

African swine fever and detection dogs for wild boar carcasses

This is part of a broader study on the possibilities for deploying detection dogs to locate wild boar carcasses in the event of an outbreak of African swine fever (by Hilde Vervaecke and Manon De Meester, Odisee University of Applied Sciences, Belgium; steering committee members: Uta Kielau, Ellen Van Krunkelsven, Kristof Baert, and Arno Thomaes).



Report 2a. Documentation of Costs of Detection Dogs for Wild Boar Cadaver Detection

Information on the costs of training and deploying detection dogs, and on the effectiveness of detection dogs for locating wild boar cadavers, was gathered from various sources:

- Scientific literature regarding the use of detection dogs, primarily for ecological detection.
- Information from several German protocols on the deployment of detection dogs for African swine fever.
- Information from a survey, interviews, and discussions with people experienced in the training, deployment, or governmental management of detection dogs in the context of African swine fever.

The sources used in this work include both peer-reviewed scientific literature and grey literature (e.g. protocols, reports, and expert consultations). While peer-reviewed publications provide scientifically validated evidence, grey literature and expert input primarily offer practical and contextual insights and should be interpreted accordingly.

Citation:

- Vervaecke, H. 2025. Documentation of Costs of Detection Dogs for Wild Boar Cadaver Detection Report 2a for ANB.
- Vervaecke, H. 2025. Information on the Efficacy of Detection Dogs with Focus on Cadaver Detection. Report 2b for ANB.

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SCIENTIFIC LITERATURE

The costs of deploying a detection dog team depend on several factors: whether the team is professionally trained, the country of origin, local prices, and the design and purpose of the project. As a result, it is difficult to provide an exact estimate of the costs (Sandor et al., 2025).

A review states that the cost of the service provided by a dog and handler is estimated to be approximately 40% higher than that of purely human search teams. However, the observed improvement in results is sufficient to justify these additional costs, especially when searching for small carcasses in dense vegetation (Domínguez del Valle et al., 2020).

The annual cost of two detection dog teams for monitoring bobcats (*Lynx rufus*) via scat samples was estimated at \$27,539 (USD), including: the costs for hiring dogs, hourly wages of handlers, training costs at the organisation's main site, transport to the location, and overhead costs. An additional \$4,653 was added to this budget for on-site logistical support, including fuel, accommodation for dog teams, and rental vehicles (Clare et al., 2015).

Taking current inflation into account, the cost of a dog handler is estimated at approximately \$480 (USD) per day, which is more expensive than a team of human searchers (Nussear et al., 2008).

Nevertheless, with the same budget and/or timeframe, twice as many wind turbines could be visited for searching bat carcasses using dogs compared to using humans alone. This comparison is based on the hourly rate of a human observer, depending on the country, and the average search time in the study. For such use, a total cost of \$8,000 (USD) per animal is estimated, based on the dogs used in the study and those subsequently trained (Mathews et al., 2013).

Deploying dogs trained by their own owners, rather than through specialised organisations, may be a way to use detection services when only limited resources are available (Byosiére et al., 2019). In this case, agreements must be made regarding performance and codes of conduct, as well as costs for equipment, accommodation, and food for volunteers.

Report on German practice (Moschner, 2020)

In 2020, the German approach was documented in a university of applied sciences report.

The remuneration of instructors/trainers varies greatly by federal state:

- Hesse
 - o One training centre charges €2,500 per team (including, among other things, training locations and the purchase of wild boars in various stages of decomposition).
 - o Another centre operates on a voluntary basis (unpaid).
 - o No data are available for a third.
- Lower Saxony
 - o No fixed cost rates, only travel reimbursement: €0.30/km.
- Thuringia
 - o Approximately €1,000 per team.
 - o Remuneration for instructors has not yet been determined.
 - o Travel expense reimbursement is provided.
- Mecklenburg-Vorpommern, North Rhine-Westphalia, Rhineland-Palatinate, Saxony, Saxony-Anhalt
 - o Training is part of the official duties of state employees, therefore no separate payment.
- No information on remuneration of instructors:
 - o Brandenburg, Baden-Württemberg, Bavaria, Lower Saxony (specifically regarding remuneration), Schleswig-Holstein and Saarland.

Payment of dog handlers and reimbursement of their costs

During deployment (not during training):

- Dog handlers usually receive a daily allowance in affected areas.
- Brandenburg: standardised contracts, expenses included.
- Landkreis Ludwigslust-Parchim (Mecklenburg-Vorpommern):

- €600 per deployment day + travel expenses per team (only in this district).
- Saxony:
 - €600 per deployment day, meals included.

During training:

- No salary for dog handlers during training.
- Support for costs varies by federal state.

Cost support during training (overview by federal state):

- Baden-Württemberg, Lower Saxony, Saxony-Anhalt:
 - Expenses during training are reimbursed by the federal state.
- Bavaria, Hesse, Lower Saxony, Saarland:
 - Provide financial support.
 - Bavaria does not specify an amount; participation requires mandatory monthly training and availability for deployment.
- Hesse:
 - Successful dogs can receive €500 reimbursement (training only).
- Mecklenburg-Vorpommern:
 - To date, the state finances the training; in the future, dog handlers will have to bear all costs themselves.
- Lower Saxony:
 - €50 per deployment on site per team.
 - Up to €1,000 support for equipment after passing the examinations.
 - Condition: 4 years of deployment availability and regular training; re-examination every 3 years.
- Schleswig-Holstein:
 - €600 support per team.
- Saarland:
 - Supports training and annual performance tests; amount not specified.

INFORMATION FROM PROTOCOLS

Contract for the deployment of dog handlers (TCRH):

TCRH Training Center Retten und Helfen has drawn up a contract for carrying out control measures against contagious animal diseases on behalf of the federal states of Hesse and Baden-Württemberg.

The contractor receives for each deployment:

- Daily allowance for activities:
 - €450 per day for deployment > 5 hours
 - €250 per day for deployment ≤ 5 hours
 (including search and rest times, breaks, weather interruptions and data transfer; plus VAT)
- Compensation for the deployed dog:
 - €100 per day for deployment > 5 hours
 - €50 per day for deployment ≤ 5 hours
- Drone deployment: €100 per day (plus VAT)
- Travel expense reimbursement: €0.30 per kilometre driven for outbound and return journeys and trips within the deployment area (plus VAT).

Settlement takes place on a monthly basis and must be paid within 30 days.

The fees cover all costs incurred by the contractor, unless the client centrally provides accommodation.

Deployment per assignment and per dog team or drone team is limited to an average of three consecutive days.

The contractor is fully responsible for taxes and social security contributions; the client does not pay these, but is obliged to report the payments to the tax authorities.

INFORMATION FROM INTERVIEWS AND DISCUSSIONS

Volunteer dog teams TCRH:

In Baden-Württemberg, the dog teams receive €450 per day and €100 for the dog. They receive a kilometre allowance and meals, and any overnight stay is paid for. This is an “Aufwandsentschädigung”, i.e. an expense allowance. The total cost amounts to €560–600 per day as compensation. (Source: Report of visit TCRH)

Surveys:

In the survey, respondents were asked: “What do you consider a correct price in case you would be hired with your dog for a search in the field (in infected area)?” The average amount is €517.86 (median: 500; range: 150–700; n=14). Transport costs and hotel costs should be added to this. Correct price per hour = €81.75 (median = €80; range: 17–150; n=4).

Wallonia (Belgium):

Information from Céline Malengreaux (Service Public de Wallonie, Département de l’Etude du Milieu Naturel et Agricole, Wallonia, Belgium): An unpublished comparison between the deployment of dog teams versus human-only teams showed that the use of **dog teams** during the ASF outbreak at the Belgian-French border was **slightly less expensive** than the deployment of teams consisting solely of humans. However, there were not enough dogs available for deployment.

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Report 2b. Documentation of the effectiveness of search dogs for the detection of wild boar carcasses.

Report 6 is complementary in content to this report and is best read as an additional source

SCIENTIFIC LITERATURE

Wisely designed and well-targeted search operations using appropriately trained dogs constitute an indispensable tool in controlling African swine fever (ASF) outbreaks in wild boar populations, particularly in so-called hotspots where the virus is detected at an early stage of the epizootic (Podgorski et al., 2020; Kruszyński et al., 2026).

How well do dogs perform compared to other detection methods?

Heinle et al. (2024) found that people visually searching for turtle shells under realistic field conditions at 5 metres from their path, while systematically covering the entire area, failed to find 37% of the visible targets. Sandor et al. (2025) analysed the literature regarding the effectiveness of detection dog teams. Since dogs can detect the volatile organic compounds (VOCs) released during the decomposition of a carcass (Dargan & Forbes, 2021), detection dog teams are 2 to 10 times more effective than observers at locating carcasses of birds, bats and sheep (Homan et al., 2001; Arnett, 2006; Paula et al., 2011; Mathews et al., 2013; Domínguez del Valle et al., 2020; Hansen & Winje, 2021; Reynolds et al., 2021). Dogs can effectively locate carcasses of animals that are victims of agricultural mowing activities across different vegetation types (Deák et al., 2021). (Table 1, Sandor et al., 2025)

With dog teams, there is an increase in the overall detection rate. Dog–handler teams are able to find carcasses that otherwise would not (or likely would not) have been found by humans, even though there are individual performance differences between teams or dogs (Hansen & Winje, 2021). Dogs can find more carcasses, both hidden and in more open areas. Dogs can detect carcasses in both recent and advanced stages of decomposition, as well as in the skeletal stage, where fewer volatile organic compounds are released due to the lack of soft tissue, making detection more difficult (Dargan & Forbes, 2021). The effectiveness of detection dogs in searching for carcasses is not always defined or reported in the same way across different studies, which makes it difficult to compare and evaluate performance (McKeague et al., 2024).

TABLE 1 Compared detection rate between detection dog teams and humans in selected studies.

Reference	Location	Dog detection rate	Human detection rate	Type of Carcass	Vegetation cover	Climatic conditions: season, temperature (T), humidity (H)	Wind	Detection distance or time	Decomposition stage and time after installation
Homan et al., 2001	East-central South Dakota (USA)	92%	45%	Birds house sparrows (<i>Passer domesticus</i>)	Density 27% Length 34 cm	April, mean T= 6°C(3-11) H=46% (23-70)	NIA	NIA	NIA
	South-central North Dakota (USA)				Density 69% Length 51 cm	August T=25°C (19-31) H= 59% (25-91)	NIA	NIA	NIA
Paula et al., 2011	Portugal	96%	9%	17 different birds and bats species	Coverage < 30%	October and November Day with cold T (11.6–16.7°C) Day with hot T (20.35-25.8°C)	6,16m/s (0.85-12.75)	<150 s carcasses placed apart 25–125 m	Each decomposition stages. Placed each day kept in a cage between trials
Dominguez del Valle et al., 2020	South-east Spain	77.3%	21.5%	Different species of bird and bats	0-3m	T= 13.54°C (-4-28.4)	20.16 km/h (7-43)	NIA	Defrosted before use (used for several trials)
Reynolds et al., 2021	Kaua'i Island (Hawaii, USA)	82%	Pedestrian team: 70%	Hawaiian ducks (<i>Anas wyvilliana</i>)	wetland	March	0-16.1 km/h	25 m (1-85)	Half of the carcasses: Active and advanced decomposition
			All-terrain vehicle team: 40%						
Hansen and Winje, 2021	Norway	23.8%	2.5%	Sheep	Open fields and hidden (vegetation and rocks)	April to August	NIA	NIA	Fresh and old carcasses
Mathews et al., 2013	Devon, Southwest England	73%	20%	Bats	Median height=50 cm, median ground cover =100%	December and February 4-8°C and no rain	NIA	NIA	Various decomposition stages (2/3 frozen)
	Lincolnshire Eastern England				Median height = 15cm, median cover=83%				
Arnett, 2006	West Virginia (USA)	71%	42%	Bats	High (86% of dog detection, medium (89%), and low (68%) visibility	August to September	NIA	50–80% detection at 10–60 m distance	Various decomposition stages
	Pennsylvania (USA)	81%	14%			July to September			
Deák et al., 2021b	Hungary	Detection of mowing mortality	No comparison	Mammals, reptiles and birds (see table S1 of the study)	Leguminous vegetation and grass meadows	May and June	NIA	0 and 200 m	Various decomposition stages

NIA, No information available.

Figure 1 Sandor et al., 2025: Table of compared detection rate between detection dog teams and humans in selected studies

Influences on detection performance (references to be supplemented)

The review by Sandor et al. (2025) lists several key factors influencing detection performance:

The nature of the target object and factors related to **its odour intensity** are among the main reasons for the differences in detection performance reported in studies.

Some challenging environments, such as tall and dense vegetation, can reduce the detection performance of dogs (Paula et al., 2011; Mathews et al., 2013; Domínguez del Valle et al., 2020). These conditions require greater physical effort, leading to increased panting, which in turn can reduce concentration. Nevertheless, the performance of detection dogs appears to be little to not affected by small carcass size in dense vegetation, in contrast to human searchers (Homan et al., 2001; Arnett, 2006; Paula et al., 2011; Domínguez del Valle et al., 2020; Hansen & Winje, 2021; Reynolds et al., 2021). A study on detection dog employed for ASF-surveillance in Poland summarizes that in practice the dogs track scents to their source, regardless of whether the area is a fenced-off thicket, idle agricultural land densely overgrown with thorny blackberry shrubs, or marshes (Kruszyński et al., 2026).

Odour dispersion, temperature, humidity and wind conditions can influence a dog's olfactory performance (Arnett, 2006; Paula et al., 2011; Mathews et al., 2013; Hansen & Winje, 2021). With increasing temperature, fatigue — and especially panting — increases, which reduces their detection ability (Homan et al., 2001; Gazit & Terkel, 2003; Mathews et al., 2013). The effect of temperature on detection rate is difficult to determine (Homan et al., 2001; Long et al., 2007; Paula et al., 2011; Reed et al., 2011; Reynolds et al., 2021), as it depends on multiple factors, such as individual differences, time spent in the field at a given temperature, and other weather conditions. Therefore, no general recommendation can be made, except to avoid searches during the hottest periods of the day. The study on Polish ASF-surveillance practices states that the dogs were not impeded by snow cover, water, or ice, showing a picture of a dog standing on ice indicating a wild boar carcass that is partly beneath the ice (Kruszyński et al., 2026).

The adverse **effects of wind** can be compensated by allowing dogs the freedom to move around the transect line, enabling them to sample scent from multiple directions (Reed et al., 2011). To increase detection rates in windy conditions or dense vegetation, it is recommended — where possible and permitted — to work without a leash or with a long line (e.g. 20 metres) (Paula et al., 2011; Reed et al., 2011; Domínguez del Valle et al., 2020; Hansen & Winje, 2021). The experience in Poland showed that a wild boar scent could be detected from over 300 m away (Kruszyński et al., 2026).

In addition, **individual differences between dogs** also have a major influence on their detection performance, alongside breed differences and **differences in training**. Several effective methods exist for training and conditioning detection dogs (Hall et al., 2021). The skill of the trainer — who is sometimes also the handler — can also influence the results achieved by the dog during training (Johnen et al., 2013, 2017). Furthermore, the handler must be able to communicate effectively with the dog, efficiently direct search tasks, and correctly interpret and reward a find (Lazarowski et al., 2020). For the same search target, different levels of performance can be achieved under comparable conditions, depending on the experience of the handler (Furtado et al., 2008; Beebe et al., 2016). For example, an accuracy of 81% in detecting jaguar and puma scats was achieved with experienced dog handlers, compared to 50% with new teams (Furtado et al., 2008).

Area and endurance

The review by Sandor et al. (2025) presents an overview of the linear distances covered during a working session by detection dogs in Table 2 (Sandor et al., 2025; Nussear et al., 2008; Brook et al., 2012; Clare et al., 2015; Mumma et al., 2015; Glen & Veltman, 2018; Hollerbach et al., 2018; Desvaux et al., 2021; Hansen & Winje, 2021; Reynolds et al., 2021). The average distance covered by dogs is estimated to be 2 to 6 times greater than that of their human handler (Nussear et al., 2008; DeMatteo et al., 2014; Desvaux et al., 2021).

In a French study on the search for wild boar carcasses, dog handlers covered an average of 4.7 km (median 4.9), while their dogs were estimated to have covered 2.3 times more distance (14.1 km) (Desvaux et al., 2021).

Fatigue can negatively affect concentration and welfare. Various protocols refer to an average daily search time of 2 to 7 hours, depending on the search target and project objectives (Brook et al., 2012; Oliveira et al., 2012; Mumma et al., 2015; Fuller et al., 2016; Glen & Veltman, 2018; Hollerbach et al., 2018; Desvaux et al., 2021; Deák et al., 2021b). Travel time to the starting location must also be taken into account.

When developing a protocol, performance parameters must therefore be adapted to the purpose and objective of the search (Nussear et al., 2008; DeMatteo et al., 2014; Glen & Veltman, 2018). At the same time, regular breaks, rest periods and days off must be planned in line with the needs and welfare of the dogs. These breaks ensure that concentration and efficiency remain at an adequate level (Nussear et al., 2008; Brook et al., 2012; Desvaux et al., 2021). The study on the Polish practices of ASF-surveillance with trained detection dogs, highlights their ability to maintain focus over extended periods, coupled with their enjoyment of working alongside their handler, enabling them to cover approx. 120–150 ha within an 8-hour period. An experienced dog handler can adjust the guiding method based on the terrain and weather conditions during the search. (Kruszyński et al., 2026).

TABLE 2 Examples of daily distances covered and work time by detection dog teams.

Reference	Distance covered	Work time	Detection goal
Desvaux et al., 2021	4.7 km per day (median: 4.9 km) 2.3 times more than the handler	Short sessions of an average of 50 minutes (median: 00:43) with resting time between sessions. Total work average time of 2 hours and 30 minutes per day (median: 02:30, min: 00:29, max: 05:40) Restriction during very hot or cold days.	Wild boar carcasses
Arnett, 2006	NIA	30 to 90 minutes for each plot	Bat carcasses
Deák et al., 2021b	NIA	47.28 ± 16.8 minute/search session 2 session/day, one the morning, one in the afternoon	All species' carcasses
Nussear et al., 2008	Human 10-14km per day Dog 40-80 km per day (6 times more)	NIA Continuously with breaks (water, rest, reward, and temperature regulation)	Living desert tortoises (<i>Gopherus agassizii</i>)
Brook et al., 2012	3-5 km per day	5.92 h per day with resting time (break, water and dog temperature monitoring) Significantly less than human team (8.52 h per day)	Javan rhinoceros (<i>Rhinoceros sondaicus</i>) scat in Vietnam (tropical rain forest conditions)
Hollerbach et al., 2018	Handler: 10.2 km (2.0-19.6) per day Dog: 13.9 km (2.2-28.6) per day	3.5 h (0.9-6.7) per day	Lynx (<i>Lynx lynx</i>) scat
Mumma et al., 2015	5-10 km per day	2-6 h per day	Large carnivore scat
Clare et al., 2015	8.8 km per day	NIA	Bobcat (<i>Lynx rufus</i>) scat
Oliveira et al., 2012	NIA	6 h (5-7) per day Regular breaks (rest and water)	Deer (<i>Mazama</i> spp.) scat, Brazilian Atlantic Forest
Fuller et al., 2016	NIA	<6h per day	American mink (<i>Neovison vison</i>) scat
Richards et al., 2018	0.8-8.3 km per day	2-3.5h per day (39mn - 5h)	Otter (<i>Lontra canadensis</i>) and American mink (<i>Neovison vison</i>) scat

NIA = No information available

Study on the ASF outbreak in Wallonia near the French border

Desvaux et al. (2021) conducted a useful analysis of the ASF approach in France during the ASF outbreak at the French-Belgian border in 2018. Three complementary active carcass search methods were compared, which supplemented opportunistic searching and were complementary to each other in terms of location and timing. The deployment focused on areas with a high risk of ASF introduction.

Method 1: Hunter Patrols

Hunter patrols were deployed shortly after the outbreak in September 2018. This was initially planned to last for 3 weeks to assess the epidemiological situation in the municipalities bordering the infected Belgian area ($n = 27$). The goal was to conduct at least one hunter patrol per week in each hunting area, in zones known to have wild boar, based on hunters' experience from previous years and field observations.

The route had to include, if present:

- Mud and water holes, known to be frequently used by wild boar
- Feeding sites, attractive to wild boar
- Fences and valleys along which wild boar may search for small rivers. Infected wild boar seek water due to fever and may be more easily stopped by physical barriers, preventing escape.

As a result, they are more often found dead along fences.

It was soon decided to offer voluntary hunters a financial compensation (€30 per field session) (average duration of hunter field sessions: 2:12 hours; median: 2:00 hours; min: 0:15, max: 9:45).

Method 2: Systematic Sweeps by People

In this method, an entire forest area was systematically searched in a "silent hunt" with teams of approximately 10 people. The ONF (Office National des Forêts) forest rangers were responsible for supervising the team, which consisted of volunteer soldiers and ONCFS (Office National de la Chasse et de la Faune Sauvage) staff members.

The selected sweep zones were forests in the buffer zone 5 to 7 km from the nearest Belgian ASF findings. Forests overlapping Belgium and France were prioritized. This surveillance started in January 2019 and stopped in July 2019, when no new cases were reported within <7 km of the border. Between January and July 2019, sweeps took place weekly or biweekly, based on risk assessment after analysis of the Belgian ASF cases, forest continuity between the finding sites and the French border, and the presence of fences. The scheduling was determined by the availability of personnel.

Method 3: Detection with Dogs

This was planned in the same high-risk zones as those for the "systematic sweeps by people," but in different locations, namely at the forest edges, near rivers, in meadows, and in areas difficult for people to access. In January 2019, three dog handlers were contractually engaged by the ONCFS to begin training their dogs on the scent of dead wild boar, and fieldwork started 3–4 weeks later. During the study period, five additional dogs were trained and deployed in the field.

The protocol included restrictions during very hot or very cold periods. A biosecurity protocol was developed, including washing and disinfecting the dogs' paws after each field session. A fieldwork day consisted of multiple field sessions, as dogs cannot search for long periods continuously. Initially, the intention was for detection dogs to complement the systematic sweeps by inspecting areas difficult to reach for that approach. The strategy was quickly adjusted to prevent dogs from having to search for hours in unpleasant environments, especially among nettles in spring or in bramble bushes. Dog deployment took place from February 2019 to August 2020. In total, between September 2018 and August 2020, 66 fieldwork days were organized, with multiple search sessions per day.

The **total human effort for each active search activity** (duration of field sessions multiplied by the number of people involved) is shown in Table 1. Significantly more time and effort ("surveillance

effort”) were invested by hunter patrols (6,128 hours) than by the systematic sweeps (2,384 hours) or by detection dogs (384 hours). Although hunter patrols were planned weekly, there were strong monthly fluctuations.

Table 1.

TABLE 1 | Surveillance effort and carcass detection compiled by active search activity over the study period in France, at the border of an infected area.

		Sept-Dec 18	Jan-Apr 19	May-Aug 19	Sept-Dec 19	Jan-Apr 20	May-Aug 20	TOTAL
Number of field sessions	Hunter patrols	314	352	473	487	264	254	2,144
	Systematic combing	0	28	29	0	0	0	57
	Dog detection (in days)	0	14	26	11	10	5	66
Total duration of the field sessions (hours)	Hunter patrols	643	734	1,071	1,049	607	630	4,734
	Systematic combing	0	96	124	0	0	0	220
	Dog detection	0	42	59	26	26	9	162
Total human involvement (hours)	Hunter patrols	981	992	1,342	1,354	818	643	6,130
	Systematic combing	0	1,026	1,358	0	0	0	2,384
	Dog detection	0	100	145	59	58	21	383
Number of carcasses detected	Hunter patrols	1	0	0	1	0	0	2
	Systematic combing	0	4	0	0	0	0	4
	Dog detection	0	2	0	0	0	0	2
	SAGIR opportunistic surveillance (roadkill)	22 (17)	15 (6)	3 (2)	4	2	0	46

The way field teams were organized also differed significantly between the three activities. In more than 80% of cases, hunter patrols were conducted by only one hunter (median: 1, min: 1, max: 17), whereas systematic sweeps were carried out on average by a team of 11 people (median: 10, min: 6, max: 39). Detection dog teams generally consisted of the dog handler(s) and one ONCFS staff member (median: 2, min: 2, max: 4).

In the French-Belgian project, the **duration (in hours)** of field sessions varied: hunter patrols lasted on average 2 hours and 12 minutes per session (median: 2:00, min: 0:15, max: 9:45) over a long period (2,144 field sessions). Field sessions for systematic sweeps were fewer in number (n = 57), but each session lasted on average 3 hours and 50 minutes (median: 4:00, min: 1:09, max: 6:50).

Detection dog teams operated on 66 days between February 2019 and August 2020, with search activities averaging 2 hours and 30 minutes per day (median: 2:30, min: 0:29, max: 5:40). A workday with detection dogs was divided into short **search periods averaging 50 minutes** (median: 43 minutes), interspersed with rest and/or training breaks.

The distance covered during hunter patrols averaged 5.6 km per field session (median: 4.6 km). For systematic sweeps, an average of 388 hectares was covered per field session (median: 400 ha), at an average rate of 109 hectares per hour (median: 104 ha).

The **distance covered** by dog handlers averaged 4.7 km per fieldwork day (median: 4.9 km). It was estimated that the dogs themselves covered on average 2.3 times the distance of their handlers.

The researchers could not perform a controlled comparison of efficiency. However, if we use their figures for a rough estimate, we get an imperfect indication of efficiency. The ratio of carcasses found to total human hours (“total human involvement”) is five times higher for the dog teams. It should be noted that the dogs were deployed in more difficult terrain.

In a **pilot project conducted in Italy**, Fortebraccio et al. (2022) conclude that detection dogs have a much broader potential than human teams, in terms of greater effectiveness. Dogs can use their sense of smell to quickly assess even hard-to-reach areas. The approach is minimally invasive, avoids direct contact with the target, enables broader and faster coverage in dense vegetation, and can reduce the need for personnel.

Coradduzza et al. (2024) point out that even untrained dogs, that accompany people in passive surveillance can increase the person’s effectiveness. Most dogs, also untrained, look for decomposing cadaver when moving in the field. However, the performance difference in finding carcasses between

trained and untrained dogs is very large, as exemplified in the study of (Kruszyński et al., 2026). Training will drastically improve this natural tendency into more efficient search patterns, reliable alert behaviour, keeping good proximity to the handler and without performing hunting behaviour.

Study on the ASF-surveillance approaches in Poland

Searches utilizing dedicated, **trained search dogs emerge as the most effective method** for locating boar carcasses (Havrànek et al., 2020; Kruszyński et al., 2023). The growing popularity of this approach in combating the ASF virus can attest to its high effectiveness. In 2023, over 50 % of all wild boar carcasses discovered in Poland were located by search dogs, accounting for slightly more than 4 % of all searches conducted in the country that year.

Kruszyński et al. (2026) made a comparison between traditional human ground search and alternative methods using specially trained detection dogs, hunting dogs and drones in locating wild boar carcasses. Some limitations are highlighted when using **human teams that “comb” an area**. With this method, the size of the search area varies based on its type and accessibility, typically ranging from 100 to 200 ha. Depending on the type of terrain and the number of participants, individuals are spaced out at intervals of 2–6 m from each other, after which they proceed together, maintaining a specific distance. Finding carcasses is easier in open spaces but wooded areas and dense thickets are a big challenge. However, human senses can be unreliable, and well-concealed wild boar carcasses may go unnoticed due to difficult terrain, dense vegetation, or fatigue of searchers. Analysis of wild boar habitats revealed that these animals are often found in inaccessible or avoided areas. Consequently, searches involving people cannot guarantee 100 % effectiveness. Dense thickets, areas with thorny vegetation, and fenced-off forest plantations are instinctively avoided by searchers, who may focus more on navigating safely than on locating fallen animals. Consequently, the discovery of carcasses during such searches is often incidental. The presence of many people in the forest during searches may startle animals, potentially causing additional forced migration of infected boar to nearby areas during the initial stage of the ASF epidemic.

In a search area of 810 km² with 30% forest cover, almost all wild boar carcasses (397 of 400; 99.2 %) were detected by **trained detection dogs**, while the remaining three were located by hunting dogs. Carcass detection using hunting dogs was far less efficient, yielding only 0.002 ASFV RT-PCR positive carcasses per search, compared to 2.08 per search with trained dogs. The other methods, including drones, were not successful. The search efficiency using dogs trained for this purpose was on average more than two and a half times higher than the values determined by the EFSA ASF exit strategy. (The latter is a scientific surveillance framework, designed to help affected countries determine when ASF virus circulation in wild boar populations has likely ended, so that authorities can consider the disease controlled or eradicated in that area.) The performance of trained detection dogs in locating carcasses was unaffected by winter weather, an important finding considering ASFV can remain viable in cold environments. The authors conclude that the role of trained detection dogs in surveillance efforts aimed at controlling ASF is vital (Kruszyński et al., 2026).

INFORMATION FROM INTERVIEWS , DISCUSSIONS, SURVEY

TCRH visit June 2025:

Human chains can co-ordinately search an area, but in forests with brambles, undergrowth and branches, the chain cannot be effectively maintained and people lose sight of each other. In the case of search and rescue dogs, 50 to 80 people are required for one dog. The estimate is that, in the case of ASF, 10 to 80 times more people are needed to search an area in a human chain compared to searching with dog teams.

Stéphanie Desvaux & Annouck Decors (ONCFS, France), ASF-outbreak in Wallonia border France in 2018:

A small experiment was conducted comparing the effectiveness of human transects with that of a handler–dog team. It was a complex experiment which did not lead to any definitive conclusions, but it did show that dogs were effective in all environments. It emerged that handler–dog teams could operate almost anywhere, provided certain parameters are properly managed, such as duration of deployment and weather conditions (e.g. intervening in the morning, taking into account heat or cold, etc.) (Desvaux et al., 2021).

Céline Malengreaux, (Service Public de Wallonie, Département de l'Etude du Milieu Naturel et Agricole), ASF-outbreak in Wallonia border France in 2018:

The cost and effectiveness analysis of the French-Walloon approach was reported in an unpublished study. Dog teams were slightly less expensive than human teams. They compared human teams consisting of 6 people (1 supervisor + 5 forestry workers) with dog teams (1 handler, 1 assistant, 1 dog, considered as one unit). There were not enough dogs available to fully replace human teams.

INFORMATION FROM SURVEYS

The question comparing the efficacy of a detection dog handler with that of a human searcher without a dog was answered by 10 respondents. 1 respondent said his detection dog found the same number of targets as a human without a dog; according to 94% of the respondents, a detection dog finds on average x times more targets. The reported median was 10 (range: 5–100; average = 21,5). In the remarks, it was noted that people can only find small carcasses by sight and therefore have little to no chance of locating them in dense areas, whereas dogs can be used to reliably search much larger areas.

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