

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 5. Analysis of logistical and operational aspects of training and deployment of African swine fever detection dog teams in Flanders

Information on logistical and operational aspects of training and deployment of African swine fever detection dog teams in Flanders was screened from various sources:

1. Scientific literature
2. Information from protocols, reports and related materials on the training and deployment of detection dogs for African swine fever.
3. Information from a survey conducted by us, interviews and conversations with people with experience in the training, deployment or governmental management of detection dogs aimed at combating African swine fever.

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

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Contents

1. Training of detection dogs (African swine fever - ASF)	4
1.Participants.....	4
1.1 Selection of dogs	4
1.3 Training locations	4
1.4 Training materials.....	5
1.5 GPS-tracking	6
1.6 Scent materials	7
1.7 Legislation and administration concerning training and deployment	9
1.8 Biosecurity training.....	10
1.9 Dog management, welfare and health during training.....	10
1.10 Training methods.....	13
2. Deployment of detection dogs for ASF	15
2.1 Capacity and phases of training and deployment.....	15
2.2. Management of teams	16
2.3 Deployment strategy.....	18
2.4 Search strategy	18
2.5 Duration of work and welfare	19
2.6 Transport and mobility.....	20
2.7 Materials on location.....	21
2.8. Biosecurity	21
2.9. Risks.....	25
2.10 Protocol in case of detection of a cadaver	28
2.11 Reporting	29
2.12 Quality control of deployment	29
REFERENCES	30
Our reports.....	33

The following is an overview of matters that need to be taken into account. Because training and deployment require different approaches, this has been divided into two parts.

Within these two parts, relevant aspects are discussed that need to be taken into account in terms of logistics and operational aspects.

Logistics involves ensuring that training and deployment are possible (resources, preconditions).

Operational aspects involve ensuring that training and deployment are carried out properly (procedures, safety conditions).

1. Training of detection dogs (African swine fever - ASF)

1. Participants

The required qualifications of those who supervise the training or certification, and the selection criteria for dog handlers, vary between countries and between the different German federal states. It is standard practice to involve people with experience in detection work or related sports, as well as hunters and foresters. Attention to attitude is important: dog-friendliness and the conviction that the end does not justify the means. They must be able to motivate their dog in a positive way, and there must be a good bond between human and dog.

Dog handlers must be athletic, have a healthy BMI and be able to move around in difficult terrain. Preferably, they should not live too far from the deployment zones, and one should work with regional teams. There is no age limit. Their deployability is crucial. For almost every handler, ASF detection is a secondary activity.

See Report 1 for a description of the criteria for selecting dog handlers.

1.1 Selection of dogs

Breed plays little role in dog selection; only brachycephalic breeds are not recommended. Often, these are dogs that already have experience with detection work, but this is not essential. Their willingness to learn is important, as is their ability to search with motivation in rough terrain. There is no fixed maximum age for dogs; a 9-year-old dog can still be deployed, depending on the individual and their experience. A willingness to learn is important.

What about hunting instinct? Handlers who can read and train their dogs well can be successful with hunting dogs. They must be able to read whether the dog is following the target scent or the game/wildlife. If the dog chases game uncontrollably, he should work on a leash.

Cf.

Report 1 describes the dog selection process.

Report 4 describes the selection of the proposed protocol for Flanders.

1.3 Training locations

What kind of space is needed for the training sessions? An **indoor space** is needed where people can sit and lessons can be given, with the possibility of giving presentations (projector). A larger indoor space where a line-up can be set up for the dogs to train in scent recognition and scent discrimination, for example, is also useful. The search material (cadaver parts) must be able to be stored separately in a separate room or cubicle.

The **outdoor areas** for training should consist of mixed zones with shrubbery, woods, meadows, fields, etc., where permission has been obtained to train with dogs off the leash.

A **car park** with sufficient space for all vehicles and shaded areas is essential. During training, the dogs are left in the car during their waiting time and can relax there. The cars are often left half-open to provide sufficient cooling, so a quiet and safe place is important.

During training, it is necessary to work in different **types of habitat**: woods with young brambles and ferns, open woods, woods with a lot of variety, agricultural land and scrubland. For training, it is important that it is possible to leave items (cadaver/meat) behind. These are secured or protected if the carcass is left overnight. A fenced-off area is ideal, e.g. in collaboration with the Ministry of Defence. Training must be as realistic as possible.

1.4 Training materials

For the initial training, **line-ups** are used, possibly a carousel and glass jars with scents. For the line-up, a holder can be used to place the jars in. A carousel, where the location of the scent jars changes as it rotates, can be a useful tool for learning the scent.

All handlers provide their own **rewards**, either a toy or food or both, depending on the dog's preference.

Garmin GPS and collar: during deployment, each dog is monitored with a GPS. The dog must get used to this during training. An antenna protrudes from the collar for signal reception. The collar can also be placed in a small rucksack with an opening for the antenna, which can be useful if the collar does not fit properly or is uncomfortable around the neck.

A **bell** attached to the dog indicates audibly its location and allows any game to hear the dog approaching from a distance so that it can move away. The dog must get used to the bell during training.

Long and short **leash**: a long leash of 5 metres or more is required for leashed searching. A short leash is required for easy manoeuvring during waiting times, cleaning, etc.

For transport, dog handlers provide a crate in their car.

See the list from "TCRH Handbuch ASP-Kadaversuche" (Baden-Württemberg):

- Drag line or long line
- Harness
- Food bag, toys
- Water bottle for the dog
- Clicker
- 1 to 2 metre dog leash
- Sturdy footwear
- Suitable clothing appropriate for the weather that does not restrict movement
- A rucksack to carry all the necessary items
- Treats for the dogs: Sufficient treats are needed, especially during the first two days when the scent introduction takes place. These should not be too large and it is important that they are not too dry. Dog sausage or cheese cubes about half the size of sugar cubes are ideal. The dog will receive between 150 and 250 treats per day. Bring enough with you.

See information from French report by Desvaux, Decors, Sandor, 2025

Materials needed to organise the training

- List of participants for attendance
- Printed training documents and programme × number of participants
- Video projector / extension cord
- Pointer
- Clickers to hand out to participants
- GetXents or cotton wool impregnated with the smell of a carcass in a glass jar, 1 or 2 per participant

- First aid kits for humans and dogs
- 1 anti-heatstroke towel
- Rewards for the dogs (for candidates who have not provided these)
- List of telephone numbers to call in case of finding cadavers

Additional material for training in the field:

- Garmin equipment
- Compass (can also be on a mobile phone)
- Equipment for bio-safety procedure for washing the dogs (tarpaulin, soap, jerry can with water, paw washers, water container)
- Roll of red and white tape

There are individual differences in the equipment used. In our survey, the following equipment for dogs was reported:

22 respondents: GPS tracker on the dog

16: Collar

16: Bell

9: Thin fluorescent vest for the dog

6: Harness

4: Thick protective vest for the dog

4: Retrieval device

2: Cooling vest for the dog

1: Glasses for the dog

1: Shoes for the dog

1.5 GPS-tracking

GPS tracking is always used when deploying the dogs. Good equipment costs around 1,450 euro for a Garmin GPS (Alpha 300ki – 850 euro) and two collars (Alpha T20K GPS – 400 euro). This is a handheld GPS device designed primarily for tracking dogs. It has a touchscreen. You can track up to 20 dogs at a time, and the tracker supports a range of approximately 10–14.5 kilometres. The built-in inReach satellite communication allows you to work in remote areas where there is no mobile coverage. The battery lasts around 50 hours with satellite functions enabled.

Information about the Garmin lessons at TCRH:

Garmin lessons are given by Alex Werning at TCRH over 3 weekends. Garmin displays topographical maps, roads, etc. It is similar to Komod. Garmin is less clearly visible on the small screen.

Garmin 300i actually has more options than you need. These are options that are not used throughout Europe. It is also more expensive. The 300 is good enough for use. Garmin 200 is also good enough. The display is slightly better on the 300, but otherwise not much has changed.

Useful features on the Garmin are the waypoint marker, the track manager (search area) and the compass. The use of a separate compass is no longer taught at the TCRH. If the Garmin compass does not work, you simply wait until there is a satellite connection again.

At the top right, there is a button to mark the location. This can be programmed.

You can also set the compass yourself (at the top).

The dog list shows which dogs' collars are linked.

You can check how strong the signal is. You need three satellites, but there are usually more available.

To see the dog in the terrain, you always have to go back to the map on the screen. Everything the dog has walked is marked and saved.

It is best to set Garmin to 5 seconds (display dog's location every 5 seconds).

In the event of war, the GPS becomes less accurate to prevent the enemy from taking advantage of extremely accurate navigation.

New collar = T20K

The deployment coordinator puts the maps into the GPS.

Base Camp (Garmin software): charging the maps, planning programme. These Garmin maps are very good.

Garmin Express: updating the maps.

You can also check maps on your mobile phone and transfer them via Bluetooth.

Freeware maps: www.freizeitkarte-osm.de/garmin/de

To download them, connect the Garmin to the PC with the charging cable.

Open TopoMap is also interesting.

Garmin Contour with contour lines does not work very well and is not very clear. The human route is tracked separately and must also be tracked with Trackmanager. (Alex Werning, TCRH).

In police teams with human-remains dogs, GPS tracking (Garmin) is also used; the software is called Sartopo.com (CalTopo). It is combined with information about wind direction (e.g., Windfinder) and terrain elevation differences. Subscriptions are paid.

1.6 Scent materials

What scents are used? Parts of wild boar carcasses or whole **carcasses** are used. Both fresh and frozen carcasses can be used. There needs to be variation in terms of the degree of decomposition and the size of the part to be found (e.g. ear, leg, piece of skin, tail, whole head, whole boar, etc.). The boars must be free of African swine fever and Aujeszky's disease. Permission from the Agency for Nature and Forests (ANB) is required to use wild boar remains. The carcasses must be **tested** by Sciensano and found to be disease-free. The use of scent carriers is also possible, complementary to training on pure carcass material.

Information from French report by Desvaux, Decors, Sandor, 2025: For field testing, it is ideal to have several wild boar carcasses, preferably in different stages of decomposition. They are left on site for at least 24 hours. However, avoid the "white bone" stage, which requires greater skill on the part of the dog.

If this proves too difficult, it is necessary to have at least a sufficient quantity of remains (skin, legs, ears, +/- intestines). In that case, each scent source must have sufficient material (aim for at least 3 kg per scent source for a sufficient scent concentration).

The carcasses (or remains) should preferably be placed in cages (bench type) to prevent predation by scavengers. This protection also ensures that there is no contact between dogs and carcasses, thus limiting the risk of transmission of Aujeszky's disease. An information sign must be placed on the cages for the public. If the carcasses cannot remain in the field after the training or test (too busy), removal and destruction must be planned. In that case, it is preferable to use animals weighing 15–20 kg maximum to facilitate movement.

Information from German trainers: In the German hunting world, boars are sometimes referred to as "Manfred", or "Heidi" as the female counterpart ("search for Manfred"). The training material used is fresh or old, ranging from 3 days to 3 weeks old. They start with a sample that is approximately four weeks old and move on to more recent samples. The carcass material is always tested and frozen. It is thawed two to three days before training. The dog handlers take the material home with them to practise. Flies and larvae get into it. After 14 days, they bring it back. After training, a lid is placed on the jar and it is sealed. During training, the material is placed in a glass jar with holes in the lid. The training sessions only use wild boar carcasses, but after some time, the trained dogs often started to indicate bones without having been trained to do so. The samples can be stored in bags or glass jars and frozen (TCRH - KUG).

Training starts with the carcass of a young animal that is already a week old and works towards a freshly killed boar. It does not matter much whether there is blood on the carcasses or not. Variation is used. The carcasses are kept in the freezer. Pieces such as an ear, skin, etc. are also offered in a jar (TCRH - CJ).

For any **training of the dogs or observation of their reaction to live wild boars**, there are several wildlife parks in Belgium where wild boars are kept, including Parc à gibier in La Roche en Ardenne, Domain of the Caves of Han, Bouillon Animal Park, Forestia, etc., where permission can be requested for training.

Legislation regarding the keeping of wild boars:

Wild animals, their tissues and their remains are “res nullius”, meaning they have no owner and fall under the responsibility of ANB in Flanders and the Département de la Nature et des Forêts (DNF) in Wallonia.

Wild boars may not be kept as pets by private individuals in Flanders. *Sus scrofa* is listed as a species on the so-called “Positive List of Mammals”, with the Dutch term “pig” added. This implies that only the domesticated pig *Sus scrofa (forma domestica)* may be kept (Cfr. BvR 13.07.2018 amending the Royal Decree of 16 July 2009 (positive list); Royal Decree of 16.07.09 establishing the list of mammals that may be kept (positive list); Flemish Animal Welfare Code of 17 May 2024; communication with the Flemish Animal Welfare Service). In Wallonia, wild boar are included on the positive list, as *Sus scrofa* “cochon domestique-sanglier et sanglochon” (Cfr. 24 July 2018. Decision of the Walloon Government establishing the list of mammals that may be kept).

Wild boars are not covered by the so-called Species Decree. They are game animals and are not covered by the Application Decree (cf. Decree of the Flemish Government of 15/05/2009 on species protection and species management, ‘the Species Decree’ or ‘Soortenbesluit’). Their management is regulated by hunting legislation (hunting decree, hunting conditions decree, hunting administration decree, hunting opening decree). Wild boars may not be kept as production animals in Wallonia. They are not on the list of wild game (“gibier”) that may be kept. (communication from SPW Wallonia; cfr. Arrêté du Gouvernement wallon accordant des dérogations pour l'exploitation de certains parcs d'élevage d'animaux appartenant aux catégories grand et autre gibiers ainsi que pour l'achat, le transport et la vente de ces animaux d'élevage vivants, M.B. 06.06.1996).

Young wild boars are occasionally taken in by nature rescue centres (oral communication, Frederik Thoelen). When these centres supply carcasses (parts) or samples for training eco-search dogs, the AVES department (afdeling Adviezen, Vergunningen, Erkenningen en Subsidies - Advice, Permits, Accreditations and Subsidies) of ANB must always grant an exemption to the rescue centre and the requesting partner to use such samples (hair, carcasses, etc.) (communication Muriel Vervaeke, ANB).

Meat can be obtained from butchers who sell game. This has been tested and is suitable for human consumption.

Information from trainers of detection dogs for human remains: When training dogs to detect human remains, scent material from domesticated pigs is also used. The scent of pigs is very similar to that of humans. Commercial pigs are sometimes used in training because of the convenience (practical, ethical) compared to human remains. When training dogs to detect human remains, two to four kilograms of pig is placed in the natural environment. For scent source training, they start with fresh material – recently deceased – and then move on to older material. They also use composite material: fresh, old, fat, muscle. Pig waste is placed in a cage. There is a great deal of social control in our country. Everyone walks everywhere and anything you hide will be found. This makes training difficult. (This information applies to training with human remains. There are many similarities with training with boar carcasses, but ASF trainers advise against working with pig odour instead of boar odour. Furthermore, ASF training does not involve increasingly rotten material, but rather variation in it).

Scent carriers: ASF training sessions also involve the use of scent carriers (cotton wool, Getxent, etc.) that are impregnated with the scent of the cadaver material, which makes it logistically easier than working with the cadaver material itself. There is always some variation, so there are also training sessions with the pure cadaver material.

A project was conducted with Paul Tijtgat and Eline Rosiers of KU Leuven to create a synthetic scent for training dogs to detect human remains. They searched for specific volatile components that characterise human remains. Several were identified, nine in total, one of which was toxic. The others can be used to create a synthetic training scent (Rosier et al., 2015). Martin et al. (2023) found that dogs trained to detect human remains also recognised a simplified synthetic aid consisting of cadaver compounds.

The lowest concentration at which the dogs could still detect the cadaver odour was determined. The dogs were not affected by minor changes in the chemical composition of a mixture of odours with which they had been trained. They associated sulphur and nitrogen compounds with human cadavers. This indicates a lack of specificity of the dogs for cadaver compounds. Furthermore, not all dogs responded positively to the same mixtures, despite having been trained using the same tools and procedures. The dogs could, however, be trained using a simplified mixture of molecules (Martin et al., 2023). The extent to which this odour can be useful for boar detection requires further research. Exploratory discussions were held between Clement Martin and Ellen Van Krunkelsven (steering group member of the ASF project, researcher at the Federal Dog Support Service).

1.7 Legislation and administration concerning training and deployment

Amendment of legislation for the use of dogs for ASF

Flemish legislation must be amended to enable the training and use of detection dogs:

- The use of search dogs for monitoring in training and deployment areas must be possible
- Possibility to work on a leash and off-leash
- Deployment must respect animal welfare
- Access to all relevant areas
- Possibility to obtain carcass samples as training material and permission to work with them in the field

Information from TCRH Mosbach & interviews: Preparations relating to the legal framework must be made in advance. An amendment to the Hunting and Game Act was necessary. A specific temporary law can be enacted at the start of the outbreak. The regulations for the dogs must be checked in advance. Consider specific issues such as whether the teams are allowed to carry a knife during the search; what about crossing borders with certain dog breeds that are prohibited in some regions/countries. It must be investigated what is possible in military areas. A warrant from an authority is required to search on private land. It must be checked if it is allowed to place carcasses in any terrain/forest.

Police dogs can train and work off-leash in the woods (see 5 December 2008, Decision of the Flemish Government concerning the accessibility of woods and nature reserves). However, this is still often a subject of discussion with forest rangers. Hunting dogs are also allowed to run off-leash during the hunt.

Our survey asked, 'Which aspect of search and rescue operations or training should ideally be regulated by specific legislation?' The following answers were given:

- Certification of teams
- Leader of the dog's deployment
- Rest periods between deployment days
- Search and rest periods for dogs; generally applicable examination requirements

- Number of consecutive deployment days; protection of dogs against overexertion; animal-friendly hunting of wild boar; possibility for hunters to euthanise dying animals
- Animal welfare
- Standardised performance tests
- Insurance coverage

Address database and other administration

An address database of trainers and handlers must be maintained. Administration relating to the selection of candidates, contracts, information about the dogs (ID, vaccinations), attendance at training sessions, and certifications must be monitored.

The trainers and handlers form one or more WhatsApp groups for mutual consultation and coaching.

Contractual agreement with the dog handlers

A model of the contractual agreement on measures to combat infectious diseases in the performance of official duties for the federal states of Hesse and Baden-Württemberg between the TCRH Training Centre Retten und Helfen GmbH and the dog handlers was made available and translated into Dutch and English.

It contains specifications regarding the work, planning, remuneration, insurance, etc., which can be further adapted. Those who have completed the training in Baden-Württemberg must also be able to be deployed there. Agreements and legal bases for this have been worked out: where they are deployed and how this is set out in a contract. Their deployment is flexible in practice and is not enforced: for example, there may always be illness of humans or dogs (information from visit to TCRH Mosbach).

Cfr appendix: contract TCRH en vertaling.

Administrative requirements for dogs

In accordance with Belgian regulations, the dog must be microchipped and have a valid passport, with proof of the required vaccinations in accordance with national veterinary standards.

If the owner of the dog and the handler are not the same person, the owner must submit a written statement giving the handler permission to train, examine and deploy the dog in official operations.

See Report 4. Protocol Flanders with the proposed administrative requirements for Flanders.

1.8 Biosecurity training

The dogs and handlers must be trained in the cleaning procedures required for deployment. During a training session in Andenne (2025) led by Patrick d'Artois and his team of volunteer dog handlers, the dogs were trained to undergo the biosecurity protocol. A clean large tarpaulin is placed on the ground and a clean small tarpaulin in the dog's crate in the car. The handlers put on gloves and wash the dog's paws and belly. They soak each paw in a container and rub it clean. The belly is rubbed with a wet hand (wearing a glove). The tub contains a product for cleaning and disinfecting the dog. Afterwards, the paws are cleaned with a stronger disinfectant in a special studded tub to clean the paws and hair on the footpads. If the dog has a minor paw injury, the product will sting. Training and conditioning are therefore required to ensure that this is accepted. The dog is then placed directly into the car from the large tarpaulin by moving the car to the tarpaulin or by carrying the dog. It must not touch the ground or leave the car. After three minutes, the paws are sufficiently dry and the small tarpaulin is taken out of the crate in the car.

See further in the text: biosecurity protocol during deployment.

1.9 Dog management, welfare and health during training

Dog management:

Each dog handler/owner is responsible for the care, animal-friendly transport and health of their dog. Advice from the TCRH Handbook ASP-Kadaversuche in Baden-Württemberg: During the waiting period, dogs should remain in the car, stay with the dog handler or be tied up. Please ensure sun protection and, in cold weather, provide an animal-friendly place to stay. Dog handlers can also learn by watching. Unfortunately, some dogs feel disturbed by other dogs, which means that these other dogs must be taken to a suitable resting place. Depending on the size of the group, the waiting time can be between 15 and 20 minutes.

Health:

In the survey sent to experienced ASF dog handlers, one respondent suggested introducing 'mandatory veterinary checks before training and during deployment'.

What vaccinations are required for the dogs?

The following advice regarding vaccinations was incorporated into the Flemish protocol (Kristof Baert):

All dogs must have valid vaccinations in accordance with national veterinary standards.

- Rabies vaccination is mandatory for travel. As ASP dogs may have to operate near borders, this vaccination is mandatory.
- Other mandatory vaccinations must protect against canine distemper caused by the canine distemper (CD) virus, infectious canine hepatitis (ICH) caused by canine adenovirus type 1 (CAV-1), respiratory diseases caused by canine adenovirus type 2 (CAV-2), canine parainfluenza caused by the canine parainfluenza (CPI) virus, and canine parvoviral enteritis caused by the canine parvovirus (CPV).
- The following vaccinations are considered optional: Leptospirosis and kennel cough (Bordetella).

What administrative requirements apply to dogs that train/work across borders?

Required documentation and vaccinations in Belgium and abroad (when deploying dogs across borders):

(Source: <https://www.health.belgium.be/nl/dieren-en-planten/dieren/houden-en-verkeer-van-dieren/reizen-met-gezelschapsdieren#reizen> & <https://www.vetcompendium.be/nl/node/6238>)

Within Belgium

All dogs must be identified and registered (transponder) before 8 weeks of age or before sale/adoption.

Travelling within the EU

Identification: transponder (tattoo only valid if placed before 3 July 2011: not valid for travel to the UK, Ireland or Malta)

European passport: mandatory (new model since 2014)

Rabies vaccination: from 12 weeks of age, valid after 21 days; booster vaccinations are valid immediately

Additional conditions: to the UK, Ireland, Finland, Malta and Norway → deworming against *Echinococcus multilocularis* (24–120 hours before entry)

More than 5 dogs: commercial transport rules apply, unless participating in a competition/exhibition/training (≥ 6 months + proof)

Young dogs: not permitted in all Member States <12 weeks (or without valid rabies vaccination). For Belgium, minimum age = 15 weeks.

Essential and recommended vaccinations for dogs

In addition to rabies (mandatory for travel), the following vaccinations are highly recommended to protect your dog (but not mandatory):

Parvovirus (Parvo): highly contagious, often fatal viral disease, especially in puppies

Canine distemper: serious viral infection that affects the respiratory tract, intestines and nervous system

Liver disease (hepatitis): caused by a virus that damages the liver

Weill's disease (leptospirosis): bacterial infection spread by rats (zoonosis)

Kennel cough (Bordetella): respiratory infection (relevant when staying at kennels, dog training schools or in frequent contact with other dogs)

'Dangerous' dog breeds

In Belgium: no breed bans. In some countries (e.g. France, Germany, Croatia, Denmark, Switzerland): restrictions or bans on certain breeds (check with the destination country in advance).

Travelling to third countries and back

Before departure:

- Check the conditions of the destination country + return to Belgium (via embassy)
- Some countries require documents in their own language, a separate vaccination certificate and health certificate

• Legalisation is often required by the FASFC, sometimes also by the Foreign Affairs Ministry/embassy

Returning to Belgium:

- From countries on the EU list (Annex II Regulation 577/2013): same rules as the EU.
- From countries not on the list: mandatory blood test for rabies (≥ 0.5 IU/ml), carried out ≥ 30 days after vaccination and ≥ 3 months before return. Result valid for life provided vaccination remains uninterrupted.

Direct imports to Belgium from third countries:

- Transponder mandatory (ISO 11784/11785).
- Rabies vaccination mandatory (≥ 12 weeks, +21 days waiting period).
- Blood test mandatory from countries not on the list (by EU-approved laboratory).
- Health certificate required, issued by an official vet (EU model) no more than 10 days before departure. Valid for 4 months.
- More than 5 dogs: clinical examination + special certificate required.
- Younger than 15 weeks: import prohibited.
- In emergency situations (war, disaster): exceptions possible, but dog must be quarantined.

Official Belgian entry points:

Airports: Ostend, Brussels Zaventem, Charleroi, Deurne, Liège

Port: Zeebrugge

Customs checks

Welfare:

Animal-friendly training methods are a must. Dog handlers are selected based on their dog-friendly approach. Training must be based entirely on positive reinforcement — rewarding desired behaviour with motivation-oriented rewards (e.g. toys, praise, food). The use of physical punishment, psychological pressure or aversive techniques is strictly prohibited.

The use of aids that violate animal welfare is not permitted, including:

- Electric or shock collars
- Prong collars
- Choke or slip collars

The thermal comfort of the dogs must also be monitored, as well as fatigue and stress.

Violation of animal welfare regulations will result in exclusion from training.

Cfr. These guidelines are also included in Report 4. Protocol Flanders.

1.10 Training methods

The **steps in the training** include learning to search, learning to recognise the scent, and learning to give an indication. More information, based on scientific literature, can be found in our training booklet available on the website <https://zoekdieren.odisee.be/>.

Cf. Report 3: Information on **how often training takes** place in a number of German states and at what intervals can be found in report 3. Overview of standardised protocols for training, deployment and certification of wild boar carcass detection dogs for monitoring African swine fever.

Visit TCRH (trainer KUG, November 2025):

Philosophy:

- There is no single fixed training schedule. Training is tailored to each dog. For example, there is a Working Cocker in the current training group that is very good at searching freely but does not work well on the carousel. That dog should not do carousel training. Not every method works for every dog.
- The handler should not take over the dog's role, and vice versa. The handler should not control the dog too much. Dogs have a much greater sense of smell, which humans must learn to trust.
- Do not try to figure out why the dog is not succeeding, but work on yourself.
- The learning effect is greater with challenging exercises. Then you show a more honest emotion when the dog can do it. That is also the advantage of working blind. Let someone else hide the sample. Build up the difficulty.

Practical training (trainer KUG, TCRH, November 2025):

- During the first seven days, they receive basic lessons. They learn to recognise the scent, but no specific indication is required yet. The aim is for the dog to become familiar with the scent and for the handler to be able to recognise that scent recognition. They do not receive in-depth training in search tactics. Initially, the scent of a cadaver does not evoke any emotions in the dog. These only come later through learned positive associations.
- Further training takes place at home. There are WhatsApp groups and subgroups that they create themselves. They organise when they will practise together. They can follow a training course to become an "Übungsleiter". If they pass, they can also take the green test.
- They must identify themselves in the WhatsApp groups.
- They do not train their dogs to ignore wild boars. This could be done during a visit to a wildlife park, for example. This training should not be done too often, as it may cause them to focus on it.
- They also train their dogs to 'always put everything in the same place', e.g. not putting the keys in the left pocket one day and the rewards in the right pocket the next. Systematicity is important here. This is drilled into them. In the search area, the handler must have everything with them, e.g. water for the dog, and take everything back with them. They must always act quickly, efficiently and correctly. This must be trained: always put everything in the same place, do not put anything on the ground.
- Blank searching is also trained in the line-up with the pots or carousel.
- During training or when searching an area without finds, a scent copy can be used.
- Sometimes scent is hidden to motivate the dogs if nothing is found. Many dogs are internally motivated to search, even after several days of searching without results in the case of experienced dogs. This varies per dog. If necessary, a scent copy can be used on the terrain to motivate the dog so that no material is brought into an area.
- What if someone's trained dog dies? In principle, they can train their new dog themselves, if the head trainer first assesses and decides that it will work. If not, the dog will go back into green training.

Police dog trainer for human remains: When training search dogs for **human remains**, they first learn to indicate. Only then do they learn to discriminate between odours, and then they learn search behaviour. Training then continues with search work in all contexts. The training of a human cadaver dog takes approximately one year. Once they are trained, the operational dogs undergo retraining for one week in every four.

The desired marking by the dog in the case of human remains dogs is barking or staying with the cadaver. The handler then uses GPS to find the correct position. They do not work with a bringer or refer to the handler to come and fetch them. Marking by barking can trigger the dogs, causing them to go into overdrive. Often, nothing is found for a long time when the dogs are deployed, which makes it difficult to keep their motivation high. To motivate the dogs, the trainer places positive samples. People also have to learn to deal with negative searches. Their motivation also needs to be worked on.

In the **survey** of experienced ASF handlers, the question was asked, 'What **changes** would you suggest to the training protocol to optimise it?' The following answers were given:

- More intensive training and further education
- Longer training period for dogs, training for GPS and radio producers/dog handlers
- More time for teaching indication behaviour
- Test situations closer to the operational scenario by allowing more time in the test, but with more difficult terrain. Successfully finding the carcass parts should always lead to a pass, even if the signalling method is not exactly what the examiners expected.
- Open the test system to everyone, from all organisations and also to other judges
- Work with pigs without glass jars or line-up
- Bones must also be trained, not just the skin
- Take into account breed-specific skills, prior knowledge and other intended uses.
- Training is not systematic. Due to the large number of dogs required, there are many breeds and individual dog personalities.
- The Kong system is not suitable for ASF searches, as it focuses too much on signalling. Signalling should be secondary during training. Instead, empty searches and the response upon entering the 'yes zone' should be trained. The 'yes zone' (by Cameron Ford) is when the dog has the target scent in its nose but has not yet fully worked it out.
- The intense carcass scent can be detected from more than 150 metres away under favourable environmental conditions. This means that the handler must be able to recognise this reaction and support the dog in working towards the target. A few metres from the carcass, the handler can usually detect the scent themselves or already has visual confirmation. Rewards can be given at this point. It is never advisable to let a dog get close to the carcass.

2. Deployment of detection dogs for ASF

2.1 Capacity and phases of training and deployment

Between ASF monitoring periods, during which the dog teams are actively deployed, it is necessary to ensure that the expertise gained during training and practical work is retained by both the handlers and the dogs. This is important so that the same or even a higher level of quality can be expected during a follow-up search operation in the same year or in the event of a new outbreak. In this way, an increasingly efficient and effective approach with higher detection rates can also be pursued. Moreover, progress in skills and the acquisition of new knowledge is motivating for both dog and handler. The better you are at something, the more enjoyable it becomes to do it (Deci & Ryan, 2013). There is therefore a need for organised and structured refresher training, not only for the dog teams (consisting of the dog and the handler), but also for the trainers and the trainers' trainers.

How all this can be coordinated was carefully explained during an excursion to TCRH-Mosbach in the German state of Baden-Württemberg, based on their own experience and expertise.

Phase 1: ASF has just broken out

In the early stages of organising the fight against ASF, the first key word is “tolerance”. In order to intervene efficiently during a crisis, decisions need to be made. These decisions must be made carefully, but at the same time decisively. Especially in the beginning, there is a chance that not everything will run smoothly, that things will be overlooked and that wrong choices will be made. Tolerance for this is crucial. Why? Because in a crisis, any decision is better than passivity. Fear of making wrong decisions because they will not be tolerated actually encourages this passivity. This is the first point in TCRH-Mosbach's philosophy that was discussed when talking about the organisation and coordination of the crisis response. In addition, it is very important, especially in the first few months, that the final decisions are made by a single authority and that the number of contact points is limited and clearly communicated. This maintains clarity in a period when chaos is lurking. In the first few weeks, there must be room for sufficient consultation and meetings. Discussions are certainly normal in the first few weeks and should not be blocked as long as they are constructive and do not hinder progress.

Different opinions need to be heard and there is a need for interdisciplinary working groups so that everything can be viewed from different angles. This reduces the chance of things being overlooked. Once this initial phase has been completed, everything slowly falls into place (TCRH Mosbach - JS, CJ).

Phase 2: Quality, capacity and involvement

You move from a disordered phase to an orderly phase. After the crisis phase, there is a kind of “management phase”. You should not rush into this phase too quickly, otherwise the administrative burden will become too heavy without the addition of extra staff. This is the institutionalisation phase. The final approach that emerged from phase 1 is institutionalised in phase 2, and a certain routine and structure emerges in the operation. In this phase, everything can still change as more knowledge is gained from the experience of the planned operation. Flexibility is therefore very important in this phase. In phase 2, everything is set in motion and work is done on the quality and capacity of the dog teams (TCRH Mosbach - JS).

Quality: In general, we can distinguish between recreational volunteers, professional teams, and volunteers who do professional work, investing a significant amount of time (Schoon, 2021). It is mainly the latter group that is deployed in Baden-Württemberg via the TCRH after being trained by professionals. In principle, these volunteers who do professional work should only be deployed if they meet a professional quality standard. In practice, however, things may be different in the early stages. When everything is just getting started, there is not yet enough time, capacity, and expertise to expect a high quality of dog teams. In the start-up phase, every dog team must be able to be

deployed, even if they do not yet meet the highest quality standard. Speed and capacity are of great importance in the start-up phase to prevent the spread of ASF, and therefore quality is secondary at that point. The trainer himself conducts a practical test with the teams to assess whether they meet the minimum skill requirements. This test is not validated and is not sufficient as a professional quality test. Certification through a professional quality test will only take place in the next phase, when a large pool of deployable teams has already been assembled.

The capacity of deployable dog teams during an ASF crisis is crucial. This is because a large region must be screened immediately during an ASF outbreak. However, the zones to be screened vary in size, and it is difficult to estimate in advance how much capacity will be required. A hybrid approach is therefore recommended, whereby a pool of dog teams is trained in advance for deployment, and an additional pool only starts training once the extent of the outbreak and the zone are known (TCRH Mosbach - JS).

Phase 3: Quality control is crucial in this next phase. To achieve this, the following points are necessary:

- Organise ongoing training for dog teams throughout the year, even when there are no searches.
- Organise an annual validated test that dog teams must pass in order to maintain and renew their certification.
- Organise training for the trainers of the dog teams. They too must continue to refresh their knowledge and keep up with new scientific insights. All knowledge continues to evolve, so trainers must also continue to develop.
- Switching dog teams that are deployed as a duo. This does not mean that the dog changes handler, but that each dog team regularly works with another dog team, and this other team changes regularly.
- There is a need for a head trainer who coordinates the trainers and organises and conducts certifications.

(TCRH Mosbach - JS, CJ).

Motivation and commitment: A factor that should not be underestimated in the success of dog teams is the motivation and commitment of the handlers and trainers. There is a need for a sense of togetherness and collective duty. To capitalise on this sense of togetherness, it is important to work on community building. Organising regular training days and additional social activities, connecting over a drink and a chat can create a club feeling and make people more eager to remain part of the community. Growing together and working together towards a goal helps team spirit and also provides a certain social control that encourages cooperation. Having your own WhatsApp chat group or your own pages and groups on other social media channels can create a “digital team house” and also facilitate communication and ensure that engagement is maintained when there are no training sessions or search days. It is therefore important to keep these digital groups active during the interim periods. In addition to fostering team spirit and a pleasant atmosphere, the use of contractual agreements can help to create a sense of loyalty among the supervisors. For example, the contract could stipulate that they must be available during periods of crisis and that the organisation of their own state or country takes precedence over others. Often, the offer of free training and self-development is sufficient motivation for many volunteers to commit themselves. After all, most of them want to enjoy spending time with their dogs (TCRH Mosbach - JS, CJ).

2.2. Management of teams

TCRH: To date, around 320 teams have been trained at the TCRH, along with 70 drone teams and many other emergency responders for cadaver searches. An operations section command (EAL) also

provides specialist advice and leadership, including the associated resources. In Germany, approximately 60% of all dog handlers deployed in Germany have been trained at the TCRH in Baden-Württemberg (TCRH-JS).

It can be difficult to quickly mobilise sufficient qualified dog teams in response to an emerging problem, which is a potential limitation to the use of detection dogs.

During the Walloon ASF outbreak in 2018, the capacity for deploying dog teams was limited at the outset – initially two dogs, later five more. A higher initial capacity will increase success. (Sandor et al., 2025).

The Walloon ASF crisis began in September 2018. In January 2019, three quotes were requested for the deployment of dog teams, to which Patrick D'Artois (Andenne, Belgium) responded. He was awarded the contract and began training. In September, a practical test was carried out by the SPW. The dogs were deployed in the autumn of 2019. From the outset, he and his daughter carried out the searches, each with two dogs. They were later joined by two French nationals, each with two dogs, one of whom came from the south of France. There were then two to three searches per team per week, carried out by one or more dogs (CM).

The organisation of search operations and management is an important point of attention. When experienced ASF handlers were asked in the **survey** to provide “tips on how to better organise operational teams for locating wild boar carcasses”, the following responses were given:

- Centrally directed by a deployment section leader, similar to rescue operations
- As with the deployment of search-and-rescue dogs, with a deployment leader or section leader; dogs are handled by the team
- Central organisation, BOS standards (public safety communication standards)
- Good structural and technical facilities (operations centre, hygiene lock, Garmin collars); permanent staff
- Organising teams into groups; fixed areas with which teams are familiar; operating only in pairs
- Planning and clearly defining search areas in advance; deploying only teams with competent handlers and capable dogs

The analysis of the results of the French study (Desvaux et al., 2021) on the deployment of hunter patrols and dog teams during the ASF outbreak in Wallonia in 2018 shows that the number of hunter patrols was not stable across the months, despite being scheduled weekly. Several possible explanations were identified. Although the hunter patrols received compensation, their deployment was on a voluntary basis. They were not obliged to carry out the patrols and had to combine this work with their professional and personal commitments. It proved difficult to keep them motivated throughout the entire period.

Based on the feedback received, they formulated the following recommendations:

- Providing appropriate **feedback** to the people in the field is crucial, but in a crisis situation this rarely happens optimally.
- A constantly changing schedule makes it difficult to prepare properly. Due to the evolving and uncertain epidemiological situation, they were initially unable to establish long-term planning: patrols that were originally foreseen for a few weeks ultimately had to continue for two years.
- Delays in paying out the allowances complicated communication. The administrative procedures for this must be prepared in advance.
- As the expected outcome was usually “**no carcass found**”, field staff could experience a sense of failure.
- **Communication** must clearly emphasise the purpose of the fieldwork.

2.3 Deployment strategy

The **deployment strategy** determines how many teams are deployed and which teams are assigned to which areas. This requires a deployment decision team that, based on modelling, decides for each habitat type which type of search (drone or dog) is carried out by which team.

The **search strategy** refers to the search behaviour in the field of the dog and its handler.

A Polish study underlines that only cooperation between different professionals can be successful against ASF spread. By combining a good understanding of search areas, the capabilities of trained dogs, hunters' knowledge and effective population control methods, the effectiveness of finding dead wild boars may reach 100 % (Kruszyński et al., 2026).

The deployment tactics (how many people and where) differ from the search strategy (how the search is conducted). Deployment tactics are determined by the expert team. During deployment, a team searches two to three search areas per day, with two dog handlers alternating and taking breaks. (TCRH November–KUG)

In November 2025, the TCRH-formed-teams carried out 10,000 hours of searching (in April 2025 this was 8,000 hours). More than 800,000 hectares have already been searched.

Staff responsible for deployment planning and data collection amount to 2.5 full-time equivalents, spread across four people who maintain the data. These data are requested by funders, policymakers and the European authorities. All data, including photographs, are mapped. Ministries must always have information on duration, deployment and costs. Daily data show the level of activity; for example, on one day in Hessen, 136 hectares were searched. The data are kept in Excel sheets, including information such as use of personal vehicles, overnight stays, expenses, search duration, hectares covered, and the type of terrain (easy, medium, difficult). These staff members decide on the search zones and how they are subdivided according to zone type (protected areas, military zones, etc.). Individual specialisations are taken into account (people who cope well with heat, people suited to mountainous terrain, etc.). (TCRH-JS)

Green teams are deployed immediately in easy areas. These areas are not double-checked, as the workload would be too large. However, the areas are searched multiple times at intervals of several days. The deployment areas are relatively easy. When they are too easy (open vegetation), it is better to use a drone. The red teams have more experience and can cover a larger area within the same search time, or operate in very dense terrain. Not every handler reaches the red level.

(TCRH-KUG)

Since washing the dog after each deployment can damage the protective layer of the skin, the dogs may only be deployed two to three times per week (Bavaria, Konzept zur Etablierung einer Bereitschaftsstaffel ausgebildeter Kadaver-Suchhundegespanne).

2.4 Search strategy

TCRH: The detailed search strategy in the field **differs for each search team** and depends on the dog. It is therefore the dog handler who determines this, based on the needs and abilities of their dog. The handler's search tactics cannot always be assessed on a computer; they must be evaluated in the field, for example depending on the steepness of the terrain. An additional experienced dog handler always accompanies the team during field deployment. Sometimes two dogs are used, for example with each searching one side of a road. In principle, one dog covers one search area. In practice, two dogs can sometimes be deployed more effectively. This requires training, especially in Belgium where

there are many roads. Two dogs are never allowed to search off-lead at the same time. The assistant may bring their own dog, for example on a lead, without it having to search. For some dogs this is better than waiting in the car if they cannot settle there; for others, resting in the vehicle is preferable. The assistant uses the Garmin device to track which areas have been completed. Every dog handler is also trained to act as an assistant and must be able to perform all these tasks. Thorny areas must also be searched. Some dogs are hesitant at first, but they grow in confidence and learn from one another.

The duration of deployment depends on experience. How long each handler searches per zone varies from person to person and from dog to dog.

A trainer of human-remains dogs speculates that two types of searches may sometimes be necessary: first a rough search for carcasses, followed by a detailed search for body parts. Knowing the location of a fox den can be important. Foxes take pieces of a carcass back to their den and drop parts along the way. In most cases, for example, all human remains are found within a radius of 800 metres, sometimes in a straight line (possibly leading to a den).

If there are watercourses in an ASF area, these must also be searched. In Germany (TCRH), there are several teams whose dogs can be deployed on water, detecting scent from a boat. These teams can potentially be hired from abroad (TCRH, JS & CJ).

2.5 Duration of work and welfare

Breaks described in several German protocols:

Bavaria (Konzept zur Etablierung einer Bereitschaftsstaffel ausgebildete Kadaver-Suchhundegespanne):

- During on-site search operations, the following applies: **after 30 minutes** of deployment, the dog must be given **at least 30 minutes** of rest, with access to water, a resting place and, if necessary, a blanket. The total duration of deployment per day (including breaks) should preferably not exceed four hours, excluding transport and acclimatisation.
- Food must be provided after the deployment.
- It is the handler's responsibility to terminate or refuse a deployment early if the dog is overworked or overtired.

Mainfranken (Regulations for the examination of ASF carcass detection dogs, Hundeteam Mainfranken, Edith Schwarz): During the certification exam, the search time is 30 minutes, with a maximum of 90 minutes. A second search task may only be carried out after a 30-minute break or an equivalent rest period.

Adjustment of search strategy and search duration in relation to animal welfare: In the French-Belgian project, the search strategy was adapted to prevent dogs from having to search for hours in unpleasant environments, such as among nettles or bramble thickets (Desvaux et al., 2021). Information from discussions with dog trainer Patrick d'Artois: searches were carried out for around **45 minutes** before **switching to another dog**. The search was conducted in loops starting from the location where the vehicle was parked.

In warm weather, or when working for extended periods, "**power food**" is given to the dogs (KUG, TCRH).

They search for a maximum of three consecutive days per week, for around seven hours per day (including searching, cleaning, briefing, etc.). The basic rule is that the duration of the break must be at least as long as the deployment itself (TCRH – CJ).

Experienced German ASF dog handler (HW): Three to four days of work per week in easy terrain is a broad guideline. You must read the dog carefully and ensure that each session ends on a positive note, using new scent carriers — not only from a freshly killed pig with skin, but also hooves and so on. For example, if you are working on a strip 20 metres wide and 400–500 metres long alongside a road, on a long line, you work for a maximum of 1 to 1.5 hours. In woodland with undergrowth or in a marsh, the rule is not to work for longer than 30 minutes before taking a break.

In our survey, respondents with experience in ASF search operations gave the following answers to the question: “What is the main animal-welfare concern when searching for wild boar carcasses?”

- Protect the dog from heat and overexertion
- A healthy dog, regular breaks
- Number of deployment days
- Search and rest times for service dogs; no drive hunts; dogs without aggression towards wildlife
- Prevent overloading the dogs
- Give the dog regular breaks
- Use durable, robust dogs for deployment
- Weather conditions (heat); rest periods; risk of injury
- Protection against heat
- Aujeszky’s disease; protect the search dog from injury and overexertion; animal-friendly searching; no chasing of wild boar
- Protection against the Aujeszky virus (notifiable)
- Rapidly ending the suffering of any still-living animals
- Handling roe deer fawns

Search duration and the number of deployment days are major concerns for experienced dog handlers. In response to the question “Which aspect of the searches or training should ideally be covered by specific legislation?” several answers related to animal welfare:

- Animal welfare
- Rest periods between deployment days
- Search and rest times for the dogs
- Number of consecutive deployment days; protection of dogs against overexertion

Some respondents expressed concerns about the welfare of wild boar and called for a more animal-friendly method of searching, as well as options for hunters to euthanise dying animals.

In the human-remains dog units of the police, the dogs often work with a harness fitted with a bell. One particular dog, after a heavy deployment period (flooding disaster), began to associate the harness with long working days and eventually went into overdrive as soon as he saw it.

The welfare of both humans and dogs is crucial during prolonged deployment of the teams. The search work demands sustained effort over a potentially long period. Assessing the mental state of both the dog and the handler is an important point of attention for management, where further optimisation of existing deployment practices is still needed. Mental overload among both the management team and the deployed team is a significant risk (interviews with Walloon and French authorities, CM, SD, AD).

2.6 Transport and mobility

The vehicles used to transport the dogs must be climate-controlled to ensure animal-friendly transport on hot days.

Access conditions for each zone are strict. The placement of disinfection points must be chosen strategically. Preventing the spread of the disease by deployed teams and vehicles is a primary concern. The deployment of dog handlers must be organised in such a way that the number of times the infected zone is exited is kept to a minimum — for example, by booking hotels within the infected zone rather than outside it.

2.7 Materials on location

At the TCRH, dog handlers receive a list of equipment required for deployment. In addition to the training equipment, the deployment equipment consists of:

- Red-and-white tape
- A small bell for use during deployment
- S2 safety shoes
- Trousers that are reasonably thorn-resistant
- An extra T-shirt, useful to wear when working in thorny vegetation
- A fluorescent collar that can tear loose if it gets caught on something
- On the first day in the deployment area, handlers receive a vest marked “ASP”. They keep this vest. (TCRH)

Notes: The collars used at the TCRH are handmade, costing €25, or €30 with an ASP print. A cheaper hunting version is also suitable.

Protective dog vests tend to hinder the dog’s movement and often cause chafing.

2.8. Biosecurity

It must be taken into account that the search teams themselves can also be a potential source of infection. This has not yet been reported in the scientific literature, but it remains a possibility. Communication with hunters in the area where searches are carried out is essential, particularly regarding the biosecurity measures applied by the search teams. The question of whether hunting dogs (with hunting experience) can or should be used is an important topic for discussion. Among hunters, there are rumours that the search operations contribute to the spread of the disease. These concerns, as well as the biosecurity measures in place, must be addressed through clear communication. In BW, “talk-about” are organised with hunters and other personnel, with regular thematic discussions accessible online via a link (TCRH, CJ & JS).

Active mechanical spread of ASF

Direct and indirect contact between infected and non-infected Suidae is the main route of ASF transmission in Europe (Bonnet et al., 2020).

Soft ticks are essential for the transmission of ASFV among wild boar. The virus survives for long periods in ticks and can therefore continue to spread. The blood, faeces and secretions of wild boar contain high concentrations of virus. Through direct or indirect contact with infected boar or contaminated surfaces, the ASF virus spreads rapidly (Mazur-Panasiuk et al., 2019). Further spread by humans — via contaminated clothing, footwear, vehicles, infected pork products, kitchen waste, feed, faeces and bedding — can lead to both local and long-distance transmission, including cross-border spread (Golnar et al., 2019; Niederwerder et al., 2019).

Passive spread of ASF via faeces after eating infected meat

If a wolf eats wild boar meat infected with the ASF virus, the virus does not survive passage through the digestive tract. In this way, wolves can significantly reduce the chance of transmission by removing infectious carcasses (Szewczyk et al., 2021). If dogs were to eat parts of an ASF-infected carcass, the virus would likewise not be spread further through their faeces. The same applies to other scavengers that consume most of the meat on site, such as raccoon dogs, foxes and ravens,

which can reduce local virus persistence through their metabolism. Scavengers may physically disperse smaller remains and bones, but the risk of disease transmission is considered extremely low. Even if carcass material were to remain on the scavenger's skin, the virus would not replicate on the body. Most scavengers remove such contamination by grooming themselves (Probst et al., 2019).

Passive spread of ASF via fleas

There are no data on the possible spread of ASF via fleas. There are no reports of fleas occurring on wild boar. Hunting dogs may temporarily pick up fleas after moving through vegetation, but adult fleas do not survive long without their specific host (Bonnet et al., 2020).

Disinfection of search teams

Information on disinfecting dogs after search operations was compiled from German and French protocols:

1. Guidelines for disinfecting dogs after search operations (Germany):

Friedrich-Loeffler Institute (2024) ("Richtlinie über Mittel und Verfahren für die Durchführung der Desinfektion bei bestimmten Tierseuchen" (Guideline on agents and procedures for carrying out disinfection in certain animal diseases): (<https://www.fli.de/de/aktuelles/kurznachrichten/neues-einzelansicht/aktuelle-desinfektionsrichtlinie-fuer-tierseuchen-online/>)

When search dogs are deployed in areas affected by ASF (African swine fever), they may come into contact with carcasses contaminated with the ASF virus or with contaminated surfaces. After completing the search operation, the dog must therefore be washed with a mild soap solution or dog shampoo before being loaded into the vehicle. Special attention should be paid to the paws and all visibly contaminated parts of the body, as well as to using plenty of water.

Towels used for drying must be washed at 60 °C in the washing machine once back home.

Tracking equipment and collars must be thoroughly cleaned and then disinfected. Leather collars can be exposed to dry heat at 70 °C for 30 minutes (in a hot-air oven) (FLI).

Additional advice provided for the cleaning of live pigs states that the entire body surface must be carefully washed to remove adhering dirt. Suitable cleaning agents include soapy water or commercially available products specifically intended for washing animals. When warm water is used, washing should begin at the back and then proceed toward the head, with extra attention paid to thoroughly cleaning the head, ears, and paws. The animal should be pre-cleaned for 2 to 3 minutes by spraying or wetting, after which it can be rinsed for 2 to 4 minutes with the washing solution (FLI, 5.4.12 Desinfektion von lebenden Tieren – (Disinfection of live animals)).

2. Guidelines for decontaminating dogs after search operations (France):

Desvaux, Decors, Sandor, 2025. OFB Report, Développement de méthode de recherche active de cadavres de sanglier (Development of an active search method for wild boar carcasses).

Version 2 – March 2025 (File: 2025_OFB_Chien_detection_Formation_pilote_vf)

Biosecurity guidelines for handlers and assistants

The instructions below apply to search operations carried out in infected areas or areas considered to be infected — in more distant zones, the measures may be relaxed.

- Between each stop — before getting back into the vehicle — remove any clothing that has been in contact with the outdoor environment (gaiters, jacket, etc.) and place it in a designated plastic bag in the "dirty zone" of the vehicle (the trunk).
- Before re-entering the vehicle during the day, clean the boots and place them in a plastic bag and/or plastic container designated for this purpose in the dirty zone of the vehicle (the trunk).
- At the end of the day, clean and disinfect the boots on site.
- Do not leave paved or gravel roads with the vehicle; if necessary, go to a washing station (high-pressure cleaner) at the end of the day to clean the wheels and the underside of the vehicle.

- After returning home, wash clothing at a minimum of 60 °C for at least 20 minutes and allow the boots to dry (and/or clean and disinfect them again).
- Avoid contact with domestic or wild pigs for at least 48 hours after working in an infected or potentially infected area.

Biosecurity guidelines for dogs

The assistant helps the handler with cleaning the equipment (tarpaulin, etc.).

Have a brush available to clean the dog's claws.

Clean the paws when changing forest areas or if the new area to be searched is more than 5 km away within a zone of the same epidemiological status. Otherwise, wipe the paws with a clean cloth before the dog gets back into the vehicle.

Carry out systematic cleaning at the end of the day before leaving the infected area (the tarpaulin must then be removed).

Once arrived at the accommodation — if no search activity is planned for the next day, or if the next search will take place in another area (another forest area or a zone more than 5 km away within a zone of the same epidemiological status): rinse the dog thoroughly. Wash with a foaming shampoo and brush the claws. Rinse well. Wash again, for example with Douxo Pyo. Leave it to act for about 8 minutes. Then rinse thoroughly again.

Additional guidelines:

Do not allow the dog to come into contact with carcasses or their bodily fluids.

Equipment checklist

- Tarpaulin to protect the car trunk
- Rubber floor mats for the car
- Washable leash and collar
- Several towels
- Garbage bag
- Wash basin
- Latex gloves
- Chlorhexidine shampoo (e.g., Douxo Pyo ©)
- Thermos with hot water

Vehicle preparation

- Cover the trunk so the dog can be placed inside after the search operation.
- Provide a garbage bag for dirty towels.
- Cleaning of the four paws
- Systematically clean all four paws with the shampoo before placing the dog in the covered trunk, following the product instructions.

Example procedure using Douxo Pyo

- Put on gloves.
- Wet the end of the paw with warm water.
- Apply the shampoo and massage to distribute it (pay special attention to the paw pads).
- Leave it to act for a few minutes (ideally 5 minutes).
- Rinse thoroughly.
- Dry the paws with a clean towel and then place the towel in a garbage bag.
- Do not forget to disinfect the equipment used (wash basin, leash, collar, etc.).

Upon returning to the accommodation

- If the dog's body is soiled with mud: wash it with a veterinary shampoo such as Douxo Maintenance, following the instructions for use.
- Soak the leash and collar in soapy water, along with any other accessories.
- Wash and disinfect the trunk covering, floor mats, and boots.
- Wash the towels at 90 °C.

Additional note

Avoid contact with pigs. Wait 48 hours before the dog has contact with domestic pigs.

Protocols in appendix:

- Friedrich-Loeffler Institut, 2024, Richtlinie über Mittel und Verfahren für die Durchführung der Desinfektion bei bestimmten Tierseuchen.
- Mindestanforderungen_Fahrzeug_Reinigung_Desinfektion_landwirtschaft_Betriebe (in German & Dutch translation)
- 2025_OFB_Chiens_detection_Formation_pilote_vf ACTIVE SEARCH FOR CARCASSES IN NATURAL ENVIRONMENTS, Methodology for organizing canine searches for wild boar carcasses (in the context of ASF) (Version 2 – March 2025).
- The protocol for Baden-Württemberg (2024): ASP–Kadaversuche Biosicherheits-Konzept, TCRH Training Center Retten und Helfen.
- English version: EN) TCRH_ASP_Biosicherheitskonzept_2024-08-05
- Translated in Dutch.

Links to hygiene-protocols :

- FLI, Friedrich-Loeffler Institut, 2024, Richtlinie über Mittel und Verfahren für die Durchführung der Desinfektion bei bestimmten Tierseuchen: <https://www.fli.de/de/aktuelles/kurznachrichten/neues-einzelsicht/aktuelle-desinfektionsrichtlinie-fuer-tierseuchen-online/>
- “Deutsche Veterinärmedizinische Gesellschaft e.V.”: <https://www.desinfektion-dvg.de/index.php?id=2299>
- Legislation Germany: <https://www.buzer.de/gesetz/7039/a211492.htm>

Additional information from surveys and interviews

Information from the visit to TCRH: The biosecurity concept for Germany was developed by the Friedrich Loeffler Institute.

It must always be possible to reconstruct who from the team was where, each day.

A distinction is made between disinfection, decontamination, and washing. **Washing** (cleaning) involves removing organic material (mud, manure, blood, saliva, fat) from vehicles, boots, equipment, dogs, etc. It includes brushing off coarse dirt, washing with water (optionally warm water) and soap, and rinsing thoroughly so that no soap residue remains.

Disinfection involves inactivating or killing the ASF virus after cleaning. It is carried out using disinfectants approved by the FASFC (usually based on sodium hypochlorite, formaldehyde, or certain quaternary ammonium compounds), with the correct concentration, contact time, and temperature. Disinfection is ineffective on dirty material and therefore always takes place after washing. All surfaces must remain wet for the entire contact time. An example is disinfecting vehicles at biosecurity checkpoints.

Decontamination refers to the complete process of cleaning + disinfection.

For dogs, it is sufficient to wash them thoroughly with soap. During the first phase of deployment, clothing and equipment are washed daily. Afterwards, clothing and equipment are only washed when leaving the hot zone — not every day, but only when switching between zones.

Zone changes are risky. The hotel for the teams must be located within the zone; otherwise, vehicles must be fully disinfected each time. This also applies to the deployment of boats.

Interview with an experienced ASF dog handler (HW): After deployment, dogs must be washed with soap and their transport crates disinfected. Based on her experience, it is sufficient to wash only the paws and the abdominal area. The back and head only come into contact with virus-carrying material if dogs roll in carcasses. She proposes an adjustment to the biosecurity protocol. Daily washing can cause skin irritation during long deployments. It is important to have suitable washing facilities for

dogs. They showered the dogs in a container equipped with three showers. Shower cabins of 1 m² with a fixed showerhead on the ceiling are unsuitable, as it is not possible to fit a large dog inside. Dog handlers must disinfect their shoes and the wheel arches of their vehicles after deployment and take a full shower at the decontamination stations. According to her, it is more practical to change shoes and trousers within the deployment area so that clean and dirty items remain better separated. It is highly unlikely that the virus spreads as far as the underwear.

Interview with ASF trainer (UK): Washing the dog too frequently is a problem. Dogs generally do not like it, and some develop an aversion to it. The soap can damage the skin. Washing each team — handler and dog — takes around 30 minutes. The waiting time for the other teams can become very long, up to several hours if multiple teams are deployed. The showers are not designed to be easily used with a dog.

Interview with Walloon ASF experts: The adjustment to the Walloon–French biosecurity protocol consisted of cleaning and disinfecting the dogs' paws **only at the end of the day** with appropriate products, instead of after every search period, in order to reduce the stress this caused in some dogs. A working day with the detection dogs was divided into short search periods of an average of 50 minutes (median: 43 minutes), alternating with rest and/or training periods. (Additional information about the Desvaux 2021 study in conversations with CM and PA.)

Bavaria: In Bavaria, dogs may only be deployed two to three times per week because washing after each deployment can damage the protective layer of the skin (Konzept zur Etablierung einer Bereitschaftsstaffel ausgebildeter Kadaver-Suchhundegespanne).

2.9. Risks

Attacks by wild boar

Wild boar have two outward-facing canine teeth in the lower jaw, which function as tusks with a defensive role. They have excellent hearing and a strong sense of smell, but very limited vision. In general, wild boar are shy animals that pose no danger to humans as long as they are left undisturbed. However, when provoked, they can react aggressively and attack using their tusks. Such attacks are typically directed at the chest and abdominal area and can cause severe injuries or even death (Mayer, 2013).

Hunting methods in which people walk through an area and drive the animals ahead of them cause wild boar to move quickly away. Once they have fled into more sheltered terrain, they tend to wait there and use open areas less frequently. In contrast, during hunting techniques where hunters wait quietly and concealed, wild boar show less movement, but they remain within cover (Thurfjell et al., 2013).

Several studies have shown that the size of a dog has a significant influence on the likelihood of attacks by wild boar (Ko et al., 2010; Ingendaay et al., 2008). Dogs weighing **more than 20 kilograms** have a higher chance of being attacked, suggesting that wild boar perceive larger dogs as a potential threat. Smaller dog breeds are at lower risk. When they do sustain injuries, these often involve individuals with particularly **bold behaviour** (Starling et al., 2013). Such dogs typically approach wild boar at close range, which may cause the boar to feel threatened and initiate an attack (Adamkova et al., 2025). The majority of attacked dogs suffer non-penetrating trauma caused by blunt impact; a minority sustain penetrating injuries or a combination of both (Surleraux et al., 2025).

Information from the interviews

If live wild boar are present in an area, the dogs and handlers do not enter with the dog. Initially, there was concern that weapons would be needed if boar were present, but this turned out to be unnecessary. When it is known that many boar are in a particular area, hunters go into the field first

to shoot them (TCRH – KUG). In Hessen — where they work with a group of hunters as dog handlers — two dogs were attacked by a male boar; one of them was struck just under its protective vest and its intestines were torn out. The dog died (TCRH – CJ).

Sick boar go to water because they often have a fever. Death occurs everywhere, not only in thickets or dense vegetation; it can also be in a maize field, so everything must be searched (KUG, TCRH).

In our **survey**, the majority of the dog handlers questioned (89% of a total n=19) had encountered live wild boar during a search operation. What happened afterwards was:

- Wild boar ran away (reported by 9 people)
- Wild boar passed by; nothing happened (reported by 2 people)
- The dog barked or stood in front of them (reported by 2 people)
- Sows with piglets confronted and threatened them (reported by 1 person)
- Sick wild boar remained standing and behaved apathetically (reported by 1 person)

Weapons

In some German states, only hunters with a firearms permit are accepted as dog handlers. The use of weapons near free-running dogs can pose a danger (German dog handler, HL).

Ticks and mosquitoes (for humans and dogs)

There are so many ticks that it is recommended to combine tablets (e.g., every 3 months) with a spot-on product (every month).

In mosquito-rich areas, people carry portable Thermacell mosquito repellents. The drone pilot sits inside a mosquito net (TCRH visit).

Injuries

In our survey, we asked: “Has your dog ever been injured during a search operation?” This was the case for 21% (4 out of 19):

- Ran into steel wire; cuts on paws caused by wire and thorns
- Cut on the paw
- Strain of the biceps tendon
- Scratches from brambles, even skin-breaking wounds

Handlers themselves were also injured in 28% (5 out of 19):

- Scratches from brambles
- Bitten by another dog
- Scratches, bruises, branch in the face, slipped on a slope
- Fell on the knees, fluid accumulation in the knee
- Ticks, abrasions, sprains, scratches

Pseudorabies or Aujeszky's disease (“mad itch”)

Aujeszky's Disease (AKD) is caused by infection with Suid herpesvirus 1 (AKD virus, pseudorabies virus). Because non-fatal disease is observed almost exclusively in pigs, pigs form an important virus reservoir and source of transmission. The virus can also infect other species, such as dogs and wild carnivores, in which it is usually fatal.

Dogs become infected by eating raw pork or organ meat, or through contact with infected pigs or pig carcasses. After an oronasal infection, the virus is transported to the central nervous system. The virus can also be detected in the blood.

The incubation period in dogs is 2–9 days; death usually occurs within 4 days after symptoms appear, such as trismus (lockjaw), anorexia, vomiting, dyspnoea (breathing difficulties), and muscle spasms, sometimes unilateral itching of the head, hyperthermia (fever), and terminal hypothermia.

AKD virus still circulates in wild boar populations in countries such as Germany, Italy, and France. AKD should be considered in animals showing neurological symptoms after contact with wild boar (Schöniger et al., 2012).

Wolves

Mugnari et al. (2025) provide an overview of the literature on wolf attacks on dogs.

The presence of **specialised problem packs** is positively associated with an increase in the number of attacks on dogs. Aggressive behaviour towards dogs can be passed down from generation to generation within wolf families.

In some areas, attacks occur more frequently in the **core of a wolf territory** due to the proximity of dens and pups. More attacks take place in the post-weaning period, between August and October, and in years with larger litters. Elsewhere, attacks occur more often **at territory boundaries**, possibly due to territorial defence behaviour.

Hunting dogs are particularly frequent targets of wolves. In Europe, this happens quite often in certain countries such as Finland (4,500 cases between 2013 and 2023), Croatia, Greece, Italy, and Sweden, but rarely in Germany (number = 1). Small and medium-sized dogs are attacked relatively more often (Bassi et al., 2021; Iliopoulos et al., 2021). Attacks occur less frequently among experienced hunters and among hunters operating in teams (Mugnari et al., 2025).

Most dogs were active in hunting situations (48%), followed by dogs kept in yards or gardens (24%), dogs in hunting training (12%), livestock-guarding dogs (8%), dogs walked on a leash (2%), dogs roaming freely in the forest (2%), dogs at a carcass (2%), and other activities (2%). Attacks occurred more often when dogs were roaming freely or tied to a building, whereas being on a leash significantly reduced the risk. The greater the distance between dog and owner, the higher the likelihood of an attack. In wolf areas, **free-running** hunting dogs are at risk of being attacked by wolves (Sweden: Ericsson et al., 2003; Finland: Kojola & Kuittinen, 2002; Kojola et al., 2004), and this risk is higher in countries where hunting dogs frequently wander or roam freely.

Martins et al. (2020) found that dogs are the most consumed carnivore species by wolves, either as direct prey or as carrion. In some areas, they can make up to 20% of the wolf diet, especially in human-influenced landscapes with little natural prey.

Hunters often fear negative experiences, such as losing hunting dogs to wolves (Bassi et al., 2021; Tikkinen et al., 2019; Kojola et al., 2002). In Croatia, dogs are regularly killed during driven hunts for wild boar, and many dogs are eaten by wolves (Bassi et al., 2021). Free-roaming hunting dogs face the highest risk of attacks near the boundaries of wolf territories, suggesting that wolves primarily perceive dogs as competitors (Tikkinen et al., 2019; Lescureux & Linnell, 2014). This corresponds with what happens when unfamiliar wolves enter a territory, where wolf-wolf aggression is a major cause of wolf mortality (Cubaynes et al., 2014).

However, there are also frequent observations that wolves show an “aversion to fighting” and avoid aggressive confrontations with dogs (Mech, 1970).

For some hunters, the bond and cooperation with their dog is more valuable than the hunt itself (Skogen et al., 2008). Among hunters in Finland, negative attitudes toward wolves are explained by the fact that wolves injure and kill hunting dogs (Bisi et al., 2010). The fear of losing valuable dogs to wolves also has a significant impact on the lifestyle of rural residents (Pedersen et al., 2019). Owning a dog and having a positive attitude toward hunting are two strong predictors of holding negative attitudes toward wolves (Vervaecke et al., 2025). Given these risks, it is necessary to disseminate best practices for dog owners in wolf areas.

Interviews

The interviews revealed that rumours circulate about the danger wolves pose to dogs. In some regions of Germany and Romania, wolves have learned to home in on the barking of farm dogs, as these dogs are often tied up outside day and night and form easy prey. Some German ASF volunteers refuse to work in specific wolf areas (TCRH – CJ).

ASF Trainer Uta Kielau:

The **context-specific** nature of rumours about wolf attacks is important, as is the distinction between a hunting context and a search-dog context. A hunting dog was attacked while it was 1.5 km away from the hunter, outside GPS range. During a lecture for the wolf specialist group in Schleswig-Holstein, given by Dr. Norman Stier on working dogs and wolves, it was stated that **off-leash work in wolf areas is possible** as long as handlers maintain good control of their dogs — meaning they know where the dogs are, keep them in sight, and have a reliable recall.

Avoidance behaviour and avoiding confrontation with dogs is the norm among wolves in Germany. Occasionally, wolves have even been observed playing with hunting dogs.

It is important that the behaviour of the dogs is “**canid-safe**,” meaning they do not show aggression or predatory behaviour toward other canids. Habituation training is necessary so that dogs learn to ignore all distractions — such as other dogs, deer, or other animals in the environment — including ASF detection dogs.

There is now extensive experience with working dogs in wolf areas, such as wolf-detection dogs, training situations in wolf territories, walking dogs in wolf areas, and monitoring by wolf wardens, with no negative experiences involving wolves.

Recommendations for ASF work in wolf areas

- Working ASF dogs must remain close enough and within sight of the handler. In wolf areas, a small bell on the harness can be used to acoustically deter wildlife (UK).
- Extra caution is necessary during the mating season — when territorial behaviour increases — and near dens and rendezvous sites between May and July, because wolves protect their pups during this period. It is also advisable to avoid denning areas when reproduction has been confirmed, to prevent defensive aggression (TVD).
- When in doubt, it is recommended to work with dogs on a leash (TCRH – CJ). If a wolf shows approach behaviour, the advice is to deter the wolf and leave the area (cf. Appendix “Hundearbeit im Wolfsgebiet Flyer 2018”).

And the unpredictable events

There was an incident in which five raccoons attacked a dog in the water. The dog nearly drowned (TCRH – CJ).

2.10 Protocol in case of detection of a cadaver

Carcasses must be recovered and analysed, and this also requires considerable capacity. In the event of detection, the following protocol applies:

- Do not touch anything; keep a distance of at least 2–5 metres; prevent the dog from touching the carcass.
- The dog handler removes the dog; the assistant carries out the marking and reporting.
- Mark the carcass with a clearly visible marker (stake, peg, red-white tape on a branch) — approx. 25 m zone.
- Record the coordinates using GPS.
- Take photos from a distance (with a mobile phone), including the search-area number and the Garmin coordinates; these are posted in the WhatsApp group for notification to the competent authority (GPS + photos + status). (TCRH discussions)

Notes:

- More than just carcasses have been found (a human body, several weapons, a fireproof safe, ...), all of which also require reporting and time.
- Bones from infected wild boar remain positive for one year. Finding bones can only be done with dogs. Many bones found test negative. A lot of carcass waste is found from hunters who

dumped it in the past year. Many carcasses are also found along roads and railway tracks from collisions, and these too are negative for ASF. (TCRH – CJ, JS)

2.11 Reporting

Data to be logged regarding each find

- Date
- Time
- Team (handler + dog)
- Search zone
- Type of carcass found: fresh, decomposing, skeleton, only remains
- Any particular observations

Mapping of the zones

During the Walloon ASF outbreak, digital mapping of the searched zones was carried out to visualise the areas that had been covered (cf. expertise of Céline Malengreaux, SPW).

Communication

In the French project, a shared database and an Android application were developed to enter spatial data. A prototype was created and tested using the KoBoToolbox platform (<https://www.kobotoolbox.org/>). Because this tool was introduced too late in the programme, it was ultimately not used routinely. It was developed because there was a need to coordinate data from different sources and with varying spatial scales.

2.12 Quality control of deployment

Post-deployment evaluation

Evaluation after deployment is essential for making adjustments. The operational data generated — including deployment times, number of search hours, number of teams, number of carcasses found and how many were infected, finds-per-hour, and spatial location data — must be systematically used as input for evaluating the use of detection dogs. These quantitative indicators make it possible to objectively measure and continuously improve effectiveness (e.g., find-rate per search hour), coverage (area per team), efficiency (cost/hour vs. number of finds), and lessons learned for training and deployment strategies.

Peer-reviewed publications reporting key performance indicators (KPI's) (e.g., search hours × teams × find ratio) for ASF carcass-detection dogs are limited to the publications and reports already mentioned earlier in this project, including:

- Sandor et al. (2025), who compared the limitations of using dogs, thermal imaging, and drones.
- Desvaux et al. (2021), who reported data from a pilot project comparing detection dogs with human search teams.

See also Report 2

See also Report 11

The database that is continuously compiled in Germany, containing deployment data over long periods and across multiple regions, holds a wealth of information on this topic (TCRH visit).

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Our reports

Report 1. Analysis of dog breeds most commonly deployed internationally.

Report 2. Documentation of the costs and effectiveness of search dogs for detecting wild-boar carcasses.

Report 3. Overview of standardised protocols for training, deployment, and certification for this purpose.

Report 4. Overview and comparison of existing protocols for training, deployment, and certification of search dogs, and analysis of these protocols in terms of applicability in the Belgian context.

Report 5. Analysis of logistical and operational aspects of training and deploying African swine fever (ASF) search-dog teams in Flanders.

Report 6. Assessment of searchable area per habitat, taking into account restrictions due to biotope type and vegetation.

Report 7. Methodological description for long-term maintenance of expertise and training in dogs, and description of other potential deployment purposes for these dogs.

Report 8 (privacy-protected). Inventory of Belgian/Flemish trainers and organisations with relevant expertise, including their willingness to participate.

Report 9. Practical guide for establishing search-dog teams for deployment in the event of an ASF outbreak in Flanders.

Report 10. The use of drones for detecting wild-boar carcasses in support of African swine fever control and prevention.

Report 11. Search dogs and drones as methods for detecting wild-boar carcasses: a comparison and exploration of their complementarity.

The reports are also available in Dutch.