

HABILITATION THESIS

"THE STRUCTURE AND FUNCTIONAL FATTY ACID CONTENT OF FATS FROM CERTAIN AGRICULTURAL FOODS OF ANIMAL ORIGIN"

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ABSTRACT

This habilitation thesis is based on original contributions materialized as a result of scientific research conducted during postdoctoral studies at USAMV Cluj-Napoca (2000-2003) and the University of Oradea (2004-2015).

The scientific research, carried out in line with my personal skills and competencies acquired through education and professional experience, briefly described and substantiated in the thesis, follows three main strands:

- influence of *nutritional factors* on the structure and composition of functional fatty acids (FA) and oxidative stability of animal fats;
- influence of *genetic and physiological factors* on the structure and composition of functional FA of animal fats;
- influence of *processing methods* of animal production on the structure and composition of functional FA of fat.

In the Section I "SCIENTIFIC, PROFESSIONAL AND ACADEMIC ACHIEVEMENTS" there is presented the personal research that had as main objective the studying and optimisation of the structure and content in functional FA and improving health lipid indices of milk fat, dairy products and meat in relation to a series of factors (i.e. nutritional, genetic, physiological, and technological) in order to ensure the multidimensional quality (health and nutritional) of these food products for the human health nutrition. The cornerstone of these studies was to improve the health quality of fat from milk, dairy products and meat by increasing the share of functional FA (omega-3, CLA-conjugated linoleic acid and VA-*trans* vaccenic acid), and increasing the content in lipophilic antioxidants and thus being able to provide to the consumers, products with a high content of bioactive components that meet the requirements of the new concept of "functional and sanogenous food".

Section I contains two chapters allotted to the presentation of the most important scientific, professional and academic achievements in line with the objectives and strands of scientific research aforementioned.

Thus, in Chapter I, entitled "Scientific research on improving the structure and content in functional fatty acids of milk and dairy products' fat" there are presented the results of two main research strands, as follows:

- structure, the composition in functional fatty acids and health lipid indices of milk, acidic dairy products and cheese' fat;
- oxidative stability (antioxidant capacity) of milk in relation to its contents in functional FA and lipophilic antioxidants (β -carotene, retinol and α -tocopherol).

In the first part of the Subchapter 1.1. entitled "Improving the structure and content in functional fatty acids of sheep's milk fat" it is presented the impact of various factors i.e. genetic (breed) and physiological (parity and stage of lactation) on the FA profile and health

lipid indices (atherogenic index, thrombogenic index, omega-6/omega-3 ratio, etc.) of milk fat, resulting the opportunity for a sustainable use of local genetic resources (i.e. Turcana breed) in order to improve the contents in functional FA and health lipid indices of milk fat.

In the second part of Subchapter 1.1. there are presented the results regarding the influence of nutritional factors (feed ration structure, dietary energy and protein level, food preservation method, rumen stability and the effect of supplementing feed rations with saponified fat, sheep-feeding management during hot summer) on the FA profile and health lipid indices of milk fat. In the same context, given that the improvement of the structure and composition of functional FA of milk fat increases the susceptibility for and risk of oxidation, we have established associations and the functional dependence between the functional FA composition, non-enzymatic lipophilic antioxidants, and the oxidative stability of milk expressed by the concentration of the latter in MDA (malondialdehyde). The results showed that the nutritional factors are dominant in handling FA profile of milk. Through a proper sheep-feeding management techniques, milk can be added, naturally, higher nutritional and sonogenic value in order to raise milk at "functional food" status.

Given the fact that a very small amount of production of sheep's milk is for fresh consumption purposes (1.4% of global consumption - Nudda, 2014), the majority of milk being converted into cheese, in the Subchapter 1.2. "Improving the structure and composition in functional fatty acids of fat in dairy products" there are presented the results of research carried out in this area, while elaborating on the following issues:

- influence of milk processing methods on the FA profile and health lipid indices of fat from dairy products;
- influence of nutritional factors on the FA profile and health lipid indices of fat from cheese;

Starting from the notable differences between ruminant and monogastric animals in terms of digestion and lipid metabolism, in the Chapter II, entitled "Scientific research on improving the structure and composition of the functional fatty acids of fat from meat" there are presented the results of two main areas of research, as follows:

- structure and composition in functional FA of intramuscular and deposit fats in ruminants (sheep);
- structure and composition in functional FA of intramuscular and deposit fats in monogastric (poultry).

In the Subchapter 2.1. "Improving the structure and composition in functional fatty acids of fat in sheep meat" there are presented research results obtained in this area which were developed in two main strands, as follows:

- the influence of various factors i.e. genetic (breed) and physiological (age, sex, anatomic region) on FA profile and health lipid indices of intramuscular and deposit fats;
- the influence of nutritional factors (feed intake structure, share of concentrated feed) on the FA profile and health lipid indices of intramuscular and deposits fat.

In the Subchapter 2.2. "Improving the structure and composition of the functional fatty acids in poultry" we present the results of scientific research on the:

- influence of the source and the degree of saturation of fats used in chicken and turkey broiler diet on FA profile and health lipid indices of fat in carcass;
- influence of some macrocomponents (lupine beans, rape meals) in broiler feed, on the FA profile health lipid indices of carcass fat.

Every aspect mentioned is supported by evidence of original scientific contributions, grounded in the current scientific knowledge nationally and internationally.

In the Section II "EVOLUTION AND DEVELOPMENT PLANS OF THE AUTHOR'S OWN, SCIENTIFIC AND ACADEMIC CAREER" there are presented the following: the synthesis of

the scientific and academic accomplishments, as well as the main strands of professional development, while mentioning specific elements that will contribute to the development of future plans.

Section III "ASSOCIATED REFERENCES" includes an alphabetical index of references used in this habilitation thesis.