

# University of Veterinary Sciences Brno

## Faculty of Veterinary Hygiene and Ecology

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### OPPONENT'S REVIEW OF THE DOCTORAL THESIS

**Study program:** Chemistry and Food Technology P2901  
**Study Subject:** Food Technology 2901V013  
**Title of the doctoral thesis:** The Effect of Alpha-amylase Enzyme Addition on the rheological Characteristics of the Gluten-free Dough and Bread  
**Candidate:** Vikendra Dabash, M.Sc.  
**Supervisor:** doc. RNDr. Iva Buresova, Ph.D.  
**Opponent:** doc. MVDr. Matej Pospiech, Ph.D.

#### Formal layout and topicality of the doctoral thesis theme

The present dissertation deals with the influence of alpha-amylase on the rheological characteristics of doughs and breads. The topic is of professional interest and provides a number of new insights into the influence of alpha-amylases on the characteristics of gluten-free dough and partly on the properties of bread. The work contains a minimum of grammatical errors.

#### Fulfilment of the doctoral thesis objectives

The objectives of the thesis are clearly stated and are also achieved to varying degrees in the present work.

#### Research methods and procedures

However, the work is not written to the depth that is considered standard for this type of work. The chapter "present state of the research topic" is elaborated on 14 pages. Although it includes new studies, more attention could have been paid to the effect of alpha-amylase on dough. From my point of view, the chapter describing the analytical methods used to assess the quality of dough and bread is also lacking. Nor is there any mention of the current EU legislation for gluten-free foods.

The material and methodology are prepared at an appropriate level. However, some of the equipment lacks information on the origin of the equipment. There is also a lack of detailed information on the samples themselves and the numbers of replications for some of the methods performed. The statistical treatment subsection does not mention if the normality of the data was verified and what ANOVA *Post Hoc* test was used.

#### Results of the doctoral thesis – dissertant's concrete achievements

The results are written on 30 pages and is primarily devoted to the problem of dynamic oscillation of rye dough. The results for uniaxial elongation, SEM and bread evaluation are also presented in the form of tables and graphs. An explanation of the statistical evaluation of some of the data should be given for this chapter because some of the statistical differences reported are not consistent with the tables presented, or the statistical differences in the tables do not correspond to the reported spread of measured values. Specific cases are written as comments in the remarks on the student's explanation during the defence. The uniaxial elongation cases

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are missing the stated reason for not examining the “sticky white” with enzyme addition. The SEM subsection lists the confirmed differences between the samples and the samples with enzyme addition based on a more dense and compact structure. Figure 5.22 confirms this but is this really a confirmation of a change in microstructural properties? The subsection also states that significant differences have been confirmed. Was a statistical test actually used? For Table 5.9, the description is non-standard on the following page. In order to verify the relevance of the results, it is advisable to present the raw data of the individual measurements for the doctoral defence.

The discussion is written in 3 pages and deals with the issue at hand. However, not all the sources mentioned are relevant to the results obtained. For example, source 88 does not discuss changes in starch but changes in protein formation. Source 91 does not deal with starch particles but with the formed gel and cannot therefore be compared with the results obtained in the present work.

The conclusion is clear and summarizes the results.

The present work contains a total of 91 citations that summarize current scientific knowledge.

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**Remarks on the doctoral thesis and suggestions for discussion:**

1. The candidate should explain the methods used to assess the quality of dough and bread in bakery and gluten-free foods.
2. Please indicate the manufacturer and country of origin used equipment: Vega II LMU, sputter-coated equipment, and type of ETA kneader, type of Miwe cube
3. The candidate should mentioned variety of *Oryza sativa* used in the experiments and explain the designation of the flour „0.5 S“.
4. How many replications was provided for moisture content, rheological tests, scanning electron microscopy test and texture profile analysis of bread?
5. The candidate should indicate what test was used to test the normality of the data for statistical processing and what ANOVA Post Hoc test was used to evaluate the results.
6. The candidate should explain the statistical differences in these measurements: elongation test sample 0.5 S; texture profile analysis Hardness semi-Coarse, Springiness 0.5 S, Extra fine, Resilience Fine and Cohesiveness Fine.
7. The candidate should indicate which statistical test was used to compare the samples in the SEM subsection.
8. The candidate should mention what magnification was used for the presented micrographs (Figure 5.22).
9. The candidate should state what changes and at what magnification are observed after the action of amylases on starch and how changes in starch molecules can be assessed by SEM.
10. The candidate should discuss results of microstructure change with scientific publications on defence exam or as supplementary material to his Ph.D. thesis.

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**Mandatory part of the assessment**

**Final assessment of the doctoral thesis:**

After reviewing the submitted dissertation, I can conclude that the submitted dissertation contains deficiencies that need to be explained by the student. **Only after successful completion and defence of the above-mentioned remarks can the thesis be recommended for defence** according to the law no. 111/1998., on Higher Education and on Amendments and Additions to Other Acts (the Higher Education Act), as amended.

If the remarks are resolved, the submitted dissertation may be accepted as one of the prerequisites for the award of the academic degree "Doctor" abbreviated as Ph.D.

**Date: 21.3.2022**

**Opponent's signature:**

