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INVITATION PUBLIC DEFENSE

Who's A Good Gene Pool? Managing Health and Diversity in an Assistance Dog Breeding Program

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PROMOTORS

Prof. dr. B. J.G. Broeckx
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Curriculum Vitae

Birgit Deboutte was born on August 25, 1989 in Roeselare, Belgium. In 2013, she obtained her Master's degree in Veterinary Medicine from Ghent University. After graduating, she worked as a veterinarian in Northern Ireland and France (2013-2018). Upon returning to Belgium, she was employed from 2019 to 2022 as an inspector-veterinarian at the Federal Agency for the Safety of the Food Chain (FASFC). Alongside her work at the FASFC, she obtained a Master of Science degree in Statistical Data Analysis (major Statistical Science) from Ghent University in 2022. That same year, she began her doctoral research at the Faculty of Veterinary Medicine of Ghent University, within the Animal Genetics research group of the Department of Veterinary and Biosciences. The research was funded by the 'Assistance Dogs Purpose Dogs' chair, established by the non-profit organisation Purpose Dogs. Birgit is the author of four scientific publications.

Where?

The defense will take place on Friday December 4, 2026, at 17.30h

Auditorium D

Faculty of Veterinary Medicine
Ghent University, Campus Merelbeke
Salisburylaan 133, Merelbeke

The defense will be followed by a reception.

How to attend?

If you would like to attend the reception, please register **before November 27, 2026,** by email to birgit.deboutte@ugent.be

Members of the Jury

Prof. dr. C. Moons
Voorzitter van de examencommissie

Dr. K. Kromhout
Faculteit Diergeneeskunde, UGent

Dr. G.Domain
Faculteit Diergeneeskunde, UGent

Dr. E. Bogaerts
AniCura Dierenartscentrum Malpertuus

Dr. F. van Steenbeek
Faculteit Diergeneeskunde, Universiteit Utrecht

Summary

Assistance dogs guide people who are visually impaired through traffic, alert those who are deaf or hard of hearing, open doors for those with limited mobility, and provide support for conditions ranging from epilepsy to post-traumatic stress disorder. Yet demand far exceeds supply. Training a single dog takes about two years and costs between 17,500 and 30,000 euros in Belgium, and only about 60% of dogs successfully complete their training. The leading causes of failure are orthopedic disorders, particularly hip and elbow dysplasia (18%), and behavioral unsuitability (17%). Each dog that does not graduate represents a significant financial loss and a person or family whose wait for an assistance dog grows longer.

Reducing these losses begins at the genetic level. A well-managed breeding program can select for healthier dogs from the start, but selection comes with a trade-off: excluding dogs on health grounds shrinks the breeding pool, risking inbreeding and new health problems. The key to effective selection lies in how well a health trait can be measured. This dissertation examined phenotyping strategies for three major health traits in Labrador Retriever assistance dog populations, each with distinct challenges.

For hip dysplasia, we evaluated the VMBDD stress radiography technique, which measures hip joint laxity directly as a continuous score. The heritability of this score was high (0.82-0.83), and when both parents were screened, offspring had significantly less hip dysplasia. In one population, not a single case was observed when both parents had been screened. For elbow dysplasia, we used CT scans to score six individual features in breeding dogs and found that sclerosis of the coronoid process was a strong predictor of disease in offspring, with each one-point increase corresponding to a more than fourfold increase in risk. The heritability of this marker was high (0.73-0.80). For dermatological disease, we tested whether an owner-completed online survey could capture clinically relevant skin symptoms. The resulting symptom score proved heritable, but only in dogs aged three or older. In younger dogs, the genetic signal was near zero, meaning that meaningful selection for skin health must rely on data from older animals.

Finally, we developed RAPPORT, a freely available, open-source software application that integrates health-based selection with genetic diversity management in a single tool. RAPPORT computes inbreeding coefficients, tracks population diversity over time, ranks breeding candidates by both health and genetic uniqueness, and generates mating recommendations filtered by inbreeding thresholds. A test case using data from a Belgian assistance dog breeding program illustrated its capacity to detect accelerating inbreeding trends and support balanced breeding decisions.

The central message is consistent: how a trait is measured determines how effectively it can be improved through selection. These findings translate into practical guidance for assistance dog breeding programs and offer concrete tools to breed healthier, more genetically diverse dogs, ultimately shortening the wait for the people who need them.