

ACKNOWLEDGEMENTS

This work was supported by the One Research One Graduate (OROG) of Suranaree University of Technology.

I want to express my deepest gratitude to my advisor, Assoc. Prof. Dr. Rangsun Parnpai, for his unwavering support of my learning goals and his inspirational efforts to provide me with laboratory experience, academic writing guidance, and assistance with my thesis. I am profoundly grateful to the members of my thesis committee, Assist. Prof. Dr. Pakpoom Boonchuen, chair of the committee, and Dr. Ampika Thongphakdee, a committee member, for their time, valuable suggestions, and insightful comments, which significantly enhanced the quality of my work.

I extend my sincere thanks to my colleagues, friends, and all members of the Embryo Technology and Stem Cell Research Center for their camaraderie, assistance, and the countless discussions that helped me refine my ideas. Your support and friendship made this journey more enjoyable and less arduous. Also, thanks to the team at Siam Vet Tech IVF Center for scholarship, with special mention to Dr. Chaiwat Chumchuang

Finally, my warm thanks go to my family and the members of the RP lab. Your guidance and support during the challenging times of my study have been invaluable.

Yanapon Anthakat