ABSTRACT OF PhD THESIS

Key words: *traditional cheeses, nutritional value, microbiological quality, sensory assessment, proximate composition, Bran- Rucar pass, Transylvania*

This PhD Thesis entitled „Research regarding the sensory analysis and the nutritional quality of some traditional Romanian cheeses" comprises a number of 252 pages and it is divided in two main parts: bibliographical study and personal researches. The achievement of this work was based on consultation of 167 bibliographical titles. The paper includes a number of 60 tables and it is illustrated by a number of 45 figures.

The bibliographical study contains a number of 88 pages and reflects the current state of knowledge in national and international research field concerning cheeses. The bibliographical study represents 33% of the total number of pages of the thesis and is divided into two chapters in which is made a synthetic classification and description of traditional Romanian and international cheeses according to different criteria, plus diagrams of manufacturing processes for Urda and Cascaval pressed cheese traditionally obtained.

The first chapter, called „Definitions and classifications of cheeses" contains descriptions of traditional chesses classes from Romania and wordwide systematized according to some criteria such as: consistency, fat content, ripening characteristics and species from which the raw material (milk) is taken. From this last point of view the traditional cheeses are classified in cheeses obtained from fresh cow's milk (fresh cottage cheese, white cheeses, cream cheeses, flavored cheeses, regional specialties), ripened cheeses from cow's milk (Emmental, Cheddar, Trappista, Dutch cheeses: Edam and Gouda; Romadour de Bran, Dalia pressed cheese) brânzeturi obtained from sheep's milk and/ or milk mixture (Dobrogea pressed cheese; Penteleu pressed cheese; cascaveaua; the pressed cheeses from Bukovina, Soveja and Harlau; Nasal cheese; Saschiz cheese; Manastur pressed cheese and Manastur bellows cheese, smoked curd and smoked pressed cheeses; Bucegi cheese with molds; fermented cheeses: Moldova cheese, bellows cheese or bellows in fir bark, melted cheeses) and cheeses from goat's milk. The last part of the first chapter contains details of the main defects that affect the structure, appearance,

texture, color, taste and smell of cheeses and describes the common alterations phenomena such as early or late ballooning, white rot and gray mold surface contamination, subsequent fines and measures after the identification of such changes.

The second chapter of bibliographical study, entitled "General framework regarding cheese manufacturing" makes another calssification toward completion of the above in the first chapter, this time through illustrating by flowcharts how technological processes is conducted in order to obtain the cheeses in the traditional system. From this point two main types of cheeses can be distinguished: those obtained by milk coagulation and those produced by curdling. Another part of the same chapter is devoted to the chemical composition and nutritional value of cheeses (description of the main types of constituent elements showing beneficial effects on the consumer) with respect to minerals, vitamins, carbohydrates, proteins and nitrogen compounds, casein, whey (description of cheeses obtained from whey: Urda and Ricotta), or potentially harmful compounds such as nitrites and nitrosamines. We considered of equal importance treating the complex processes generically called "ripening" comprising glycolysis and related processes, lipolysis and complementary processes, post-clotting operations, effects of salt and salting methods on cheeses. The section of bibliographic study ends with the description of the beneficial effects and the main factors (lactic acid bacteria and probiotics) involved in the production of such effects on the human body after drinking milk or eating raw cheeses.

The second part, devoted to personal research, represents 67% of the total number of thesis pages, not taking into account the Annexes related to the statistical calculations and surveys.

The third chapter, the first in the section is dedicated to personal research and is called "Sensory analysis of foods. Principles, concepts, definitions" and begins with the justification for choosing the current theme, continues by presenting the principles, necessity, importance, purpose and benefits of sensory analysis. Succinctly are shown: terms and main attributes used in the sensory analysis. Descriptions are made for the impressions of human senses (olfactory, gustatory, olfactory - gustatory, visual, auditory, tactile, kinetic and thermal) involved in normal sensory analysis.

Chapter III adds physiological and psychological conditions to be met by the

people who are taking part in a panel, when organizing sensory analysis sessions and specifies the mandatory evaluation of assessors by monitoring the repeatability index and the deviation index for a period of minimum 12 months, in order to ensure the reliability of analysis performed in the same research center and the necessity of parallel comparisons of the results with those obtained in other Member States of the European Union. At the end of each chapter are described the conditions of the sensory analysis using the points ladder method, paired method and triangular method.

Chapter IV is devoted to the actual sensory analysis of traditional romanian cheeses specifying details on how to organize and conduct tastings that served the intended purpose of this doctoral thesis with reference to the points ladder method. Described herein are the evaluation systems by scoring used for curd, smoked curd and Telemea cheese as main types of assortments covered by the current research and the statistical interpretation of the results is being made. Are established here correlations between scores and ratings that define classes of sensorial quality. We mention that the results of research on this subject are contained in Annexes A, B and C and summarized in Annex D.

The fourth chapter concludes with partial conclusions. The rating by points scale method applied in order to evaluate Urda cheese resulted finally that this product falls into the category "satisfactory sensory qualities", although there was a sample with very good sensory qualities. Following investigations bellows cheese was classified as a "good sensory qualities" cheese; Telemea cheese and smoked curd were rated as "very good sensory qualities" cheeses.

Analyses carried out by paired method indicated unanimously the preference for a certain type of Telemea cheese. The same sample was unanimously appreciated using the triangular method as having the best expressed flavor intensity.

Chapter V is related to the traditional manufacturing methods and technologies used in order to obtain the cheeses investigated in this thesis and the criteria for determining the quality of the bellows cheese, smoked cheese, Telemea cheese and Urda cheese, the desired organoleptic, physicochemical and microbiological properties of good quality cheeses, technological schemes for obtaining smoked cheese curd and Telemea.

Chapter VI refers to "The nutritional quality of traditional Romanian cheeses

obtained in Bran-Rucar pass and surroundings" assessed by physicochemical methods used to determine the integrity (Dean – Stark, Soxhlet and measuring the percentage of salt), the results rarely presenting exceedances of salt (one curd sample and four samples of Telemea cheese). Six samples of Telemea cheese had the highest percentages of sodium chloride, which exceeded the 3% standard specified as necessary and sufficient for meeting the concentration of salt as an ingredient in manufacturing food recipes.

Results regarding the humidity fluctuated around 52.37 ± 5.07 in bellows cheese and were consistent or slightly higher to those reported in other studies performed for traditional Romanian cheeses (Mara Nicolaescu, 2008). The average humidity value for fresh and smoked curd was 47.63 ± 5.5%, and concordant with previous research results mentioned above. Average moisture in Telemea cheese samples was 55.83 ± 5.34%, which coincides with the values recorded in previous research.

The percentage of fat in cheese samples analyzed ranged around 45.75 ± 5.3 values which are about 10% smaller than those specified in other specialized research (Nicolaescu Mara, 2008). The mean value of 47.21 ± 5.3% fat in bellows cheese corresponds with previous research. The fat in Telemea cheese samples recorded values of 50.54 ± 4.73%, being slightly quantitatively lower than the previously analyzed same type of samples (Mara Nicolaescu, 2008). A sample of Urda cheese recorded the highest percentage of fat, namely 63.83%.

Chapter VII entitled "Assessing the microbiological quality of traditional Romanian cheeses obtained in Bran-Rucar pass and environs" was aimed for the microbiological characterization of cheeses taken from Brasov, Covasna and Bistrita Nasaud Districts when conducting compulsory self-control procedures, laying down the sanitary veterinary strategic surveillance plan, in order to prevent and control the animal diseases, to prevent the diseases' transmission from animals to humans and to protect the environment.

On this occasion were analyzed organoleptically, physicochemically and microbiologically 164 samples of fresh cottage cheese, Urda cheese, smoked curd, bellows cheese, Telemea cheese taken within the strategic and self-control programs from individuals in rural areas Fundata, Poiana Sibiului, Şirnea, Pârău, Cristian, Cincşor, Bran, Sohodol, Râşnov, Braşov, Bod, Roadeş, Hărman, Prejmer, Şoarş, Rupea, Lunca

Câlnicului, Bățanii Mari, Buzaiel, Bărcut, Hălchiu, Făgăraş, Moeciu de Sus, Purcăreni, Bran – Şimon, Veneţia de Jos, Vama Buzăului, Vărghiş, Sita Buzăului and Întorsura Buzăului.

The results of microbiological analysis for fresh cottage cheese samples did not reveal any case of number exceeding for *E. coli*, expressed in CFU/g over the maximum admissible range of 10^2 -10^3 CFU/g, provided by European legislation in force.

A similar phenomenon can be observed in Urda samples whose results are demonstrating compliance with hygiene criteria process in this regard resulting values below the maximum allowable limits, both for coagulase-positive Staphylococcus aureus (CFU/g) and for the number of E.coli (CFU/g).

In most samples of curd were no exceedances of CFU's maximum allowable values for *E.coli*. In one case there was a breach of processing hygiene criteria (coagulase positive *Staphylococcus aureus* 6×10^6 CFU/g), the maximum allowable value of 10^{-5} being overcome with one logarithm. The samples of Cascaval pressed cheese did not exceed the maximum allowable values for *Salmonella* spp. and coagulase-positive *Staphylococcus aureus* (233,33 UFC/ g).

The 98 Telemea cheese samples analyzed showed two violations of processing hygiene conditions (*E. coli* $2{,}8 \times 10^3$ CFU/ g and $1{,}1 \times 10^5$ *S. aureus* cp CFU/ g) and are both related to the manufacturing process of assortment "Telemea sheep cheese", and also was showed the absence of pathogens like *Salmonella* spp. and *Listeria monocytogenes* in all analyzed samples.

The microbiological analysis of 98 Telemea cheese samples revealed an arithmetic average of 23,65 CFU /g coagulase – positive *Staphylococcus aureus* and an arithmetic average of 168,6 (CFU /g) *E. coli. Salmonella* spp./ 25 g and *L. monocytogenes*/ 25 g were declared absent in the samples. Analyzed bellows cheese called „Burduf" showed no increase above the admissibility threshold of processing hygiene indicators or finished product's safety indicators.