations may take the following two forms:

1) if p is lesser than 0.05 then we state that a given parameter is <u>statistically significantly</u> different from zero (analogously in the case of differences between parameters)
2) when p is lesser than 0.01, we talk of highly significant parameters or differences.

Example:
Estimation of the linear correlation coefficient between body weight and height at the withers is positive and statistically highly significant amounting to 0.89 (p = 0.00003).
The same information may be presented as:
The estimated linear correlation coefficient between body weight and height at the withers is positive and statistically highly significant amounting to 0.89**.

**/ Denotation of significance of differences between parameters using letters. Then the same letters (or their absence) indicate a lack of statistically significant differences. When the differences are statistically significant we use different small letters, while in the case of statistically highly significant differences we use capital letters.

Table
Mean monthly salary (standard deviations in parentheses) of miners working in gold mines (G), iron ore mines (F) and coal mines (C)

Miner groups	Mean (standard deviation)
G	6500^{A} (1300)
F	4300^{Ba} (1100)
C	3700^{Bb} (850)

where: different capital letters - differences significant at $p<0.01$
different small letters - differences highly significant at $p<0.05$
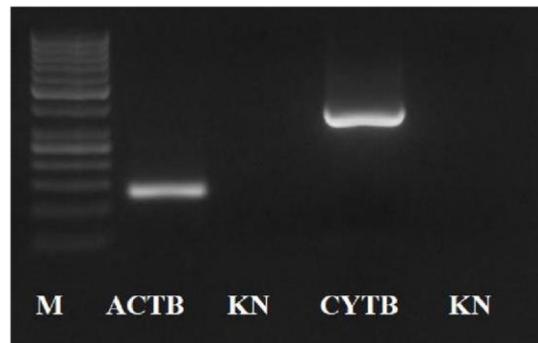
6

Photographs

Fig.2. Detection of PCR products in agarose gel (M – reference molecular mass, ACTB – ACTB gene amplification product of 135 bp, KN – negative control, CYTB – CYTB gene amplification product of 368 bp)
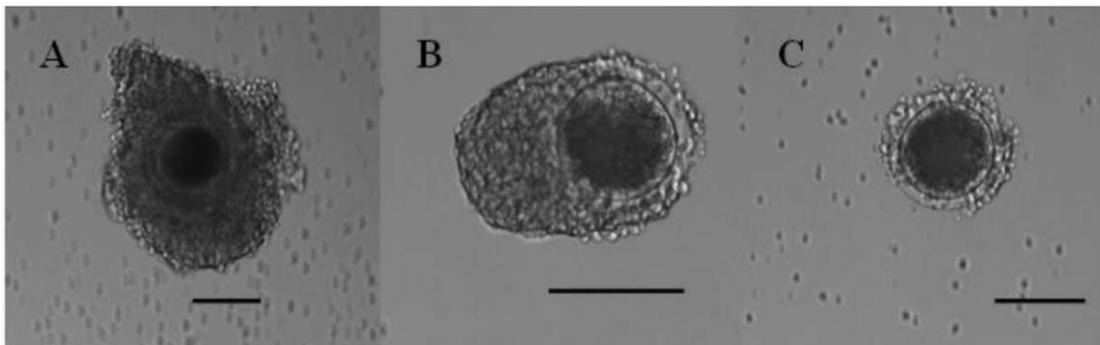

Fig.4. Morphological classification of cumulus oocyte complexes of the domestic pig (complexes with appropriate morphology: A – class A, B – class B; complexes of inappropriate morphology: C – class C). The segment corresponds to 100 μm
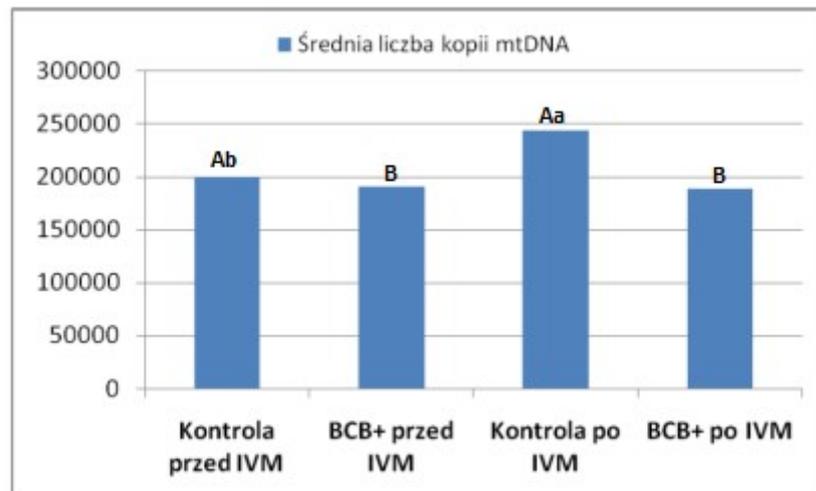
7

Graph

Fig. 20. Mean number of copies in individual oocytes of slaughter gilts (control before IVM – oocytes not subjected to in vitro maturation, BCB+ before IVM – more competent oocytes, BCB positive not subjected to in vitro maturation; control after IVM – oocytes subjected to in vitro maturation; BCB+ after IVM – more competent oocytes, BCB positive subjected to in vitro maturation;
Different capital letters - differences significant at $p<0.01$ Different small letters - differences highly significant at $p<0.05$

Prepared by: Dorota Cieślak and Tomasz Szwaczkowski

Poznań, May 2014

English version: Anna Binczarowska

8