

Bovine hypodermosis in France in 2014: no outbreaks detected

Chloé Taveau (1) (chloe.taveau.fngds@reseaugds.com), Kristel Gache (1)*, Sébastien Wendling (2), Cécile Perrin (3), Sophie Mémeteau (4)

(1) GDS France, Paris, France

(2) Directorate General for Food, Animal Health Office, Paris, France

(3) ANSES, Bovine hypodermosis National Reference Laboratory, Niort, France

(4) French Certification Association for Animal Health (Acersa), Paris, France

*Management team member of the French National Epidemiological Surveillance Platform for Animal Health (ESA Platform)

Abstract

During the 2013-2014 campaign, 9,873 herds underwent screening for bovine hypodermosis (serological analyses and visual inspection). Sixty-six percent of surveyed herds were randomly selected and 34% underwent planned checks. With no outbreaks detected, the epidemiological situation in France is therefore considered to be highly satisfactory. While the situation has improved in border areas, such zones remain one of the main risk factors of reintroduction, due to the lack of organised control plans in neighbouring countries, the absence of natural barriers and the proximity of French and foreign herds on summer pasture lands. Therefore, reinforced monitoring in at-risk areas, surveillance of animal introductions and targeted screening continue, so as to avoid undermining the efforts that have been made over the past several years.

Keywords

Bovine hypodermosis, Warble fly, Cattle, Epidemiological surveillance

Résumé

Hypodermose bovine en France en 2014 : aucun foyer détecté

Durant la campagne 2013-2014, les dispositifs de surveillance aléatoire et orientée de l'hypodermose bovine, ou varron, (analyses sérologiques et contrôles visuels) ont porté sur 9 873 cheptels : 66 % des cheptels surveillés provenaient d'un tirage aléatoire et 34 % de contrôles orientés. Aucun foyer n'a été mis en évidence : la situation épidémiologique de la France est donc très favorable. Bien que la situation se soit nettement améliorée dans les zones frontalières, celles-ci restent un des principaux facteurs de risque de réintroduction, du fait de l'absence de plans de lutte collectifs connus dans les pays limitrophes, de l'absence de barrières naturelles, et de la proximité entre troupeaux français et de pays voisins en zone d'estive. Dans ce contexte, la surveillance du varron reste renforcée dans les zones à risque, la surveillance des introductions et les contrôles orientés sont maintenus pour ne pas compromettre les efforts entrepris depuis plusieurs années.

Mots-clés

Hypodermose bovine, varron, bovins, épidémiosurveillance

Hypodermosis (warble) is an internal myiasis in cattle characterised by infestation of subcutaneous connective tissue in the dorsolumbar region by larvae of flies in the *Hypoderma* genus, following a period of larval migration and transformation. The larvae develop in bovine tissue over the winter and emerge in the spring after forming a nodule on the animal's back and perforating the hide.

In the past, this disease had substantial economic consequences: reduced milk production, slowed growth of young animals, immunosuppression caused by larvae, and damage to the hide when the larvae exit through the skin in the spring. For these reasons, farmers came together at the end of the 1980s to implement an organised control plan, region by region. Each regional control scheme had two components: a systematic treatment phase at the beginning of the plan, followed by a testing phase (first visual inspection, then serological analysis) for several years. Serological testing became mandatory for all herds in France in July 1998 and was reinforced by the Ministerial Order of 6 March 2002. A rapid decrease in the country-wide prevalence of hypodermosis was then observed in herds between 1998 and 2001, from 5.7% to 0.4% (Mémeteau *et al.*, 2011). Given the rate of eradication, in February 2006 bovine hypodermosis in its clinical form became a notifiable disease with compulsory control measures (Decree No. 2006-178, 17 February 2006). It is now considered to be a Category 2 health hazard (Ministerial Order of 29 July 2013).

There are currently two surveillance schemes, one voluntary and one mandatory (Box):

- The mandatory scheme is underpinned by the Ministerial Order of 21 January 2009 and relies on:
 - A random surveillance scheme conducted annually to determine whether the prevalence of infestation in a zone is below a certain level (5%). Implementation of this scheme is entrusted to the GDSs.

- This surveillance scheme entails serological analysis of pooled sera or bulk milk (sampled between 1 December of the previous year and 31 March of the current year for blood samples, and between 1 January and 31 March of the current year for milk samples). Sampling takes place as part of programmed cattle screening procedures for brucellosis and infectious bovine rhinotracheitis (IBR), in a randomly selected group of herds. Animals in herds found to be positive then undergo a sight check in the spring to confirm or rule out the presence of hypodermosis.
- If necessary, serological surveillance can also be supplemented by random sight checks⁽¹⁾. These inspections take place during the period when the larvae emerge, between 1 April and 30 June each year.
- At the end of the random surveillance campaign, and on the basis of an annual report forwarded by the national coordinator (GDS), the DGAL determines which zones are hypodermosis-controlled or hypodermosis-free. An area is considered to be a hypodermosis-controlled zone when the rate of infestation of herds, demonstrated by the random scheme through serology and/or sight checks, has been below 5% for two consecutive years. Hypodermosis-free zones have had an infestation rate, demonstrated by random serological testing, of less than 1% for two consecutive years.
- A targeted screening campaign is also carried out to detect outbreaks of hypodermosis. This campaign increases the probability that infested herds will be detected, but also aims to raise awareness among breeders for whom the risk of infestation is related to farming methods. Targeted screening focuses on

1. On 31 March each year, if less than 80% of randomly selected herds in an area have been tested serologically, herds that have not been tested are inspected visually to reach the threshold of at least 80% of herds monitored in the area. Serological testing is given preference because sight checks are far less sensitive.

Box. Control measures for bovine hypodermosis

Objectives

Mandatory surveillance

- Confirmation of the controlled or disease-free status of the various regions of mainland France (an infestation rate of below 5% or 1%, respectively).
- Early detection of any outbreak of hypodermosis.

Voluntary certification scheme

Guarantee the status of the herd of origin for animal sales.

Monitored population

Domestic cattle across mainland France.

Surveillance procedures

Outbreak surveillance:

Any cutaneous lesion suggestive of bovine hypodermosis must be notified to the Departmental Directorate for Protection of the Population (DDecPP) in the *département* where the suspect animals are located.

Mandatory Programmed surveillance

- Screening by serological analysis of pooled sera or tank milk in a random sample of herds. Given the qualitative approach, the sample size is determined on the basis of a threshold prevalence level (5% for "controlled" status) and the number of herds present. Any non-negative result for pooled blood samples leads to individual testing. A non-negative result for one or more animals entails loss of the negative status of the herd. A positive result for milk pooled from a number of animals (tank milk) leads to a positive status for the herd. If the result is uncertain, a second sample is taken before 31 March in order to determine the status of the herd. Serological surveillance can also be supplemented by random sight checks seeking to detect any cutaneous lesion.
- Targeted screening of herds or animals considered to be at-risk (epidemiological link with an affected herd, geographic location of the herd in an area at risk of re-infestation, farming practices, non-negative results obtained during serological screening campaigns).
- Monitoring introductions: only animals from at-risk herds (foreign herds or herds reported as being at-risk by the managers) undergo hypodermicid treatment, unless introduced in a finishing herd under exemption with cattle kept entirely in closed facilities, or cattle born after 31 October and introduced before 1 March of the following year (in compliance with the ACERSA statement of requirements for national certification).

Voluntary scheme

This scheme is managed by the French Certification Association for Animal Health (ACERSA) and results in certification of production sites. It is implemented in the field by local certification units (STCs) authorised to grant herds within their area the certification "hypodermosis-controlled" or "hypodermosis-free", guaranteeing the status of the herd of origin when animals are sold. Herds qualify if they are in a controlled or disease-free zone respectively and fulfil the conditions of the national statement of requirements.

Health control measures

Bovine hypodermosis had been a notifiable disease with compulsory control measures in its clinical form since 2006, and is now a Category 2 health hazard.

If a farm is found to have clinical cases of bovine hypodermosis, the clinically affected animal or animals, as well as those suspected of being infested, must be treated.

Regulatory References

Ministerial Order of 29 July 2013 defining Category 1 and 2 animal health hazards.

Ministerial Order of 21 January 2009 establishing collective prophylaxis and control measures for bovine hypodermosis.

potentially at-risk herds, specifically those where there is an epidemiological link to an infested herd, those located in a zone where infestation may recur (particularly border areas, i.e. any municipality located less than 5 km from the border), those subject to certain farming practices (trade, summer grazing) or those where non-negative test results were obtained through random surveillance.

- The second surveillance scheme involves issuing health status certification, to complement the mandatory measures. It serves to guarantee the status of the herd of origin when animals are sold. The scheme is coordinated by the French Certification Association for Animal Health (Acersa) and implemented by local certification units (STCs) authorised to grant the following certifications to herds within their areas: hypodermosis-controlled herd, or hypodermosis-free herd, depending on the zone's status, and guaranteeing the status of the herd of origin when animals are sold. Livestock farmers can apply for either of the certifications if their herds are located in controlled or disease-free zones and fulfil the conditions in the national statement of requirements (ACERSA Statement of requirements - CC VAR 01), and are reported as being in a zone where there is an accredited STC for issuing hypodermosis certifications.

This article presents descriptive results for bovine hypodermosis obtained through the random and targeted surveillance schemes for the 2013-2014 campaign that took place between 1 July 2013 and 30 June 2014. The results presented below are based on data collected specifically from FRGDS groups (Regional federation of animal health protection farmers' organisations) and forwarded by GDS units that implement the bovine hypodermosis surveillance plan.

Results

During the 2013-2014 campaign, 9,873 herds were tested as part of the random and targeted surveillance schemes for bovine hypodermosis through serological analyses and sight checks: 66% of the monitored herds were selected at random, and 34% underwent targeted testing

Random surveillance of herds

Evaluation of the rate of herd infestation is based on a random sampling plan involving computerised random selection from among all herds in a region, excluding finishing herds that are exempt and housed entirely in closed facilities.

Given the qualitative approach, the sample size is determined on the basis of a threshold prevalence level (5% for controlled status) and the number of herds present.

For the 2013-2014 campaign, 7,201 herds were selected at random, and 6,513 of these were tested: 6,391 herds by serological analysis and 122 by visual inspection. Thus 90% of randomly selected herds were controlled, with a completion rate higher than 80% for all regions. The requirement concerning the level of tests to perform, i.e. more than 80% of the random sample, was therefore fulfilled for all regions. This testing level of below 100% is primarily related to the obligation to carry out the serological controls during a given period. A certain number of randomly-selected herds could not be tested, particularly for blood testing, because programmed screening for brucellosis and/or IBR took place before 1 December or after 31 March.

Random serological surveillance

In total, 6,391 herds underwent serological testing: 3,808 were analysed only through blood sampling, 2,001 only through milk, and 582 via both blood and milk samples (mixed herds).

During the 2013-2014 campaign, nine herds were identified as seropositive through the random testing scheme (herds providing positive blood samples) as well as one mixed herd in the French regions of Provence-Alpes-Côte d'Azur, Limousin, Languedoc-Roussillon, Franche-Comté and Centre. Sight checks performed on these herds were negative, however. These seropositive herds were therefore not

registered as outbreaks of bovine hypodermosis, but were considered to be the result of residual antibodies or false-positive results. We note that the proportion of positive tests on blood (0.05%) concurs with the test specificity (99.8%, according to the supplier's validation dossier) (Institut Pourquier, 2001). These herds will be included in targeted serological controls next year.

Random visual inspection

In all, 6,382 animals in 122 herds were inspected visually. No outbreak of clinical hypodermosis was detected.

Targeted surveillance of herds

3,360 herds were tested as part of targeted surveillance *via* serological analyses or sight checks.

Targeted serological testing

Serological analyses were carried out in 1,936 herds with blood samples, and with milk samples in 1,101. The majority, 67%, of these targeted serological controls concerned herds in border areas where the risk of reintroduction is highest. These serological analyses detected 29 seropositive herds, located in the French Regions of Rhône-Alpes, Provence-Alpes-Côte-d'Azur, Champagne-Ardenne and Auvergne. Sight checks performed on these herds were negative, however. Again, these seropositive herds were therefore not registered as outbreaks of bovine hypodermosis, but were considered to be the result of residual antibodies or false-positive results.

Targeted visual inspection

In all, visual inspections were carried out in 323 herds. No outbreak of clinical hypodermosis was detected.

Control of introductions and treatment measures

In all, out of a total of 7,158 cattle that should have been screened following introduction in herds in mainland France for the 2013-2014 campaign, 6,191 cattle were actually treated, giving a treatment rate of 86%. If animals are not treated, this results in the implementation of targeted testing of the animal and/or herd of origin.

Tactical treatment (preventive treatment in at-risk herds) was administered for a total of 1,869 cattle in 83 herds. To a very large extent, these treatments were administered in border areas, and were far less numerous. Tactical treatments are no longer systematic, with priority being given to control measures.

Report on implementation of local certification units

The national control scheme covers 21 regions or zones, including six that have borders with Belgium, Luxembourg, Spain or Italy (14 *départements* in all). Most *départements* and some regions are organised into local certification units (STCs) accredited by ACERSA to manage the control plan for bovine hypodermosis (Figure 1).

At this time, only two *départements* on the French mainland have not submitted an application for accreditation of a local hypodermosis STC. These are Nord and Pas-de-Calais. The epidemiological situation close to the border with Belgium has improved (absence of outbreaks and a decrease in the number of positive blood tests). This should facilitate the management of the hypodermosis programme and enable these two departments to engage with it as a result.

Discussion

Results obtained for the 2013-2014 campaign indicate that all regions have an infestation rate below 5% (according to serological testing

and/or sight checks) and fulfil requirements concerning the number of tests to perform (more than 80% of the random sample). Therefore, as per the criteria stipulated in the Ministerial Order of 21 January 2009, all the regions of mainland France have controlled-zone status. In addition, the vast majority of *départements* and regions on the mainland have STCs, with regional or departmental organisations accredited by Acersa, and can issue herds with hypodermosis-controlled certification.

During the 2013-2014 campaign, no outbreaks of bovine hypodermosis were detected, despite an outbreak in 2012-2013 following the introduction of an infested animal from Spain in the Midi-Pyrénées region. The epidemiological picture is therefore highly favourable. As a reminder, no outbreaks had been detected during the two previous campaigns, 2010-2011 and 2011-2012.

In view of the very favourable epidemiological situation in France in the past few years, the assumption that the persistence of antibodies can explain the positive serological results must be further investigated. For this purpose, the data concerning the age and origin of the seropositive animals will be collected for future campaigns.

In view of the very low prevalence levels observed over these recent campaigns (Figure 2), some or all of the STCs could work towards obtaining disease-free certification. To achieve this, stricter sampling requirements would be needed and would only be acceptable if groups of neighbouring regions were created. However, recognition as a disease-free zone is not currently planned since there are no economic benefits compared to controlled status.

Costs

The measures taken included awareness-raising initiatives for breeders, administrative and technical follow-up (targeted testing of herds), and tactical treatment of animals, for a total cost of €543,790. In order to carry out these actions, the livestock producers bear a significant share of the costs, even if the aid from the State (€60,000), from regional councils and the general Union of hides and skins are essential to maintain a surveillance adapted to the favourable epidemiological situation in France.

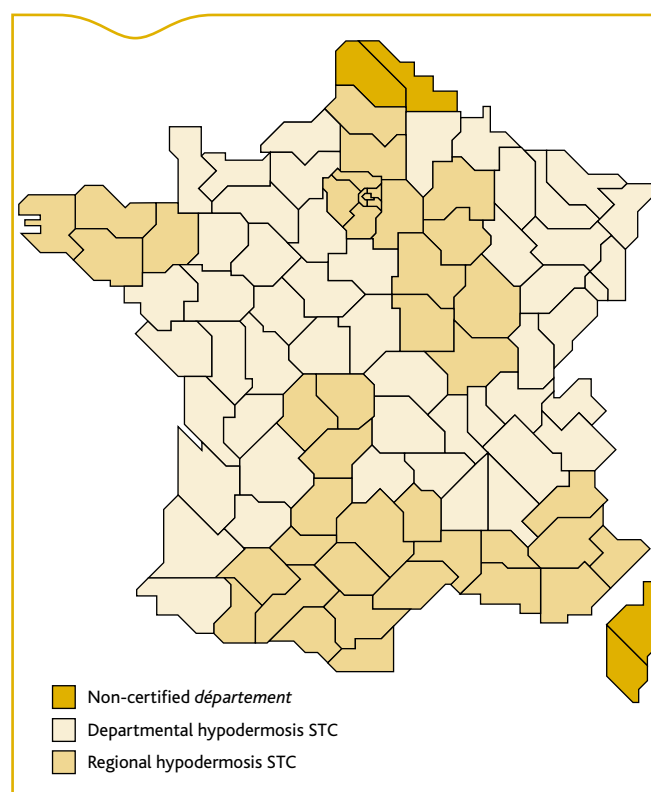


Figure 1. Accredited local certification units (ACERSA data)

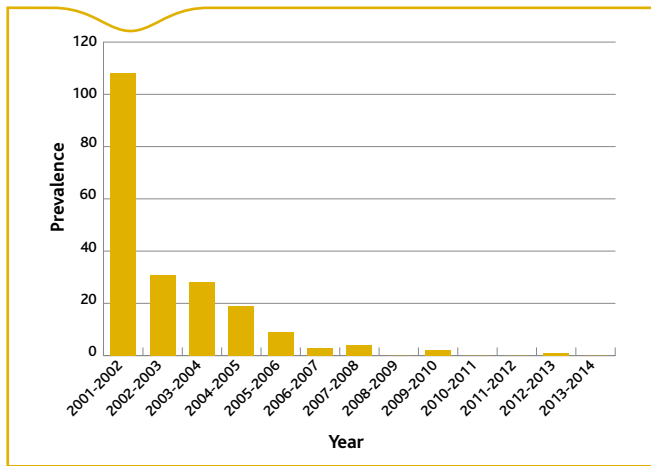


Figure 2. Changes in prevalence of bovine hypodermosis since 2002 in France

The 14 at-risk *départements* bordering Spain, Italy, Belgium or Luxembourg spent €104,180 on control of hypodermosis, or 20% of the national total.

Conclusion

During the 2013-2014 campaign, no outbreaks of bovine hypodermosis were detected. The results obtained in the 2013-2014 campaign mean that “disease-controlled” status can be maintained for all regions concerned, since hypodermosis can be considered absent at the prevalence threshold of 5%.

However, border areas remain vulnerable. The introduction of warble fly and resulting outbreaks is still possible in the absence of acknowledged control plans in neighbouring countries, the absence of natural barriers, and the proximity of French and foreign herds in summer grazing areas (the range of *Hypoderma* warble flies is about 5km).

Given this context, surveillance of at-risk zones, tactical treatment, monitoring of introductions and targeted testing all remain important, with the *départements* most exposed along their borders playing the role of buffer zone.

Acknowledgements

We would like to thank all the accredited laboratories for diagnosis of hypodermosis in serum or milk, all GDS personnel, responsible for implementation of hypodermosis control, and coordinators of local certification units (STCs), who provided the data essential for drafting this article.

References

- Cahier des charges Acersa CC VAR 01, version C, et avis du 25 novembre 2009 portant homologation du cahier des charges technique en matière d'hypodermose bovine [Consulted on 7 October 2013] http://agriculture.gouv.fr/IMG/pdf/cc_var_01__version_C.pdf.
- Institut Pourquoi, 2011. Dossier de présentation du réactif pour le contrôle du kit ELISA hypodermose, 12-13.
- Mémeteau, S., Bronner, A., Erimund, S., 2011. Report on surveillance of bovine hypodermosis in 2010: detection of two outbreaks associated with neighbouring countries. *Bull. Epid. Santé Anim. Alim.* 46,21-23.