

Wildlife Detection Dog Odisee Projects

Hilde Vervaecke & Ellen Van Krunkelsven

Odisee University of Applied Sciences



INSTITUUT
NATUUR- EN BOSONDERZOEK

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UNIVERSITY OF APPLIED SCIENCES

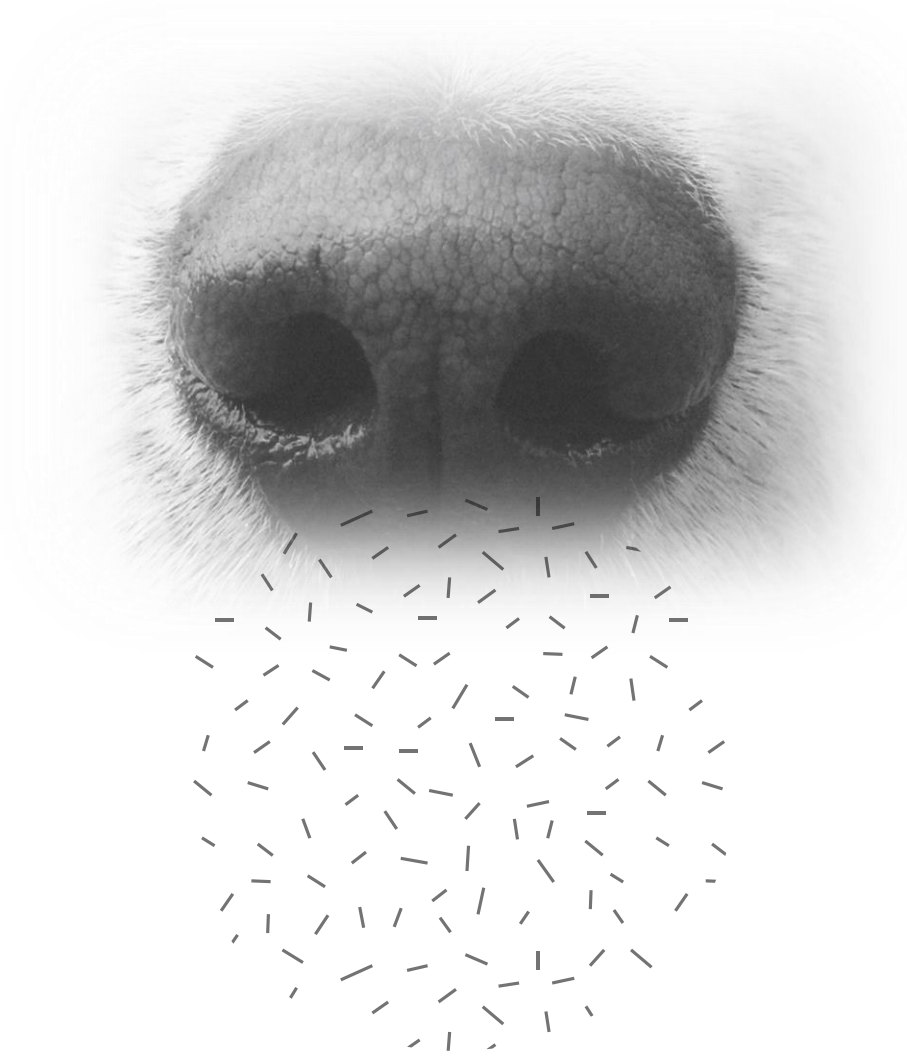
salto
Research Group Agro-Bio

The start

Student projects






Odisee-financed-
projects

Future





Student projects in 2016

Dog	Breed	Target species	English name	Target substance	Status	Studied by
Smokey	Malinois	<i>Lucanus cervus</i>	Stag beetle	Larva, Imago 	ongoing	Ianthe Terpelle - Odisee
Peckie	Mixed breed	<i>Lucanus cervus</i>	Stag beetle	Larva 	(+)	
Jimmi	Mixed breed	<i>Lucanus cervus</i>	Stag beetle	Larva 	(+)	
Smokey	Malinois	<i>Lutra lutra</i>	Otter	Spraints 	ongoing	Dorien Vercauteren
Blue	Australian shepherd	<i>Lutra lutra</i>	Otter	Spraints 	--	- Vives





American bullfrog (*Lithobates catesbeianus*)
Scent Source: Living animal
Reason: Invasive exotic species → potential impact on native biodiversity



Name: Edgar
Breed: Basset Hound
Age: 2 years
Dog: No detection experience
Handler: Basic training experience



Name: Pippa
Breed: Belgian Malinois
Age: 3,5 years
Dog: Some detection experience
Handler: Professional detection instructor



Name: Niro
Breed: Belgian Malinois
Age: 4,5 years
Dog: Trained detection dog (cash)
Handler: Professional detection instructor



Bat fatalities at wind turbines
Scent Source: Carcass
Reason: Find out which species, how many, when and where → protective measures



Name: Lima
Breed: Crossbreed
Age: 3 years
Dog: No detection experience
Handler: Basic training experience



Name: Jules
Breed: Goldendoodle
Age: 5 years
Dog: No detection experience
Handler: Professional dog trainer



Lion's mane mushroom (*Hericium erinaceus*)
Scent Source: Mycelia
Reason:
- Endangered in Flanders
- Indicator of quality of N2000 forest habitats



Name: Otte
Breed: Labrador Retriever
Age: 3,5 years
Dog: Mantrailing experience
Handler: Dog trainer + mantrailing experience



European pine marten (*Martes martes*)
Scent Source: Scats
Reason:
- Monitoring of N2000 species
- Critically endangered in Flanders
- Discrete lifestyle → nocturnal
- Scattered habitat in Flanders



Name: Raya
Breed: French Water Dog
Age: 2,5 years
Dog: No detection experience
Handler: Animal behavioral therapist



Hermit beetle (*Climacidium erwinia*)
Scent Source: Larvae, scats
Reason:
- Monitoring of N2000 species
- Critically endangered in Flanders
- Highly specialised lifestyle → tree hollows



Name: Wirtse
Breed: Flatcoated Retriever
Age: 5 years
Dog: Trained detection dog (Boortint)
Handler: Detection training experience + dog trainer



Stag Beetle (*Lucanus cervus*)
Scent Source: Larvae, living animal
Reason:
- Monitoring of N2000 species
- Endangered in Flanders
- Small scattered populations



Eurasian otter (*Lutra lutra*)
Scent Source: Scats
Reason:
- Monitoring of N2000 species
- Critically endangered in Flanders
- Discrete lifestyle → nocturnal



Name: Smokey
Breed: Belgian Malinois
Age: 3,5 years
Dog: Trained detection dog
Handler: Professional detection instructor



Hazel dormouse (*Muscardinus aevalanus*)
Scent Source: Nesting material
Reason:
- Monitoring of N2000 species
- Critically endangered in Flanders
- Distribution limited to one region



Name: Kikki
Breed: English Springer Spaniel
Age: 1,5 years
Dog: Some detection experience
Handler: Detection training experience + dog trainer



European hamster (*Cricetus cricetus*)
Scent Source: Nesting material
Reason:
- Monitoring of N2000 species
- Critically endangered in Flanders
- Protection program: habitat and reintroduction

Odisee Student projects: ecodog hindrances & successes

SNIFFING FOR NATURE: DETECTION DOG TRAINING IN REAL LIFE ENVIRONMENT

Bente Stockmans¹, Arno Thomaes², Ellen Van Krunckelsven³, Hilde Vervaecke¹

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² Research Institute for Nature and Forest, Havenlaan 88 bus 73, B-1000 Brussels, Belgium; arno.thomaes@inbo.be

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Scent detection dogs can provide a fast, reliable and non-invasive method for detection of a variety of target species for nature monitoring, offering a charismatic tool for communication. Therefore, it could be an ideal tool for the monitoring of N2000 species with a discrete lifestyle. However only limited experience is available in Europe. A volunteer program was set up where a professional scent dog trainer selected eight human-dog dyads and assisted them in scent training on different target species. We documented if the dogs could reliably detect the target species in a controlled as well as natural setting.

MATERIAL AND METHODS: We interviewed the volunteers and trainer (Ellen Van Krunckelsven) to identify which problems were encountered when the training proceeded from a controlled setting to a natural environment. Each dog was trained on one or two target species. Training experience of the volunteers ranged from very restricted to professional level.

RESULTS: All dogs of varying breeds, sexes and ages, manage to correctly discriminate the target species, with inter-individual differences in learning speed and drive. Detection problems in the field relate to species-specific natural history traits of the target species such as depth of hiding under ground, seasonality of markings and ease of possible detection of the target by humans.

Bente Stockmans. 2019. **Flemish eco-dog teams: hindrances & successes.** Dissertation Odisee University of Applied Sciences. Promotor Hilde Vervaecke- Ellen Van Krunckelsven

Longlist (top 10) of Flemish Scriptieprijs



Odisee Student projects: ecodog needs & future

Needs & future of Flemish Ecological detection dogs?

Laura De Kort, 2020. Dissertation Odisee University of Applied Sciences. Promotor Hilde Vervaecke - Ellen Van Krunkelsven

- Surveys (Qualtrics) Belgium - The Netherlands - Germany - Switzerland - UK - USA
- 53% professionals - 47% volunteers
- 70% operational dogs - 30% in training

- Certification
- Professionalisation
- Online platforms to share knowledge & experiences
- Science



Odisee financed projects: wolf pilot



Bulletin of University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca. Animal Science and Biotechnologies

Open Access

Training of Ecological Detection Dogs for Wolf Scat (*Canis lupus*)

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² Research Institute for Nature and Forest, Havenlaan 88 bus 73, B-1000 Brussels, Belgium

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RESEARCH ARTICLE

Abstract

Detection dogs for wolf scat can assist in conservation-monitoring of wolves. In this pilot project, the first encounters of experienced detection dogs with wolf scat were documented. It was tested how a dog, trained with only a few scat samples (minimally four, maximally six), could generalise towards new unknown wolf scats and discriminate them from distracting odours. Four dogs all showed a behavioural expression of aversion upon first presentation with wolf scat during their initial training to fixate on wolf scat. The dog that showed the least aversion to wolf scats was trained during two weeks. His ability to discriminate wolf scat from other odours and to generalise to new wolf samples was evaluated. He was presented a line-up with new wolf scat, dog scat and other distracting odours in eight boxes, seven trials and random rotations of odours. The test was conducted blindly without the dog handler knowing if or where a positive sample was present. The dog showed partial generalisation of wolf scat odour from only a few known training samples to new wolf samples. The test was evaluated for methodological improvements.

Keywords: *Canis lupus*; scat; detection dogs.



Wolf pilot



Figure: Smoke showing aversive behaviour to the wolf sample: she prefers to turn away



Figure: Pippa showing aversive behaviour to the wolf sample by reluctance to approach and point



Figure: Smoke showing aversive behaviour to the wolf sample, stepping by sideways, averting her head



Figure: Pippa correctly pointing. Notice her lifted back foot, possibly a sign of some conflict behaviour due to the aversive odour.

Wolf pilot



Odisee Student projects: certification test

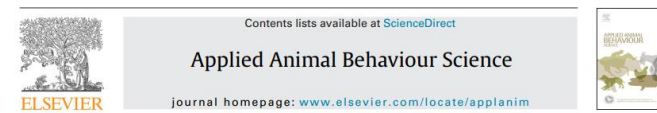
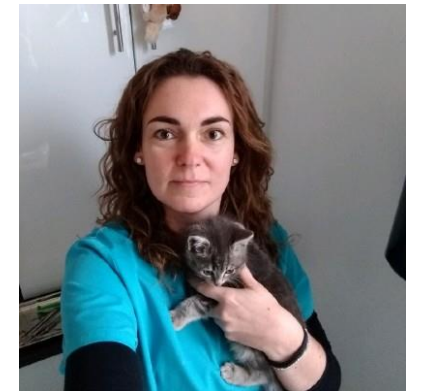
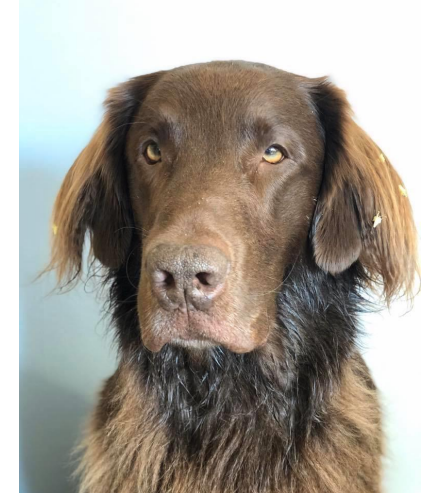
Ecological detection dogs on wolves: testing a certification method.

Katrien Vrijdag. 2021. Dissertation Odisee University of Applied Science (Promotor Hilde Vervaecke - Ellen Van Krunkelsven - Carina Depape).

Shortlist of Vlaamse Scriptieprijs (3th)

M&M:

- Wietse & Carina Depape
- Testing feasibility of Certification test of Porritt et al. (2015)
- Testing outdoor plots & trajectories



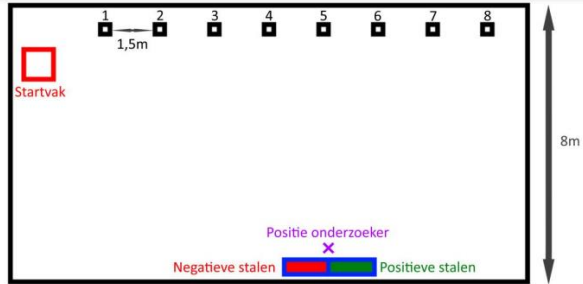
Validation of a short odour discrimination test for working dogs[☆]



Fay Porritt^{*}, Ralph Mansson, Alison Berry, Natalie Cook, Nicola Sibbald, Steve Nicklin

Dstl, Fort Halstead, Sevenoaks, Kent TN14 7BP, United Kingdom

Odisee Student projects: certification test



Figuur 1 Indeling en afmetingen testlokaal

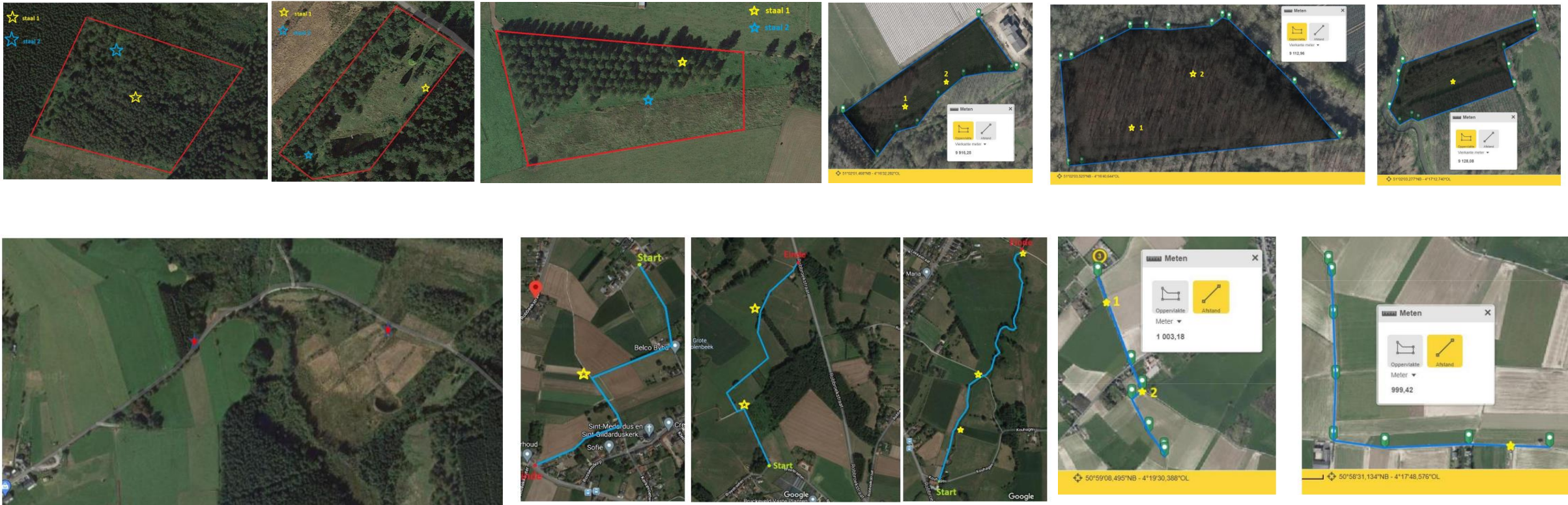


Figuur 2 Line-up met acht containers



How: 6 runs double blind (1 blanco), on leash, one pass from left to right, handler says if dog alerts or if he “doubts”
Minimal target detection score & false alert score

Odisee Student projects: certification test



Outdoor test plots: 8/11 (73%)

Test trajectory 1 km: 8/11 (73%)

Odisee Student projects: ecodog data management

Ecological detection dogs in Flanders: evaluation of data collection.

Brian Mommers, 2022. Dissertation Odisee University of Applied Sciences. Promotor Eva Paridaens - Hilde Vervaecke

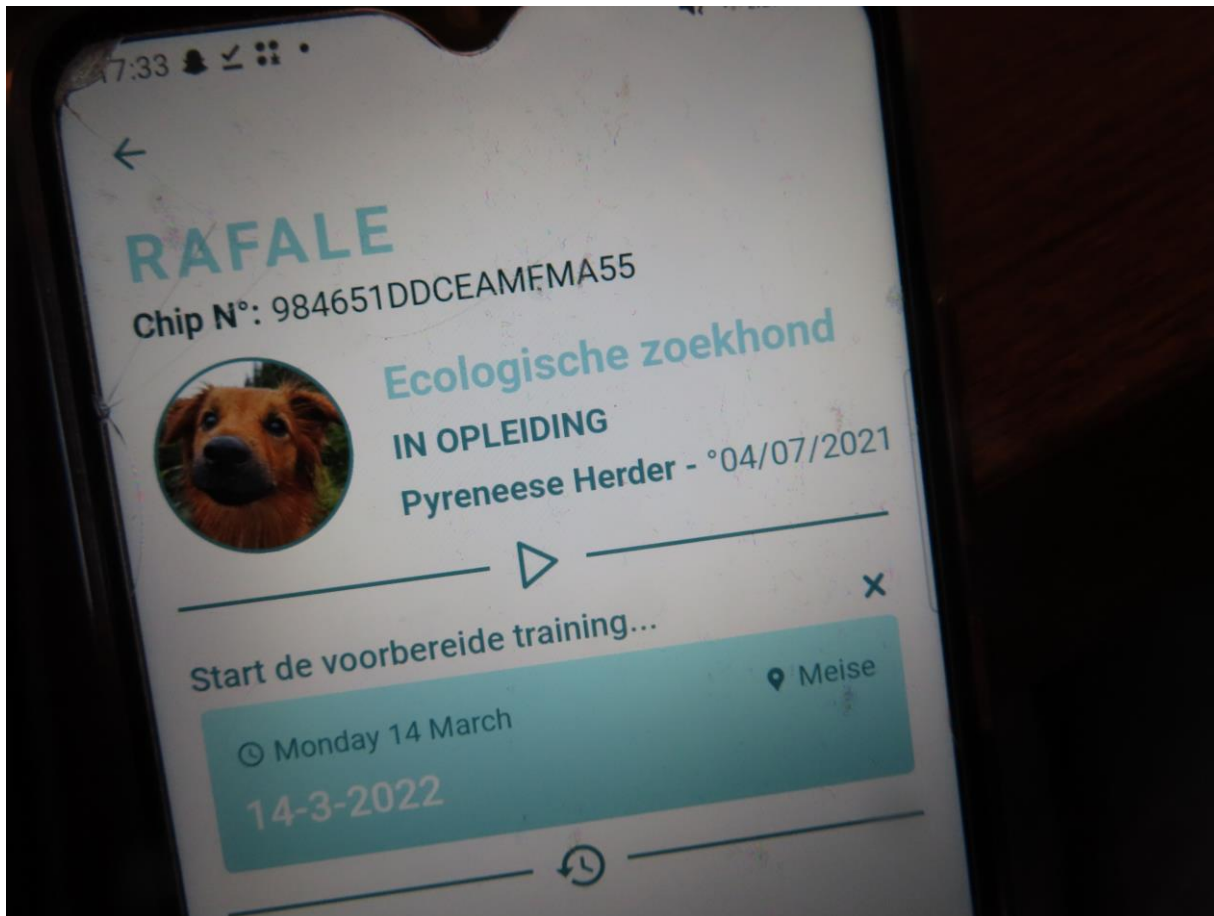
How does it work now & what are the problems?

- Interviews of dog handlers & matching species specialists
- Species: wolf, stag beetle, otter, pine marten, European hamster & dormouse

Odisee Student projects: ecodog data management

- Most frequent problems:
 - training time
 - training samples
 - communication
- Most frequent questions about field searches:
 - Methodology: verification of dog indication, entry permits, how to run trajectories/plots, should we score absence of target & how, what to do with data, ...
- Solution?
 - protocols (methodology, data entrance)
 - good practice guidelines

Odisee financed project: Nose Log

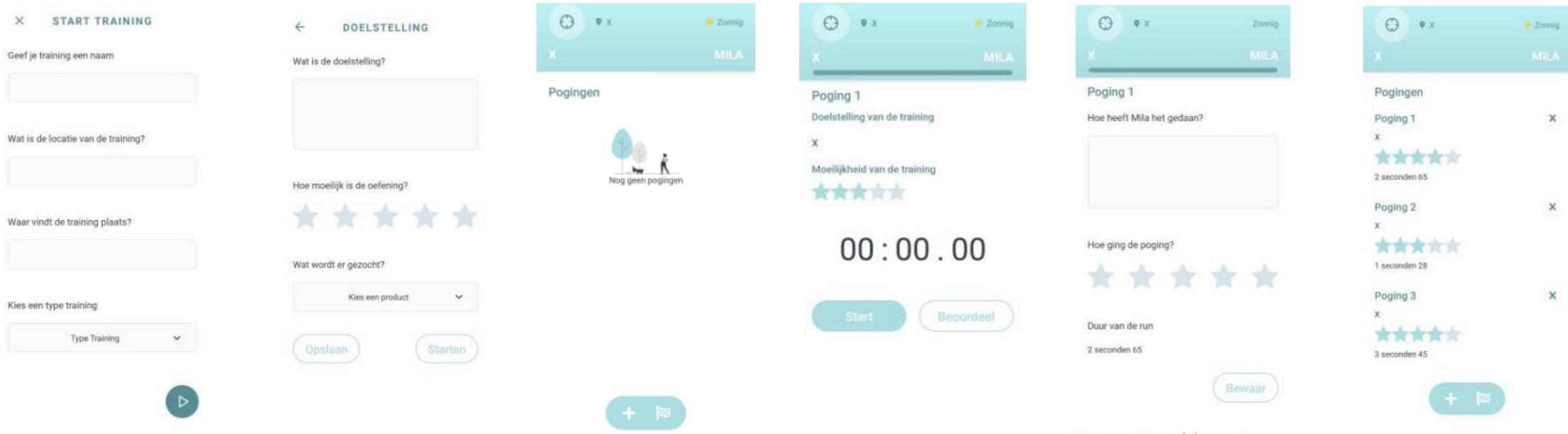


Training application for detection dogs. Testing and evaluating the prototype.

Caro Wouters. 2022.
Dissertation Odisee
University of Applied
Sciences. Promotor Hilde
Vervaecke - Ellen Van Krunkelsven



Nose Log

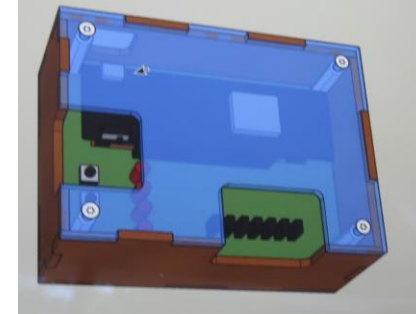
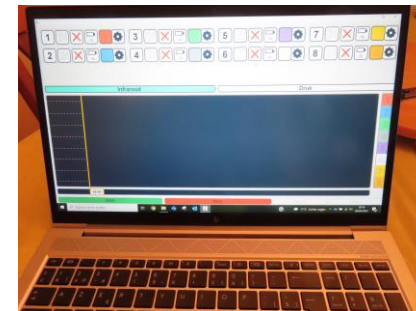
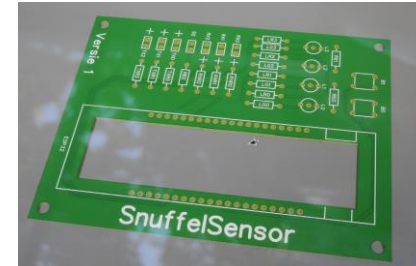
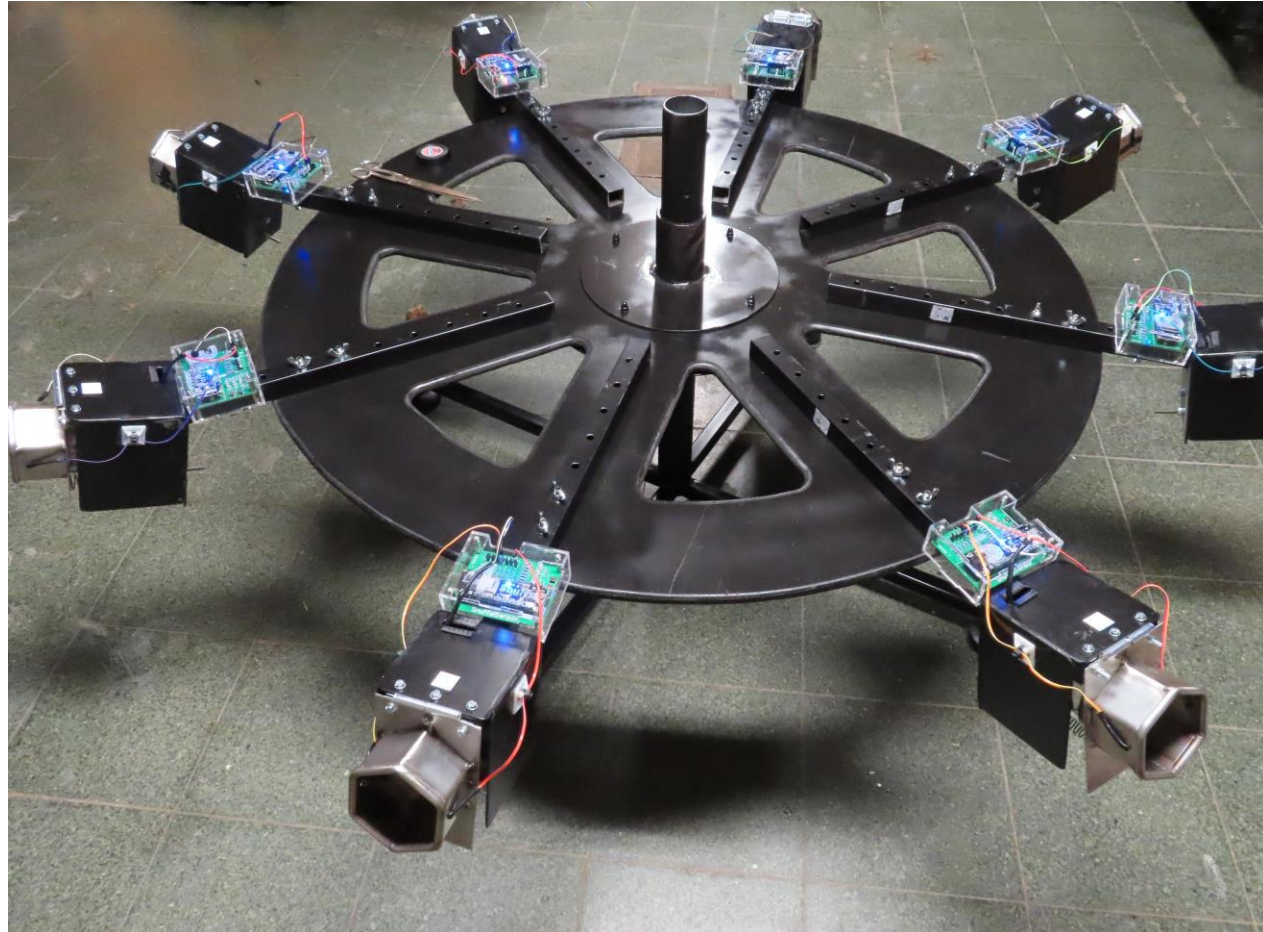


Evaluated with SUS (System Usability Scale) – in further development

Odisee financed - SnuffelSensor

- Can we develop a sniffing time measuring device to accurately measure sniffing duration?

SnuffelSensor



SnuffelSensor

Chem. Senses 39: 749–754, 2014

doi:10.1093/chemse/bju045
Advance Access publication September 11, 2014

Using Sniffing Behavior to Differentiate True Negative from False Negative Responses in Trained Scent-Detection Dogs

Astrid Concha¹, Daniel S. Mills¹, Alexandre Feugier², Helen Zulch¹, Claire Guest³, Rob Harris³ and Thomas W. Pike¹

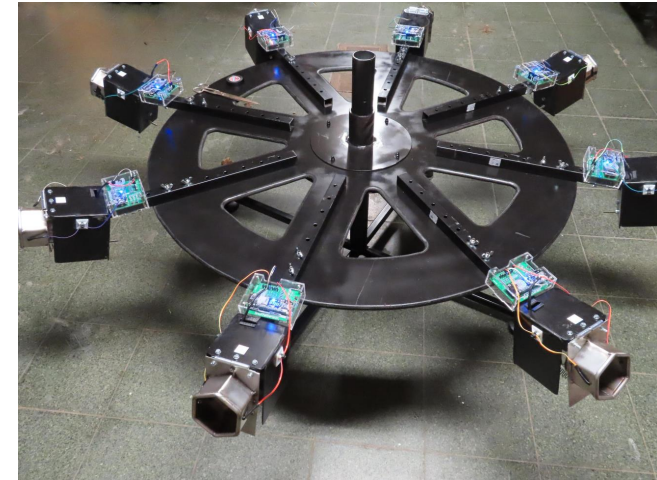
¹School of Life Sciences, University of Lincoln, Joseph Banks Building, Lincoln LN6 7DL, UK, ²Royal Canin SAS, Avenue de la petite Camargue, Aimargues F-30470, France and ³Medical Detection Dogs, 3 Millfield, Greenway Business Park, Great Horwood, Milton Keynes MK17 0NP, UK

Correspondence to be sent to: Astrid Concha, School of Life Sciences, University of Lincoln, Joseph Banks Building, Lincoln, LN6 7DL, UK. e-mail: aconcharamirez@lincoln.ac.uk

Accepted August 3, 2014

False negatives are recorded in every chemical detection system, but when animals are used as a scent detector, some false negatives can arise as a result of a failure in the link between detection and the trained alert response, or a failure of the handler to identify the positive alert. A false negative response can be critical in certain scenarios, such as searching for a live person or detecting explosives. In this study, we investigated whether the nature of sniffing behavior in trained detection dogs during a controlled scent-detection task differs in response to true positives, true negatives, false positives, and false negatives. A total of 200 videos of 10 working detection dogs were pseudorandomly selected and analyzed frame by frame to quantify sniffing duration and the number of sniffing episodes recorded in a Go/No-Go single scent-detection task using an eight-choice test apparatus. We found that the sniffing duration of true negatives is significantly shorter than false negatives, true positives, and false positives. Furthermore, dogs only ever performed one sniffing episode towards true negatives, but two sniffing episodes commonly occurred in the other situations. These results demonstrate how the nature of sniffing can be used to more effectively assess odor detection by dogs used as biological detection devices.

Key words: detection dogs, false negative, false positive, sniffing behavior, target odor



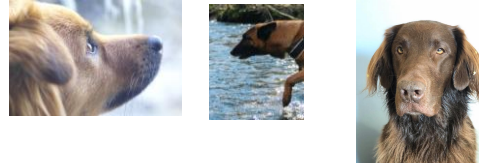
Odisee financed - SnuffelSensor

The SnuffelSensor: Does sniffing duration differ among individuals? Are correct negatives shorter in duration than the other types of scores?

Océane Marville. 2023. Dissertation Odisee University of Applied Sciences. Promotor Hilde Vervaecke- Ellen Van Krunkelsven



SnuffelSensor



M&M

- Rafale – glowworm larvae - fixate
- Smoke – glowworm larvae - fixate
- Wietse – wolf scat - sit

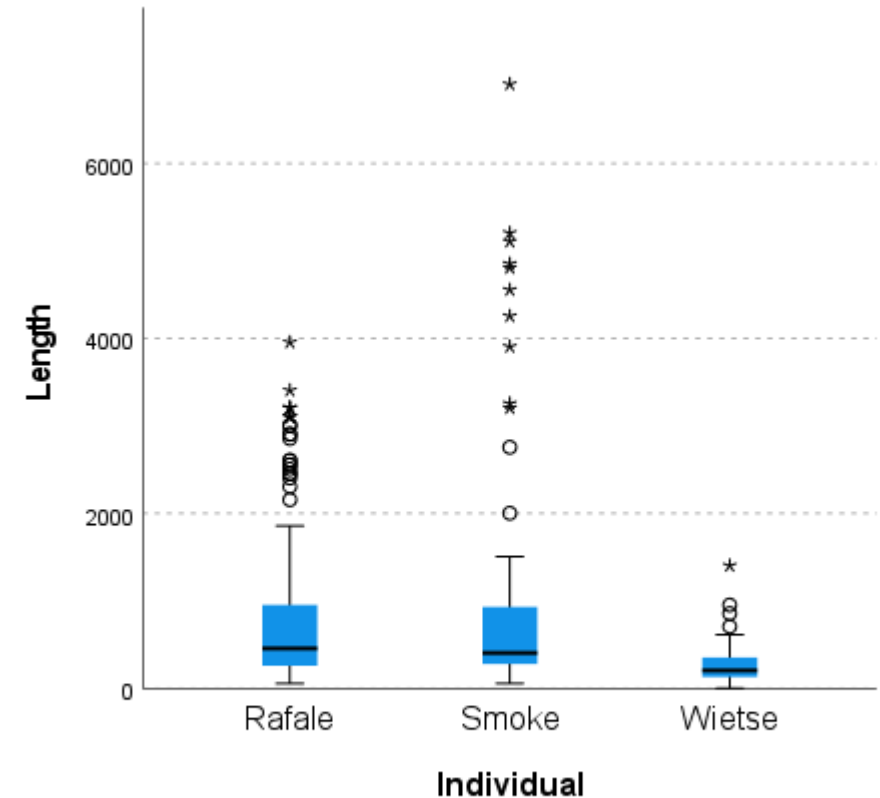
1 & 2: Mixed linear model with the natural log of duration to comply with normality. Fixed effects: dog, type of score; random effects: day, session.

SnuffelSensor

How long do they sniff? Is there an individual difference in duration?

Dogs show significant difference in duration ($p < 0.0001$) ($n=359$).

- Rafale & Wietse: $p < 0.0001$
 - Smoke & Wietse: $p < 0.0001$
 - Smoke & Rafale: NS ($p=0.1911$)
 - Duration is significantly shorter in Wietse
-
- Rafale: $x=803,47$ ms; $SD=832,69$, range=55-3955
 - Smoke: $x=1021,14$ ms; $SD= 1442,92$; range=56-6905
 - Wietse: $x=272,52$ ms; $SD= 234,17$; range=1-1403



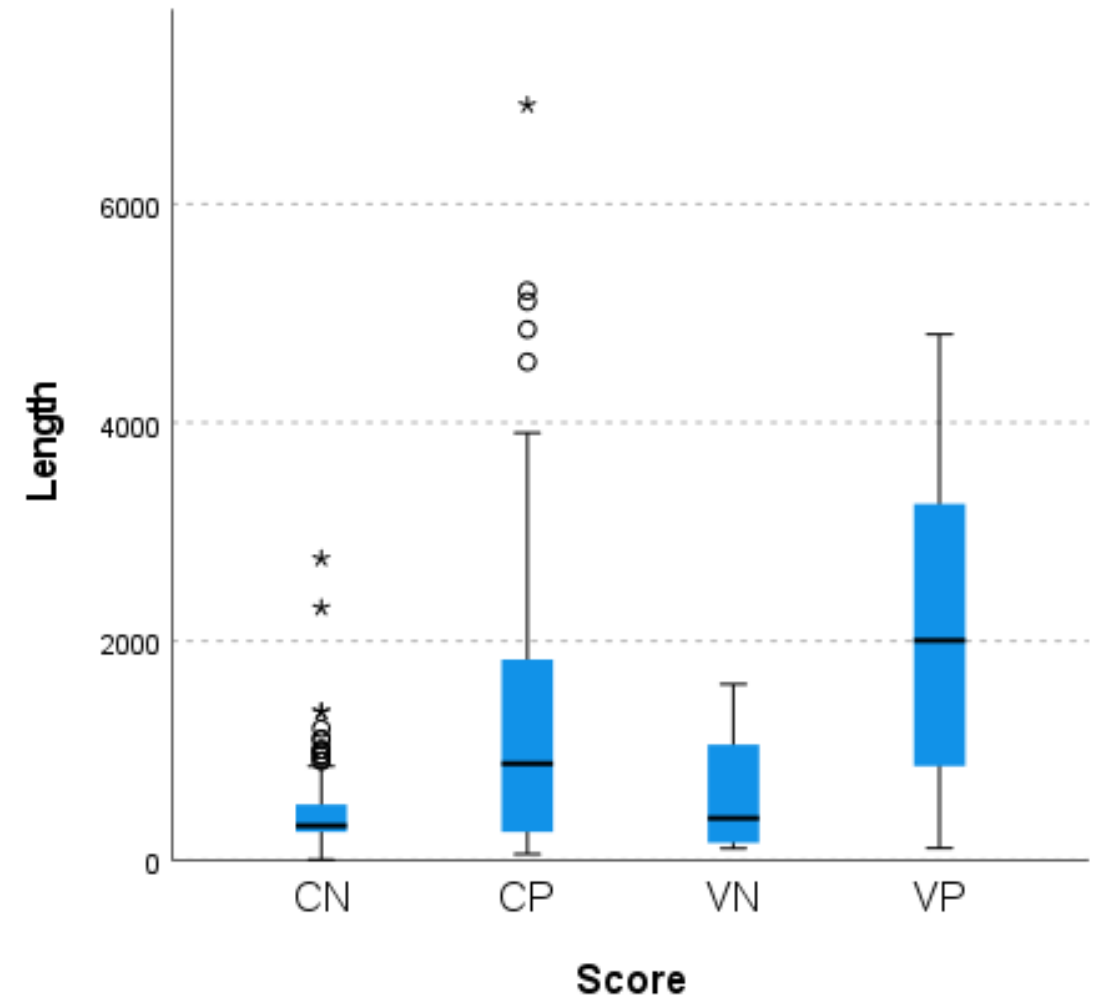
SnuffelSensor

Is there a difference among types of score in sniffing duration?

- CN: $x=415,85$; $SD=316,32$; range=1-2756, $n=227$
- CP: $x=1294,52$; $SD=1358,23$; range=52-6905, $n=108$
- FN: $x=600,50$; $SD=527,52$; range=104-1606, $n=10$
- FP: $x=2194,86$; $SD=1549,56$; range=106-4806, $n=14$

Types of scores show significant difference in duration ($p < 0.0001$).

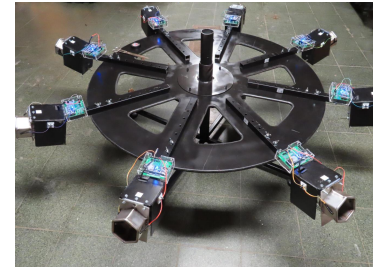
- CN - CP: $p < 0.0001$ → CN is shorter
- CN - FP: $p < 0.0001$ → CN is shorter
- CN - FN: trend ($p < .08$)
- CP - FN: NS ($p = 0.9382$).



Student project: sniffing aversion and attraction



Sniffing duration with naturally aversive and attractive odours



Alicia Vorstenbosch. 2023.
Dissertation Odisee
University of Applied
Sciences. Promotor Hilde
Vervaecke- Ellen Van Krunkelsven

Animal Cognition (2020) 23:721–729
<https://doi.org/10.1007/s10071-020-01379-y>

ORIGINAL PAPER



Fears from the past? The innate ability of dogs to detect predator scents

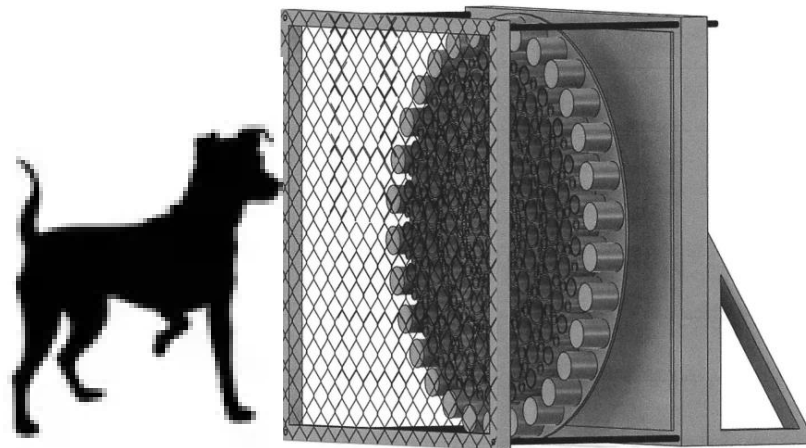
Lydia Samuel¹ · Charlotte Arnesen² · Andreas Zedrosser^{2,3} · Frank Rosell²

Student project: odour perception

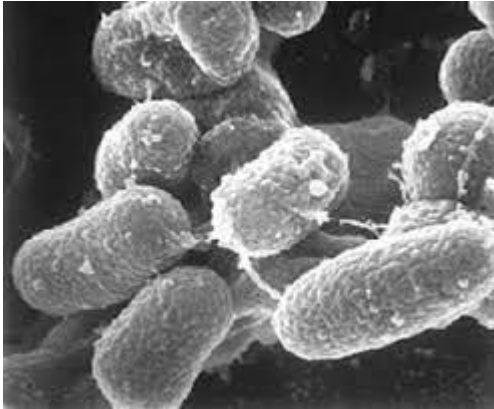


Practical test of odour perception for detection dogs

Wodan Libot. 2023. Dissertation
Odisee University of Applied
Sciences. Promotor Hilde Vervaecke - Ellen Van
Krunckelsven



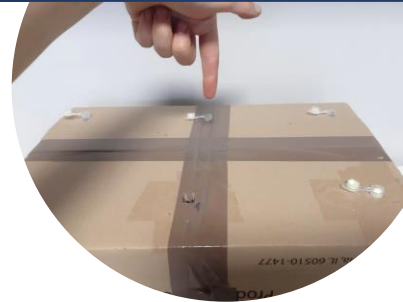
Student project: ParaTBC in goat milk



**Training of rats as
detection animal:
Mycobacterium avium
subsp. *paratuberculosis* in
goat colostrum**

Manon De Meester. 2022.
Dissertation Odisee
University of Applied
Sciences. Promotor: Jo Vicca &
Hilde Vervaecke, Ellen Van Krunkelsven)

Longlist Vlaamse
Scriptieprijs



Student project: scent training a horse



Training a scent detection horse: feasability test

Enid Beke. 2023. Dissertation
Odisee University of Applied
Sciences. (Promotor: Hilde Vervaecke,
Thaana Van Dessel)



Future

Connecting
Researching
Sharing

<https://zoekdieren.odisee.be>
zoekdier@odisee.be



Thanks to:

- you
- the students
- Odisee & my colleagues
- INBO
- the biologists
- the dog handlers & the volunteers
- the dogs



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Wouters, Caro. 2022. Trainingsapplicatie voor zoekhonden Opvolging en evaluatie van het prototype. Eindwerk Agro- en Biotechnologie, afstudeerrichting Dierenzorg 2020-2021, Odisee. Promotor: Hilde Vervaecke, co-promotor: Ellen Van Krunkelsven.

