Summary

This habilitation thesis synthesizes the professional and scientific achievements attained throughout my academic activity in the fields of infectious diseases, immunology and preventive medicine beginning in 2006, the year I defended my doctoral dissertation. Moreover, the thesis outlines the strategic directions and objectives I have set for the future development of my academic career.

The habilitation thesis, entitled *"The One Health, One Welfare, One Environment Concept – A Foundation for the Prevention and Control of Infectious Diseases"*, presents the most relevant findings obtained from recent scientific investigations. These are reflected in the publication of 16 original research articles indexed in the Web of Science database, seven of which were authored as first or corresponding author, along with two papers published in proceedings volumes, also indexed in Web of Science. All these studies were conducted using advanced immunological and microbiological techniques. The use of such modern methods enabled the generation of meaningful data regarding the interaction between plant extracts and the immune system, as well as the risks associated with bacterial resistance in the context of exposure to natural immunomodulatory or antimicrobial agents.

My scientific activity is characterized by a research direction focused on investigating the effects of plant extracts on the in vitro cellular immune response in various animal species, considering health status, target species, and the botanical origin of the extracts. The results indicate that the immune response is influenced by multiple biological and ecological variables, and that the immunomodulatory effects of plants differ among species. Additionally, the research addresses issues related to the antimicrobial resistance profiles of opportunistic bacteria isolated from animals, and how previous immunological exposure may contribute to enhanced antimicrobial resistance. By integrating these topics, my research is situated at the intersection of veterinary microbiology, comparative immunology, phytotherapy, and experimental biomedicine.

Following a brief introductory chapter, the second section of the thesis—titled *Scientific and professional achievements*—brings together the main research themes that underpin the development of this habilitation thesis. Among the key areas of focus is the qualitative assessment of bacterial load in various infectious disease episodes, aiming to

understand the dynamics of pathogenic agents depending on the clinical and etiological context. Another major research direction involves characterizing the immune system through the analysis of immunophysiological parameters in various species and identifying immune response alterations in different infectious diseases. Furthermore, the increasingly critical issue of antibiotic resistance was explored by testing commonly used antibiotics in veterinary practice and assessing bacterial resistance using the Multiple Antibiotic Resistance (MAR) index. An essential component of the research was also directed towards identifying natural therapeutic alternatives through the use of standardized whole plant extracts, their components such as essential oils, and apicultural products, with the goal of exploring their antimicrobial and immunomodulatory potential.

Chapter 2.1, dedicated to the qualitative evaluation of bacterial load in different infectious disease episodes, aims to investigate the presence and diversity of pathogens involved in the clinical manifestation of diseases with bacterial etiology. Modern microbiological identification and characterization methods were applied. The studies included in this section focused not only on isolating the bacteria involved, but also on correlating their presence with the clinical characteristics of each case, emphasizing the importance of differential diagnosis and the complexity of host–pathogen interactions. Through comparative analysis of the bacterial profile in various pathological contexts, the importance of rigorous qualitative evaluation was highlighted as support for therapeutic decision-making and understanding the underlying pathogenic mechanisms. The obtained results contribute to strengthening knowledge regarding the epidemiology of bacterial infections in animals and offer useful perspectives for optimizing prevention and treatment strategies.

Chapter 2.2, titled *The immune system – immunophysiological parameters in different species and alteration of immune response in various infectious diseases*, presents studies focused on evaluating the immunological profile in both farm animals and wild species belonging to the taxonomic classes Pisces, Aves, and Mammalia. In most cases, these investigations were conducted alongside analysis of the immunomodulatory effects of various plant extracts, enabling an integrative approach to understanding immunological mechanisms and the therapeutic potential of phytocompounds under different pathological conditions.

Chapter 2.3, *Assessment of antibiotic resistance: testing common antibiotics used in veterinary therapy and evaluating resistance using the MAR index*, is dedicated to analyzing the phenomenon of antibiotic resistance through the investigation of antibiotic sensitivity profiles in bacterial strains isolated from diverse veterinary and ecological contexts.

Chapter 2.4, *Natural therapeutic alternatives: use of standardized whole plant extracts, their components (essential oils), and apicultural products*, focuses on the exploration of natural therapeutic alternatives, particularly the use of standardized whole plant extracts, essential oils, and bee-derived products in the context of veterinary medicine and experimental biomedicine. The primary objective of the studies included in this section was to evaluate the biological activity of these substances especially their antimicrobial, anti-inflammatory, and immunomodulatory effects tested on cell lines, experimental models, and animal species of agronomic or ecological interest. These investigations not only assessed the efficacy in inhibiting pathogen development, but also examined the impact on immune system cells, their capacity to modulate inflammatory responses, and their potential to reduce oxidative stress. Through the application of standardized phytochemical and biological characterization methods, the studies demonstrated that these natural products could represent promising complementary solutions for reducing reliance on conventional antibiotics, thereby contributing to the fight against antimicrobial resistance and supporting the development of sustainable therapeutic strategies.

My scientific and publication activity can be summarized as follows: I have contributed to the writing of four scientific books published by national publishers, three textbooks, and one set of practical guides for students, as well as a chapter in an internationally published specialized book on antimicrobial resistance. Additionally, I have authored seven articles (as first author) published in journals indexed in the ISI Web of Science Core Collection with impact factors (classified as Q1–Q4 journals). I also participated as a member or project leader in successfully completing 11 national and international research projects (ERANET, Horizon, CNCSIS, CEEX, Partnerships, Capacities, Ideas, or Innovation Vouchers). Four of the original articles indexed in Web of Science received awards from UEFISCDI under the Research Results Awards program. The scientific articles I have published have received appropriate international recognition, being cited in 42 papers (including 24 indexed in Web of Science). Consequently, my Hirsch index according to Web of Science is 2.

The third section of the thesis is dedicated to outlining the strategic directions for the consolidation and advancement of my professional trajectory within academia. In this context, continuous development both theoretical and practical represents a priority, supported by systematic consultation of the most recent specialist publications, critical analysis of relevant scientific literature, and ongoing updates to educational materials, including both lectures and practical works for students.

In terms of research activity, the primary objective is to ensure a consistent increase in scientific output, with a focus on publishing in prestigious, internationally indexed journals. Moreover, securing research funding through national and international grant programs remains a strategic priority, contributing to the expansion of resources dedicated to scientific projects. Complementary to these objectives is active participation in national and international conferences and symposia, as well as involvement in the organization of scientific events hosted by our university. These efforts are aligned with the broader strategy of professional recognition and integration into the academic community.