Acknowledgement

This thesis would not have been possible without the help and support of the kind people around me, to only some whom it is possible to give particular mention here.

First and foremost I offer my sincerest gratitude to my supervisor Dr. A. Michael, Associate Professor and Head, Department of Microbiology, P.S.G. College of Arts and Science, Coimbatore for his supervision, advice and guidance as well as giving me extraordinary experience throughout the work. He has been supportive since the day I began working on this project. I always remember him saying “whatever experience you are gaining, that will all help you at some moment of your life time” and “Try to achieve your goal with the available resources around you”. He has supported me not only by providing research guidance, but also rendering help academically and financially. And during the most difficult times when writing this thesis, he gave me the moral support and the freedom I needed to move on. I could not simply acknowledge by expressing mere thanks for such a responsive supervisor.

I convey special acknowledgement to Thiru. N.C. Nandagopalan, Secretary, P.S.G College of Arts and Science, Coimbatore, for his constant encouragement and for making available all the facilities needed to carry out the work.

I am very grateful to Dr. R. Rajendran, Principal, P.S.G College of Arts and Science, Coimbatore, for facilities provided and for rendering help of any kind whenever approached with wholeheartedness and his constant encouragement throughout the project.

Words fail me to express my special thanks to Dr. C. K. Raadha (Late), Associate Professor, Department of Microbiology, P.S.G College of Arts and Science, Coimbatore for her constant encouragement and Motherly care till her last moments of life time. Unfortunately, I miss her guidance but I am sure that she blesses me from the heaven. I pray for the peace and rest of her soul.

I would like to thank Dr. K. Latha, Project Co-ordinator, T-Stanes & Company Ltd, Coimbatore for collaborating with my research supervisor and taken up this work forward with the financial support by DBT, Govt of India. And also her personal guidance for successful completion of this research work.

My special thanks to Dr. S. Ramalingam, Principal, PSG Institute of Medical Sciences and Research (PSG IMSR), Coimbatore and Chairman and Members of Institutional Animal Ethics Committee, Dr. B. Appalaraju, Professor and Head, Department of Microbiology, and Dr. S. Gnanapoongothai, Professor, Department of Microbiology, PSG IMSR, Coimbatore for their indispensable help in the ethical approval for animal experiment.

I gratefully acknowledge my super senior Dr. S. Meenatchisundaram, Associate Professor, Nehru College of Arts and Science, Coimbatore for having guided me on how to work with Chicken Antibodies by the protocols and SOPs which he prepared and made available for his juniors like me in the form of his doctoral thesis. I had several opportunities to spend my time with an experienced researcher like him. His involvement with his originality has triggered and nourished my intellectual maturity.

I would like to extend my sincere thanks to Dr. Thirumurthi, Veterinarian, Dr. R. Saravanakumar, Dr. Malligarjun, Veterinarian for the training to rear white leghorn chickens for this study.
I extend my sincere gratitude to **Dr. Rudiger Schade**, Institute of Pharmacology, Charite-University Medicine of Berlin for his kind cooperation and clarifying the doubts in the protocols used for the study through online portal.

It gives me an immense pleasure to acknowledge **Dr. Elanagan Nagarajan**, Trainee at St Barts London NHS Trust, London and **Mr. Suresh Kannan B** , Doctoral Student, Ulsan National Institute of Science and Technology, Ulsan Republic of Korea for their in time help during my literature survey. They have helped me to get international articles with recent updates in the field for review.

I am immensely expressing my thanks to **Prof. K.R. Ventakesan**, Principal, Sri Sankara Arts and Science College (SSASC), Enathur, Kanchipuram for his encouragement and kind advice, which exceptionally inspire and enrich my growth as a student and a lecturer at SSASC.

Many thanks go in particular to **Mrs. S.M. Shanthi**, Associate Professor, Department of English, SSASC, who taught me the English language during my Under graduation as a Tutor in Intensive Spoken English Training Course organized by SSASC.

I was extraordinarily fortunate in having **Dr. R. Balagurunathan**, Reader and Head, Department of Microbiology, Periyar University, Salem, **Dr. K. Sathyamurthy**, Assistant Professor, Department of Bio-Medical Science, **Dr. G. Muralitharan**, Assistant Professor, Department of Microbiology, and **Mr. N. Prasanabalaji**, Research Scholar, Department of Microbiology, Bharathidasan University, Tiruchirappalli, **Mrs. K. V. Brahmaidhya**, HLL Biotech Limited, Chennai and **Mr. M. RadhaKrishnan**, Research Assistant, TRC, Chennai as my faculties in Sri Sankara Arts and Science College, Kanchipuram during my UG and PG Courses. I could never have embarked and started all of this without their prior teaching in Microbiology and thus opened up on areas to me.

It is a pleasure to express my gratitude wholeheartedly to **Dr. B. Ramesh**, Assistant Professor, Department of Biotechnology and **Mrs. K. Kavitha**, Assistant Professor, Department of Microbiology, Sri Sankara Arts and Science College, Kanchipuram for their prior teaching in Microbiology at SSASC and constant encouragement throughout my path.

I would like to thank **Mr. P. Muthukrishnan**, Associate Professor, **Mrs. N. Krishnaveni** Assistant Professor, **Mrs. R. Shanmuga Priya**, Assistant Professor, **Mrs. D. R. Darjily**, Assistant Professor, **Mrs. Poornam Sen**, Assistant Professor, and other faculties, Department of Microbiology, PSG College of Arts and Science, Coimbatore who presented helpful and memorable time during my doctoral research.

I extend my gratefulness to **Dr. S. Radhai Sri**, Associate Professor, Department of Nutrition and Dietetics, PSG College of Arts and Science for her immense moral support.

I was extremely fortunate to have such a wonderful seniors **Mr. T. Subburaj** and **Mrs. S. Avanthi**, PhD Research Scholars of our department. They have helped me a lot morally, technically and financially without any hesitation during my doctoral research.

I have no words to express my gratitude to my sweet friends **Ms. Sentila Rajan** and **Ms. S. Karthika**, PhD Scholars of our department whose presence rendered unendingly refreshed, helpful and memorable time. Thanks for the science discussion and exhilarating time we spent together.

I am personally thankful to **Mr. B. Muralikrishnan**, M.Phil scholar (2008-2009) for his moral support and kind help rendered while I began this doctoral study at PSG CAS.
Acknowledgement

I am very much deeply touched and feel the sweetness when thinking of and thanking Ms. M. Menaka, Research scholar of our department for her support, prayer and sisterly care taken during the period of completing this research work.

I am very much blessed by the God to have memorable friends cum co-workers Mrs. S. Anitha, Ms. R. Indrani and Ms. C. Ajitha for their help and moral support. I never forget the moments we all spent together during my doctoral research.

It gives me an immense pleasure to gratitude my acknowledgment and thanks to our research team Mr. P. Saravanan, Mr. Sengali Ragunath, Mr. R. Mahenthiran and Mr. S. Naveen for their continuous support, helps rendered in the laboratory and valuable discussion in the weekly and monthly meetings to complete this research work.

It is my privilege to express my heartfelt thanks to post graduate research students of our department Ms. T. Jeevitha and Ms. S. Elakiya, for their kind co-operation and help rendered during the initial days of this research work.

Collective and individual acknowledgments are also owed to my colleague Mr. N. Karthik, Sis. Betsy Maria K.J. and junior fellow students Ms. Kanmani, Mr. M. Sankareswaran, Ms. Buvaneswari, Ms. Jayashree and Ms. C. R. Radha for their help and time spent for the science discussion.

My sincere gratitude to Mr. Jayaramakrishnan, Ph.D. Scholar, Department of Physics, PSG College of Arts and Science, Coimbatore for his advice, willingness to share his bright thoughts with me, which were very fruitful for shaping up my ideas and research.

I express my thanks to Dr. C. Balakumar, Mr. S. Karthik Sundaram, Ms. R. Radhai, Ms. P. K. Prabavathy Ph.D Research Scholars, Department of Microbiology and Mr. C. Sukumar, Ph.D Research Scholar, Department of Environmental Science, PSG College of Arts and Science, Coimbatore for their kind help during my work.

I am very much thankful to Mr. P. Levin Anbu Gomez, Assistant Professor, Department of Biotechnology, Karunya University, Coimbatore and Mrs. K. Priyadarshini Anbu, for their kind support and help during my doctoral study.

I am very grateful to Mr. S. Udaya Kumar, Project Assistant PSG Tech who helped me for the standardisation of the Spray Drying Process. I would like to thank Mr. K. Selvakumar, Euro Informatics, Gandhipuram for helping me with the statistical analysis without which the interpretation of my study would be incomplete.

I extend my heartfelt gratitude to my recreational friends Mr. G. Gopi, Officer-Logistics, Netafim Irrigation India Pvt. Ltd, Coimbatore and Mr. V. Senthilkumar, ERP Executive, The Bakgiam Groups, Coimbatore for the time we spent together in the week-ends who made me relax whenever I needed it the most.

I thank Mrs. K. Pappathi, Mrs. Selvi and Mrs. T. Ponmani, Lab In-charge, Department of Microbiology, P.S.G College of Arts and Science, Coimbatore, for their timely help.

It is my duty to thank all the Non-teaching staff of P.S.G College of Arts and Science, Coimbatore, for their valuable and timely help.

I convey my sincere gratitude wholeheartedly to Mr. P. Eswaramurthy, Mrs. K. Sulokchan and their two daughters and their family for the kind hospitality during my stay in their home at Nehru Nagar, Coimbatore as tenant but originally they treated me as their son.
Acknowledgement

Furthermore, I would like to thank my aunty Mrs. M.K. Marimuthu, Head Mistress (Rtd.) who put the fundamental of my learning caliber, showing me the joy of intellectual pursuit ever since I was a child.

Where would I be without my family? My parents deserve special mention. My mother Mrs. T. Sadayammal is the one who sincerely raised me with her care and prayers. My father Mr. K. Thirumalai in the first place is the person whose dedication and persistent confidence gave the endurance to come up in life. I express my sincere thanks to my brothers, sisters, uncles, sister-in-laws and their kids. Their support is unique and amazing, they gave up many things for me and cherish my life with every great moments and supported me whenever I needed it. I owe my family for their unconditional support to pursue this degree.

Finally, I would like to thank everybody who was important to the successful realization of thesis, as well as expressing my apology that I could not mention personally one by one.

Above all I thank the Almighty for His grace.

For any errors or inadequacies that may remain in this work, of course, the responsibility is entirely my own.

T. Diraviyam