



ANSES in Annual Report 2022 action



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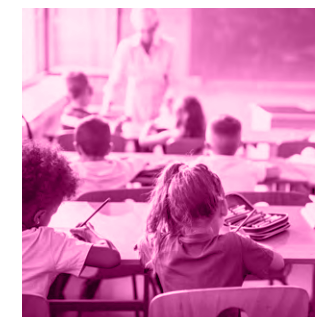
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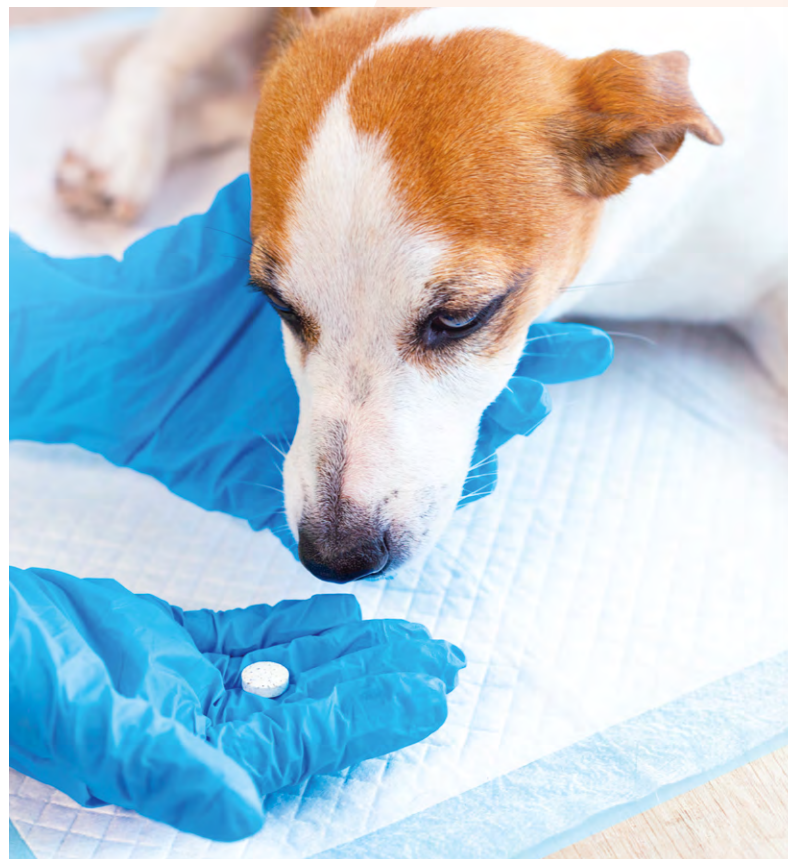
Animal health

Antibiotics and animals

The use of antibiotics in animals, particularly livestock, contributes to the global phenomenon of selection of resistant bacteria known as antimicrobial resistance. These resistant bacteria can circulate between countries, persist in the environment and infect humans, with serious health consequences. To meet the public health challenges, ANSES monitors and assesses resistance in animals and explores alternative solutions to antibiotics.

According to the World Health Organization, antimicrobial resistance could lead to 10 million deaths worldwide each year by 2050. To combat this scourge, uses of antibiotics in human and veterinary medicine need to be reviewed. This is because most of the compounds are used for both humans and animals, and many of the resistant bacteria that emerge in animals can be transmitted to people.

In its role as national reference laboratory, ANSES monitors bacterial resistance phenomena in meat production sectors, focusing on bacteria such as *Escherichia coli*, *Salmonella* and *Campylobacter*. As the French Agency for Veterinary Medicinal Products (ANMV), it also monitors sales of antimicrobials administered to animals. This enables the authorities to assess animal exposure to antimicrobials and changes in practices for different species. Every November, the Agency publishes the main monitoring results as part of World Antibiotic Awareness Week and European Antibiotic Awareness Day.



It also contributes, at national, European and international levels, to the various action plans to promote the proper use of antimicrobials and combat antimicrobial resistance in animal health, while taking account of the "One Health" dimension. Lastly, it is involved in implementing the interministerial roadmap to "Control bacterial resistance to antibiotics", which is currently being updated.

Forty years of monitoring resistant bacteria in animals

Created in France in 1982, the epidemiological surveillance network for antimicrobial resistance in pathogenic bacteria of animal origin (Resapath) is still the only one of its kind in Europe. With the participation of more than 100 volunteer veterinary testing laboratories, it collects data from antimicrobial resistance tests: antibiograms. This enables it to monitor trends in antimicrobial resistance in all domestic animal species in France, and to detect any emerging threats. On 17 November 2022, ANSES organised a round table looking back on the network's 40 years, as part of a scientific event on antimicrobial resistance in animal health and the environment.

Adapt the regulations on antibiotic uses

The Agency made an active contribution to European work on new legislation for veterinary medicinal products, which includes a number of changes to help combat antimicrobial resistance. For example, the regulation that came into force in January 2022 prohibits the use of antimicrobials as preventive treatments for individual or groups of animals, other than in exceptional cases. The risk of emergence of antimicrobial resistance has also become a justification for refusing marketing authorisation for these products. These are significant changes that should promote the rational use of antimicrobials in all Member States.

80%
of antibiotics are common
to both veterinary
and human medicines

Exposure of animals
to antibiotics of critical
importance for human
medicine has been
reduced by
90%
in recent years

Monitoring veterinary medicinal product sales and antimicrobial resistance: parallel developments

LONG-TERM TRENDS

Since 2011, overall exposure of animals to antimicrobials has halved. Since the start of the monitoring programme in 1982, the rate of antimicrobial resistance has fallen by varying degrees depending on the animal sector and antibiotic. In 2021, the trends in antimicrobial resistance remained generally favourable.

2021 REVIEW

Continuing downward trend in livestock exposure to antimicrobials:

- volume of sales of antimicrobials: -10.7% from 2020 to 2021;
- animal exposure to antimicrobials: -3.2% from 2020 to 2021.

Lower resistance overall, with a few points to watch out for:

- stabilisation of exposure and resistance for critical antibiotics, i.e. those essential for treating human disease, but an upturn in resistance for two antibiotics: amoxicillin and amoxicillin-clavulanic acid;
- a decrease that seems to have levelled off in cattle;
- an upsurge in antimicrobial exposure of pets that needs to be monitored.

Multidrug-resistant bacterial strains, i.e. those resistant to several antibiotics, are more common in cattle and swine (18-20%) than in poultry, dogs, cats and horses (5-10%). However, in dogs, cats and equines, a diminishing number of bacteria can now be treated with several antibiotics, as multi-susceptible strains fell sharply between 2017 and 2020.

Avian influenza: a first step towards solutions

Europe has been experiencing one major crisis after another caused by highly pathogenic avian influenza (HPAI). The disease is in danger of becoming endemic, and the large-scale circulation of the virus increases the chance of it being spread from birds to mammals. In France, ANSES is playing an essential role in providing scientific support to limit the impact of this disease by investigating cases, sequencing viruses and assessing control strategies including biomonitoring and vaccination.

While avian influenza is not a new disease, the current epidemic is on an unprecedented scale in domestic and wild birds, and led to the culling of more than 21 million poultry during the 2021-2022 season. It also sporadically affects mammal species throughout the world. The high mortality rates among wild birds, particularly the deaths of seagulls in the Ile-de-France and Grand Est regions, call for great vigilance.

In late December 2022, ANSES confirmed the infection by an H5N1 virus of a domestic cat living near a duck farm affected by the virus in the Deux-Sèvres *département*. It then identified the virus in dead foxes in Oise and in two captive bears in the Aude *département*. As the national reference laboratory, ANSES has also sequenced numerous circulating virus strains and carried out a number of emergency expert appraisals and epidemiological missions to support crisis management on farms.

For the Agency, correct application of biosecurity measures remains the most effective way to prevent the introduction and spread of HPAI within and between farms. As well as preventing the disease from circulating in animals, surveillance needs to be stepped up to detect any cases of transmission to humans at an early stage. In view of the virus's potential to spread to humans, closer coordination is being established between ANSES, the National Reference Centre for respiratory viruses and *Santé Publique France*.



On the front line of the avian influenza crisis

- Coordination of genetic analyses of viruses to trace the epidemic.
- Epidemiological investigations.
- Risk assessments and scientific support for the authorities on the management measures to be taken in light of the epidemic's progression: keeping animals indoors, biosecurity practices, etc.
- Insights on possible strategies for adapting production methods.
- Assessment of new vaccines and expert appraisals on vaccination strategies.
- Genetic investigations into viruses detected in birds and certain mammals.

A need to develop a vaccination strategy

In addition to other preventive measures, ANSES has been examining the possibility of introducing a poultry vaccination strategy.

In its first opinion, the Agency had highlighted a number of obstacles to carrying out vaccination in the winter of 2022-2023, including the lack of a vaccine for ducks, and the need for vaccination to be conditional on monitoring of vaccinated animals, to guarantee the absence of asymptomatic infection.

In its second opinion of April 2023, it proposed three preventive vaccination scenarios. They aim to protect poultry sectors and limit the spread of the virus by determining the types of farms and the species to be vaccinated as a priority, depending on the available vaccination resources.

In general, vaccinating the most exposed poultry also limits the spread of the virus and the risk of it adapting to mammals, including humans.

Animal diseases and zoonoses

Does a disease in animals mean an epidemic for us? It is essential to study and monitor animal diseases in order to foresee the possibility of transmission to humans. Researchers at ANSES closely study the major animal diseases that affect livestock farms and can cause zoonoses.

Progress towards a vaccine for African swine fever

In August 2022, researchers at the ANSES Ploufragan-Plouzané-Niort Laboratory filed a patent for a prototype vaccine based on an attenuated strain of the African swine fever virus. This disease is responsible for high mortality rates in pigs and wild boar in several countries in Europe, Asia and the Caribbean. This vaccine has the advantage of not being produced by genetic manipulation, which should make it easier to authorise its use in wildlife. Indeed, wild boar would probably be the first target for the vaccine in Western Europe. This is the most affected species, and the presence of the virus in wildlife constitutes a risk for pig farms. Studies are still under way, in particular to ensure that this attenuated strain cannot be transmitted from one animal to another, or become virulent again.



Tick-borne encephalitis and transmission via goat's cheese

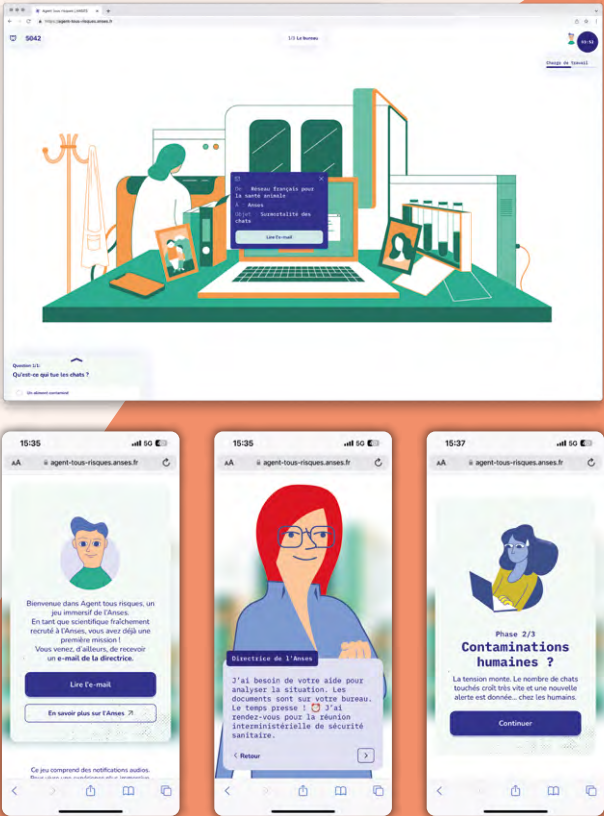
Human cases of tick-borne encephalitis virus transmitted via food were observed in France for the very first time in 2020. Several ANSES laboratories responded in order to determine the circumstances, improve detection of the virus in raw-milk products and prevent the risk of similar cases occurring. Virus-carrying ticks found in the undergrowth where the goats were grazing were probably responsible for their infection. These contaminations also revealed the presence of the virus in the Ain département, whereas previously it had mainly been identified in Alsace, Lorraine, Savoie and Haute-Savoie. However, its presence is difficult to determine, because tick-borne encephalitis causes no symptoms in animals, and only 10-30% of infected humans develop meningitis or encephalitis.

Zoonoses: end of the European One Health EJP

This programme is coming to an end after five years. It brought together 44 partners – research bodies and health agencies from 22 European countries – with the shared goal of acquiring new knowledge of foodborne zoonoses, antimicrobial resistance and emerging threats. The One Health European Joint Programme (EJP) is one of the few public initiatives in Europe to bring together researchers from the human and animal health sectors. Seventeen doctoral students have been trained through the programme and made aware of the need to avoid working in a compartmentalised manner to ensure cross-sector collaboration and meet the health challenges of today and tomorrow.



AGENT TOUTS RISQUES



Agent tous risques: investigate an unknown disease just like an ANSES scientist!

How can the public be made more aware of emerging zoonoses in an effective and compelling way? ANSES opted for a “serious game”, launched at the 2023 Paris International Agricultural Show, where the Agency’s stand was devoted to animal diseases. Confronted with a mysterious disease affecting cats, players had to discover its origin and prevent its spread. This fun experience took them behind the scenes of the investigative work carried out by researchers and experts. It also showed the daily commitment of the teams and the importance of working together with other scientific players to support the public authorities.

Play Agent tous risques (in French) →



Interview



Charlotte Dunoyer
Scientific Director
of the Animal Health
and Welfare theme

Why is it important not to view animal health and human health in isolation?

Certain diseases, by circulating among animals, could adapt to humans. It is necessary to combat these pathogens in order to protect our own health. A telling example is the avian influenza virus: the more mammals it infects, the more it evolves genetically, enabling it to become contagious for our species. Another example is swine flu. We know that pigs are a crucible favouring the reassortment of influenza viruses (swine, avian, human) and therefore the emergence of a zoonotic disease.

It is also important to control existing zoonoses, such as tuberculosis, brucellosis, salmonellosis and tick-borne encephalitis. Regarding brucellosis, a disease transmitted by ruminants, 2022 was an eventful year. Our Laboratory for Animal Health

organised an unprecedented response to the outbreak in the Alps of Haute-Savoie. The teams carried out various analytical investigations to identify the epidemiological links between ibex and the affected cattle farm, and then between this farm and other cattle farms in the area. They also tested all the cattle in the outbreak after slaughter to determine the number of infected cows, and continued analytical investigations to monitor the ibex in the Massif du Bargy. The purpose of all this work was to protect both animals and human health.

How do ANSES's animal health missions improve the response to emerging risks?

Five of our research laboratories specialise in animal diseases, whether zoonotic or not. As reference laboratories for these different diseases, they are responsible for the effective implementation and confirmation of analyses carried out on farms and in production sectors to detect a pathogen and respond accordingly. They therefore play a major role in monitoring diseases, while working with the network of departmental testing laboratories and all the players of the epidemiological surveillance platform for animal health. The scientific skills of our laboratories enable us to support the authorities in preparing for future outbreaks.

Take the example of foot-and-mouth disease: it is extremely contagious, and would be a disaster for all French livestock farms if it were to spread across the country. ANSES's Laboratory for Animal Health holds all the national, European and international reference mandates for this disease. This gives us a comprehensive view of foot-and-mouth disease viruses circulating around the world, but also enables us to maintain a high level of vigilance and anticipate any emerging threats. Through its various man-

dates, our laboratory is also able to collect a variety of specimens of these viruses. These are essential for conducting research into this disease, which is not present in France.

What are the challenges to preventing new epidemics?

Ever since the COVID crisis, there has been a lot of talk about the "One Health" approach: animals, plants, environment and humans. However, practice is still inadequate. We need to rethink the health system to improve horizontal coordination of human and animal diseases. This means, for example, harmonising surveillance systems. Sharing data on the development of diseases in different animal species and in humans, and analysing them jointly, would provide a more comprehensive view of the risks.

Moreover, regulation of certain zoonoses – which are diseases that affect both humans and animals – is poor or even non-existent in animal health, because most of the time they are asymptomatic in animals. This is the case today, for example, with tick-borne encephalitis, echinococcosis, Q fever and West Nile disease. If we fail to acknowledge the One Health challenge of these zoonoses, we are depriving ourselves of the tools with which to monitor and prevent their emergence.

Lastly, in terms of research funding, it is important to integrate the "One Health" principle without neglecting the animal health aspect, in order to acquire cross-over knowledge on pathogens that are shared or that could become zoonotic. The European One Health EJP research programme is a good example of this.

Animal health is also our health. ”

The challenge of climate change

The health consequences of climate change are becoming more intense. ANSES already contributes to their prevention and management in its various fields of activity, and this contribution will increase.



The Agency is already highly engaged on ecological effects such as the emergence or return to France (metropolitan France and the overseas territories) of diseases and insects that are harmful to plants and animals (including wild flora and fauna), invasive exotic plants, and new diseases transmitted to humans by mosquitoes and ticks. Now it has also been asked to respond to questions such as the impact of climate change on risk factors in the workplace.

Since the drought of summer 2022, it has also been regularly consulted to assess new approaches, such as the direct reuse of wastewater for irrigation.

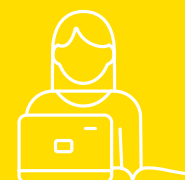
Generally speaking, the scope of ANSES's expertise means that it may be called upon to address many different consequences of climate change in terms of environmental health, occupational health, food, animal health and welfare, and plant health.



Proliferation of ticks and mosquitoes and the development of vector-borne diseases



Changes in lifestyle and consumption habits



Adapting working conditions



New geographical distribution of plant diseases and pests



Disruption of ecological balance, emergence of new pathogens and zoonoses



Changes in the quality of environmental media and resources – water, soil, ambient and indoor air



Adapting animal and plant production sectors



New geographical distribution of animal diseases

climate change

Climate: vectors and pests under surveillance

With higher temperatures and wetter conditions, the geographical distribution of disease vectors and plant pests is changing, and new arrivals are threatening Europe. In 2022, ANSES continued working towards its goal of anticipating and combating their establishment.

EMERGING THREATS UNDER CLOSE SURVEILLANCE



CRIMEAN-CONGO HAEMORRHAGIC FEVER

Ticks of the genus *Hyalomma*, which have been observed in the south of France for several years, could potentially spread throughout metropolitan France as a result of climate change. In particular, this tick can transmit Crimean-Congo haemorrhagic fever (CCHF), which has a fatality rate of up to 30% in humans in some countries. No indigenous cases have been detected in France, but cases are recorded every year in Spain. Moreover, in France, antibodies specific to the CCHF virus have been found in domestic and wild animals, suggesting that these animals were exposed on French soil. Following a scientific expert appraisal, ANSES confirmed the risk of emergence and called for nationwide surveillance of these ticks.

EPIZOOTIC HAEMORRHAGIC DISEASE

First detected in Europe in late 2022, several cattle herds have been affected in Italy and Spain. The virus is transmitted by biting midges of the genus *Culicoides*. Fifteen years ago, it was unimaginable that the disease would one day arrive in Europe, but climate change is now enabling the midge vectors to survive in French regions. ANSES has been helping to identify and monitor the spread of the virus. One infected deer was detected in Sardinia but it is still too early to tell whether it was an isolated case. In order to detect the arrival of the virus in France, a surveillance system has been set up with the aim of analysing any suspect animal, particularly among wildlife.



SEVERAL PLANT-PARASITIC NEMATODES

There is a risk that several species of plant-parasitic nematodes of the *Meloidogyne* genus could become established in France as a result of global warming. In the short term, their arrival in our latitudes will pose a major challenge to the protection of agricultural production, as they attack a wide range of plants. Among these "tropical" nematodes, around a dozen species are being closely studied by the scientific community, because they can reproduce very rapidly through parthenogenesis and they parasitise a very wide range of plants. The tropical species *M. incognita* and *M. javanica* are recognised as the fastest-spreading plant pests in the world.



JAPANESE BEETLE THREATENING MANY PLANTS

This insect pest has already been in Italy and Switzerland for several years and is a threat to hundreds of plant species. According to the ANSES expert appraisal published in 2022, there is nothing to stop it becoming established in France: it moves around easily, the temperature and precipitation conditions here are favourable, and it can feed on many of the plant species found in France. If it is detected, ANSES recommends defining the infested area to be monitored and combining methods including mass trapping, use of synthetic products and biocontrol. Reducing irrigation during the egg-laying period and tilling the soil in autumn have also proved effective.

FOCUS

The greening of towns and cities can have an impact on vector-borne diseases and the fight against vectors such as mosquitoes, ticks and aphids. In November 2022, ANSES and the Vectopole Sud network held a scientific conference to take stock of the work being done to restore biodiversity to urban areas.

ANSES has established seven cross-functional scientific themes to help ensure that the production of knowledge and methods can meet and is consistent with the scientific needs of risk assessment. These include the **Epidemiology and Surveillance** theme.



“ We investigate unusual disease peaks, anything out of the ordinary. ”

Émilie Gay

Scientific Director of the Epidemiology and Surveillance theme

Epidemiology and surveillance play an important role in ANSES's activities. What are they?

Epidemiology can be defined as the study of population health factors, i.e. diseases and anything that contributes to them. Surveillance enables these health factors to be monitored on an ongoing basis. The cross-functional scientific theme that I manage supports the Agency's expert appraisal activities, for example on the implications of wastewater reuse or the transmission of tuberculosis between cattle and badgers, and above all the activities of its laboratories.

Our primary objective here is to provide support for public policy-making: detecting and quantifying to allow action to be taken. We investigate increases or decreases in health problems, unusual peaks, anything out of the ordinary. These disciplines require specific methodological development work.

What role does ANSES play in these areas?

ANSES is closely involved and plays a leading role at national, European and international level. It carries out surveillance activities under the many reference mandates it holds in animal health, plant health, food safety and environmental safety. In each case, it acts as the national reference laboratory, assisting the State, official laboratories and surveillance schemes. It provides them with the scientific and technical support needed for the collection, processing, accessibility, transmission and dissemination of epidemiological surveillance data.

The Agency works closely with many partners. It contributes to around a hundred national surveillance networks and runs five of them, including Resapath (which focuses on antimicrobial resistance in pathogenic bacteria of animal origin) and the *Salmonella* network. It jointly leads the three national epidemiological surveillance platforms for animal health, plant health and food-chain safety, respectively. Lastly, it participates in European surveillance.

What are the main challenges facing epidemiology and surveillance?

There are three that I'd like to mention. First of all, improving surveillance. This means having the right tools for detecting threats and raising alerts. We are also keen to contribute to a more integrative "One Health" approach and develop the indicators needed to assess it. There have been numerous methodological developments in the field of surveillance, particularly regarding strategies for sampling and the resulting analyses, and syndromic surveillance.

A second challenge is how to better identify health risk factors at scales ranging from the animal to the ecosystem. To achieve this, we are studying the impact of predominant and alternative production systems on animal health and welfare, as well as interactions with wildlife.

The third challenge relates to controlling the spread of diseases and health hazards. Predicting them and measuring the impact of management measures is a major issue here. With regard to vaccination, for example, what happens if I vaccinate my animals? Or isolate them? Statistical and mathematical models are used to support decision-making, mainly to define measures that could stop or reduce transmission. Genetic sequencing data can be used, for example with avian flu, enabling us to investigate further.

More generally, in both epidemiology and surveillance, it is important to exploit methodological and technological innovations such as artificial intelligence and tools for managing big data.



Contaminants and environments

Pesticide metabolites in water

The presence of contaminants in the environment, particularly pesticide residues, is a major cause for concern. ANSES conducts numerous studies to identify and monitor the presence of undesirable substances in water, air and soil and to assess the risks they pose to the health of living beings.

Emerging pollutants in water: 2019-2022 sampling campaign

Every three years or so, the ANSES Laboratory for Hydrology carries out a campaign to measure the presence of emerging compounds in water. Here is an update on the latest national occurrence campaign, which was finalised in 2022.

METHOD

Raw and treated water samples were taken throughout France, including the overseas territories, to analyse water catchment points accounting for around 20% of the water supply. These analysis results improve knowledge of contamination of natural resources and water treated to produce tap water.

WHO USES THE DATA AND FOR WHAT PURPOSES?

These data are used by water production and distribution managers to design their water quality monitoring programmes, and by regional health agencies to update their water quality monitoring programmes. They are also valuable for assessing population exposure to health risks from drinking tap water.

MAIN RESULTS

More than
136,000
results collected

COMPOUNDS SCREENED FOR

157
pesticides
and pesticide
metabolites

54
explosives residues
1
solvent:
1,4-dioxane

A SPECIAL CASE: THE CHLOROTHALONIL METABOLITE R471811

This metabolite of a pesticide that is now prohibited was found most frequently, in more than one in two samples. In more than one in three samples it was found at concentrations exceeding the water quality limit.

The findings show that depending on their properties, certain pesticide metabolites can remain in the environment for several years after the active substance from which they were derived has been banned.

ANSES withdraws authorisations from herbicides containing S-metolachlor

S-metolachlor is one of the most widely used herbicidal active substances in France. It degrades into metabolites that migrate into soil, surface water and groundwater. In tests of drinking water, these metabolites have frequently been detected at concentrations exceeding the quality standards. In May 2021, the French Ministries of Ecology, Health and Agriculture asked ANSES to review marketing authorisations (MAs) in France.

ANSES worked in three phases to respond to this formal request

- 1 • A complete analysis of the contamination situation in different types of water in France, based on data from various types of monitoring, which found a significant presence of S metolachlor or its metabolites in all types of water.
- 2 • Certain MAs were reviewed in late 2021 on the basis of this analysis: in France, the quantities of herbicides containing S-metolachlor to be used on maize, sunflower, soy and sorghum have been reduced, while ensuring that the effectiveness of the products is maintained.
- 3 • Assessment of transfer of the substance and its metabolites into groundwater, following the review of the MAs.

The Agency's opinion, published in January 2023, concluded that the estimated concentrations of the three metabolites of S-metolachlor (ESA, OXA, and NOA) in groundwater exceeded the threshold value set by the European reference regulation. On this basis, ANSES withdrew the authorisations for products containing S-metolachlor in April 2023. In addition, as part of the European re-examination of the active substance S-metolachlor, the European Food Safety Authority (EFSA) published an assessment report in February 2023, also highlighting a major non-compliance relating to groundwater contamination.



Chlordecone and food in the French Caribbean

The chlordecone used in banana plantations in the French Caribbean until the 1990s has caused lasting contamination of soil and water, and still has an impact on food production today. In 2022, ANSES provided new insights into population exposure and food practices that could reduce the health risks. It also continued its research to improve the measurement of chlordecone and understand its effects. These advances were presented at a symposium held in Guadeloupe in late 2022.

Limit the consumption of certain foods to reduce the risks

ANSES showed that part of the French Caribbean population is at risk of being overexposed to chlordecone. People living in areas known to be contaminated have higher rates of exceeding health reference values than other residents. To reduce this risk, the Agency confirmed that all three of its dietary recommendations should be applied. Three quarters of the population already apply these recommendations, which shows that they are fully compatible with Caribbean dietary practices.

- 1 • Limit the consumption of fishery products acquired through short channels (leisure or subsistence fishing or bought from roadside vendors) to no more than four times a week.
- 2 • Avoid consuming freshwater fishery products from areas where fishing is prohibited by prefectural order.
- 3 • Limit the consumption of roots and tubers from family gardens in areas known to be contaminated to no more than twice a week. In the event of uncertainty, refer to the advisers of the JaFa family garden programme.

Toxicity reference values (TRVs)

- The chronic internal TRV is based on chlordecone levels in blood. ANSES first set this value to 0.4 micrograms per litre of plasma in 2021. It is used to identify the population profiles and geographical areas where action needs to be stepped up.
- The chronic external TRV relates to dietary exposure. In 2021 it was lowered to 0.17 microgrammes per kilo of body weight per day, in light of recent scientific data. It is used to adjust dietary recommendations.
- Below these TRVs, the risk of health effects occurring from exposure to chlordecone over the medium and long term is considered negligible.

ChlorExpo study: the effects of cooking food on chlordecone levels

Launched in early 2021, this study is examining the French Caribbean population's food procurement, preparation and cooking practices. In 2022, food potentially contributing to chlordecone exposure was collected from supermarkets and hypermarkets, markets, small shops, roadside sellers and allotments. Prepared according to Caribbean habits as much as possible, they will be analysed in the laboratory to determine their chlordecone content, with a particular focus on the effect of cooking. ChlorExpo's results are expected in 2024.

Research into chlordecone

- Study of the distribution of chlordecone in bovine tissue (muscle, fat, liver, blood serum) and development of new measurement methods in animals.
- Development of new analytical procedures to detect and measure chlordecone levels in livestock more quickly before slaughter.
- Study of the effects of different meat and offal preparation processes on chlordecone contamination of food.
- Study of the effects of cooking, specifically in a microwave, which could reduce chlordecone levels in food of animal origin, as part of the AlimOmic project.
- Study of the effects of chlordecone on human health, particularly on the brain.



Prostate cancer associated with chlordecone exposure recognised as an occupational disease

As part of its expert appraisal mission prior to the creation of occupational disease tables, the Agency concluded in a 2021 opinion that there was a probable causal relationship between exposure to pesticides, including chlordecone, and the risk of prostate cancer. Following its expert appraisal, a specific occupational disease table was created for the agricultural social security scheme.

Air pollution



Research, microensors and citizen science

In 2022, ANSES was designated to receive part of the penalty payment imposed on the State for exceeding thresholds for nitrogen dioxide pollution in air in several regions. These funds were used to launch research into this issue, including a study into wood combustion and five new projects to be funded as part of the National Research Programme for Environmental and Occupational Health (PNR EST).

In June 2022, ANSES and ADEME organised a scientific symposium on research into air quality, open to all stakeholders, to discuss the projects already funded by the PNR EST as well as future prospects. A citizen science approach based on microensors was also presented. Increasingly used by individuals and local authorities both indoors and outdoors, these devices measure particulate matter (PM10 or PM2.5), carbon monoxide and volatile organic compounds.

In its expert appraisal, ANSES looked at how the data they collect could be used to supplement the measurements taken by Approved air quality monitoring associations (AASQAs) and, in particular, how to acquire information in places where exposure to air pollutants is poorly documented, such as establishments open to the public.

FOCUS

Air pollution encompasses a wide range of pollutants. While the risks from ambient air are well established, those associated with indoor air pollutants have been less documented. There is a real need to acquire data to characterise population exposure and provide input for expert appraisals, while also taking account of the impact of climate change. Since 2006, ANSES has funded **126 research projects** on air quality issues as part of the PNR EST.



Pollution specific to underground metro and RER areas

Rail, which is a relatively clean mode of transport, will probably see greater development over the next few years. ANSES has been studying air pollution in underground railway areas. It revealed concentrations of suspended particles (PM10, PM2.5 in $\mu\text{g.m}^{-3}$) that were on average three times higher than in urban outdoor air.

Its composition is also different, with high levels of metallic elements such as iron, and elemental and organic carbon. This pollution is caused by the wear and tear of materials due to the braking of trains, contact between the rolling stock and the track, and the resuspension of dust due to train movements. Reducing user exposure means improving monitoring systems on platforms, stations and trains.

The Agency proposed indicators for monitoring air quality according to a typical user journey duration. These indicators can be used to determine the levels of particulate pollution in the air in each network in France, and then to assess the effectiveness of measures to reduce pollution at the source.

Interview



Charlotte Grastilleur
Managing Director
General of the Regulated
Products Division

Our actions are in line with the overall strategy of rational and minimal use of chemicals. ”

What are the challenges surrounding the assessment of plant protection products?

We have to assess both their safety and effectiveness according to regulatory criteria that determine whether they can be placed on the market. Similar processes apply to other regulated products assessed by ANSES (biocides, fertilisers and veterinary medicinal products).

The challenges we face are complex and varied, because we have to meet the needs of insect and disease control – or weed control for crops – while protecting public health and the environment. This assessment work is in line with European legislation, but also takes account of additional French requirements relating, for example, to the protection of bees or the expected assessment of buffer zones for protecting local residents.

We assess risks to residents and to the workers applying the products, transfer to soil and water, residues in food and effects associated with ecotoxicity (more specifically, on birds, aquatic organisms, mammals, bees and non-target plants). To find out more about this process, I encourage you to read our specific 2022 report on this activity.

As an expert appraisal agency specialising in health, we also harness our scientific skills and expert committees to help develop assessment methods at European level, in order to better identify and prevent risks and also adapt assessments to practices, for example to new product application techniques. On this last point, changes are being planned on the initiative of the European Food Safety Authority.

More generally, what areas require particular vigilance and attention?

We are keenly aware of what is at stake when assessing the dossiers submitted to us. Depending on whether it is favourable or unfavourable, an assessment will lead us to grant, renew, restrict or refuse marketing authorisation (MA). For the final authorisation or refusal decisions, the key aim is to ensure that the products placed on the market are safe and effective, in line with the findings of the assessment. The assessment findings and the resulting decision are published together on the Agency's website.

To support the National Biocontrol Strategy, a prioritisation system has been introduced to minimise the time taken to process applications for these products. These accounted for 59% of the main applications for authorisation of plant protection products in 2022 (i.e. 101 applications), compared with just 17% in 2018.

How do you ensure independent scientific assessment?

Scientific assessment prior to decision-making is carried out in accordance with the expert appraisal processes and ethical rules that apply

to all the Agency's expert appraisal activities, with the findings validated by independent, multi-disciplinary groups of experts. These experts, like the Agency's scientists, are required to complete public declarations of interests and keep them up to date. The assessment phase is carried out by a separate ANSES department from the one responsible for the administrative examination of dossiers and decisions.

How does the Agency stand with regard to the agro-ecological transition?

The use of plant protection products raises economic, political and societal questions of which we are fully aware, but that go well beyond the scope of our missions. We strive to cultivate dialogue in order to listen to expectations and reiterate our role. Numerous associations, companies and technical institutes take part in ANSES's platform for dialogue on plant protection products.

Our actions are in line with the overall strategy of rational and minimal use of chemicals. While the number of active substances available is falling, mainly as a result of safety requirements, uses are being concentrated on a smaller number of substances due to the lack of alternatives, and this is fostering the emergence of resistance to treatment in pathogens, insect pests and weeds, as well as an increase in certain residues or metabolites in the environment. We are working with INRAE and various technical institutes to identify alternatives to certain products and assess their viability.

We are also conducting work to document contamination, most recently in soil, as well as studies on population exposure and its sources. These include the PestiRiv study with *Santé Publique France*, and Géocap-Agri with Inserm, as part of our phytopharmacovigilance (PPV) scheme. This scheme gathers and analyses reports of adverse effects and also enables large-scale studies to be financed. It is important to recognise that the PPV scheme's findings actually lead us to review MAs, for example by tightening the conditions of use. Marketing authorisations are reviewed when new risk factors are identified during the life of a product.



Exposure to chemicals

Food additives

Exposure to nitrates and nitrites

Nitrates and nitrites are mainly known as the food additives used in delicatessen meat products. In order to obtain an overview of the population's exposure, ANSES assessed all sources of exposure to nitrates and nitrites via food and drinking water.

In its expert appraisal of July 2022, the Agency concluded that exposure limits were mainly complied with, but that this exposure was associated with the formation of compounds that increase the probability of cancer. The intentional addition of nitrites and nitrates to food should therefore follow the "as low as reasonably achievable" principle.

Reduce additives in delicatessen meat: a solution tailored to each type of product

In delicatessen meat, nitrates and nitrites are mainly added to limit the development of bacteria responsible for diseases such as salmonellosis, listeriosis and botulism. Reducing their use can be considered on the strict condition that other measures are taken to control the risk of contamination by these bacteria, tailored to each category of product. For example, with cooked ham, bring forward the use-by date, or for dry-cured ham, strictly monitor salt levels and temperatures during the product's salting, rest and ripening stages.



Almost 99%
of the population is below the acceptable daily intakes (ADIs) that have been established by EFSA for nitrates and nitrites

NITRATES
Around 2/3
of exposure comes from eating plant products, particularly leafy vegetables such as spinach and lettuce

NITRITES
Over half
of our exposure is related to the consumption of delicatessen meat, due to the nitrite additives used to prepare it

1/4
is associated with drinking water
Less than 4%
is due to their use as food additives in delicatessen meat



Nanomaterials in food

Titanium dioxide used as a food additive (E171) was banned in Europe in 2022 following the most recent assessments by health agencies. However, other nanomaterials are still used in food. Assessing their effects on health is a major challenge.

In human food, engineered nanomaterials are mainly used as food additives, for example to change the colour or texture of food, or as technological additives in food contact materials. Their traceability is still incomplete, despite regulatory requirements to declare nanomaterials in the R-nano database, managed by ANSES, and to provide information for consumers on food packaging.

A nanospecific assessment methodology

Standard methodologies for assessing food additives do not take account of the particularities of the nanoscale. Indeed, if they are not dissolved by the digestive system, nanoparticles have different properties and behaviour in the body than those observed with conventional substances. The 2022 expert appraisal confirmed the relevance of ANSES's nanospecific methodology established in 2021 and applied to E171, the nanomaterial for which the most data are available. It enabled exposure levels to be calculated for different populations and led to the identification of several potential health effects. Lastly, this work revealed the scarcity of data for conducting a risk assessment tailored to nanomaterials in food.

The presence of nanomaterials is confirmed or suspected in 4300 food products

Everyday risks

Every day, whether at home or at work, we are exposed to chemicals, some of which are harmful. In recent months, ANSES has been examining the risks associated with the handling of school supplies, the use of insecticides and the labelling of vitamin D. It has also developed new methods to help public authorities improve worker safety in the face of chemical risk. In some cases, it has recommended special regulations in France or Europe to ensure safer use.

Improving the safety of school supplies

In an opinion published in May 2022, ANSES revealed the presence of several classes of hazardous chemicals – such as phthalates, perfumes, formaldehyde and dyes – in pens, exercise books and glues used at school, at home or in the office. Some can cause health problems when inhaled, ingested or in contact with the skin, particularly in children who tend to put objects in their mouths.

In France and Europe, the composition, manufacture and use of school supplies are not covered by any specific regulations designed to ensure their safety. Applying European regulations on toy safety (Directive 2009/48/EC) to all school supplies would encourage the reduction, or even elimination, of most of the chemicals identified.



Better regulation of purchases of biocidal products

In order to reduce the impact of biocides, the French EGAlim Act provides for a ban on self-service sales of certain biocides to the general public. To define the criteria, ANSES drew up an inventory of the products on the market and the active substances they contain, and examined the loss of effectiveness due to resistance phenomena and the serious poisoning cases reported.

Following its expert appraisal, it recommended that self-service sales of all rodenticides, insecticides and anti-fouling paints for boat hulls be discontinued, and that members of the public be given information on the hazards and proper conditions of use of these products, at the time of purchase.

Plastics and composting

As part of the AGEC Act against waste and for the circular economy, ANSES has studied the environmental impact of so-called biodegradable plastics. More than one in three French people recycle their waste in garden or community composters, where they are able to dispose of plastics labelled “biosourced, biodegradable or compostable”. However, there is no guarantee that these plastics will degrade completely, and it is difficult to control the conditions in these composters. As with all other packaging, priority should be given to collecting, sorting and treating these used materials through industrial channels.

The Agency calls for the introduction of a single mandatory standard on the composting of plastic articles claiming to be biodegradable or compostable in all sectors using them, not just the packaging sector.



Restrict the reuse of creosote-treated railway sleepers

In France, creosote is now only used under very specific conditions to treat railway sleepers. Despite the fact that individuals are not permitted to reuse them for fencing, charcoal or firewood, such practices continue and pose risks to health and the environment.

The Agency recommends applying marking when treating wood with creosote so that it can be identified over time. To harmonise the ban at European level, it submitted a restriction proposal to the European Chemicals Agency (ECHA) that is available for consultation until June 2023.

Vitamin D: no endocrine disruptor label on food products

The AGEC Act requires consumers to be informed of the presence of any substance considered to be an endocrine disruptor (ED) in the products they buy. Although used as a biocide, cholecalciferol is also a valuable health substance: vitamin D3.

Following an expert appraisal, the Agency advised against identifying cholecalciferol as an ED on food product labels, to avoid dissuading consumers from purchasing it and thus making it harder for the French population to meet its nutritional requirements for vitamin D. Other nutrients such as iodine can also potentially have harmful effects at high doses by disrupting the endocrine system, whereas they are beneficial to human health at nutritional doses.



Focus on occupational health

Better detection of carcinogenic work processes

In addition to exposure to chemicals, certain activities or working conditions – such as welding, sanding or manufacturing and handling harmful products – can cause or promote the onset of cancer. While the regulatory classification of carcinogenic substances and chemicals is based on a methodology defined by the European Regulation on Classification, Labelling and Packaging (the CLP Regulation), this is not the case for carcinogenic processes.

ANSES therefore devised a methodology to identify them with a view to preventing these risks for workers. To do this, it examined the process classifications developed around the world and decided to draw mainly on the approach of the International Agency for Research on Cancer (IARC) and the work carried out by other occupational health players. In 2022, ANSES used the methodology it developed to recommend adding work involving exposure to welding fumes and cytostatic drugs to the list of processes recognised as carcinogenic.

Insight



Benoît Labarbe
Head of the Unit for
Assessment of Tobacco
and Related Products

Understand the impact of chemicals emitted by e-cigarettes on vapers, whether or not they are smokers. 🍃



What work is ANSES doing on tobacco and vaping?

Since 2016, ANSES has been responsible for collecting declarations of tobacco and vaping products placed on the market in France. As part of this, it publishes the list of declared products, together with their characteristics and composition, in an open-access format. It has begun using this information to analyse these products and determine what work is needed to assess the risks associated with vaping. In 2023, the Agency issued an internal request to conduct an expert appraisal on this topic. Carrying out work of this kind requires knowledge of the hazards of the chemicals emitted by the products and the actual exposure of vapers.

been identified. Several hundred vaping liquids sold on the Internet were tested. In addition, tests using vaping machines reproduced the vaping of e-liquids under standardised conditions, in order to measure the substances found in the resulting emissions.

How can we learn more about the practices of vapers?

Two surveys have been conducted with polling institutes since 2020, based on a questionnaire drawn up with the experts, to learn more about the exposure of adult vapers. This step is needed to capture the wide diversity of their profiles, the devices they use, their preferred flavours and behaviour. As well as the exposure scenarios, these studies have provided us with a number of insights, including the fact that the majority of vapers are still smokers and that they choose vaping mainly for economic and health reasons. The studies also confirm that many vapers make their own e-liquids using ingredients purchased on the Internet (the “do-it-yourself” approach). A third survey is being launched this year to take better account of certain populations, such as pregnant women and teenagers, and to compare vaping with other practices, such as cannabis use.

FRENCH ADULT VAPERS



What analyses have you carried out on vaping products?

Based on the declared data and a literature review, almost 2000 substances used in the composition of products have been identified and categorised according to their toxicity levels. As recommended by the experts, the Agency has also carried out analyses of products on the market, in order to search for other substances that may not have



Technological developments

Health effects of electromagnetic waves

How can we predict the health impact of new technologies such as 5G? This is a major challenge for scientific research, which needs time to produce the knowledge required for expert appraisal and public decision-making. In 2022, ANSES continued its support for research and launched several citizen science initiatives.

Each year, ANSES funds research projects on radiofrequencies as part of the National Research Programme for Environmental and Occupational Health (PNR EST). These projects contribute to better characterisation of exposure, effects on the brain and carcinogenic effects. All these data have been used to assess the risks associated with the rollout of 5G. In 2022, six new projects were selected, including four relating to electromagnetic fields associated with the rollout of 5G. On the same topic, in February 2022, the Agency also updated its 2021 expert appraisal with new data acquired through the public consultation it had undertaken based on its first opinion and the inclusion of recent exposure measurements.

At a scientific symposium organised in November 2022 with the International Agency for Research on Cancer, the Agency also presented the results of "exploratory investigation projects". These have generated new knowledge in response to questions raised by civil society about symptoms reported in the vicinity of base stations or about hypersensitivity to electromagnetic fields. The knowledge requirements were identified by the ANSES dialogue committee on "Radiofrequencies and health".

Capitalising on the knowledge produced by the PNR EST

All of ANSES's work contributes to the open science dynamic. For the projects it funds as part of the PNR EST, for example, researchers are required to make their publications available and to provide access to data in an interoperable format.

Before publication of the final results, the Agency promotes the research under way, its methods and the issues involved through two channels: the *Cahiers de la Recherche* and the scientific conferences it organises once or twice a year with another research funding body. These initiatives are aimed not only at the scientific community, but also at any other interested parties.

A study to better understand electromagnetic hypersensitivity

ANSES is funding a national study to improve the quality of scientific research into electromagnetic hypersensitivity (EHS) and the medical care available. This followed an initial feasibility study carried out in Brittany between 2017 and 2019, which cross-referenced "daily experiences" with medical data. The first *départements* to be surveyed are Côtes d'Armor, Finistère, Ain, Isère and Rhône. In each sector, investigators will go and meet individuals with EHS, particularly those who have chosen to move away or isolate themselves from potential sources of exposure. As part of this, a call for volunteers affected by EHS was issued in 2022.

Insight



Laetitia Dubois
Director of the Research
Funding & Scientific
Watch Department

Mobilising researchers on environmental and occupational health issues. “

What are the contributions of the PNR EST coordinated by ANSES?

The National Research Programme for Environmental and Occupational Health (PNR EST) has two main objectives.

The first is to generate knowledge about environmental and occupational health, prior to the expert appraisal process. Through the PNR EST, we encourage research to add to the body of scientific data on known issues that have not yet been widely studied, or issues that are emerging. In some cases, the programme leads to alerts being issued. The data generated can also be used directly in expert appraisals. For example, in its work on atypical working hours and night work, the Agency used data from research funded since 2011.

The second objective is to structure and mobilise research communities around these themes, through calls for long-term projects. Having all the necessary skills is essential, and some researchers have subsequently joined our expert groups.

What are the issues facing the programme today?

Many issues need to be addressed: climate change, the exposome, changes in society, etc. However, while the research teams are there, funding is scarce. The scientific community knows that the PNR EST is the point of contact for funding on environmental and occupational health issues, but it has become too modest. While recent reports, strategies and national plans recommend that research be carried out and state the need for a considerable increase in funding to do so, it is clear that the resources are not forthcoming. And yet if we are to respond to the emergence of new risks related to the changes under way, for example in terms of uses of products and technologies, or the spread of pathogens, we urgently need to anticipate and support research now. And to do that, we need to remain attractive.

ANSES has forged closer links with its partners, such as the French Research Agency (ANR) and the Ministry of Research. It is also actively involved in simplifying the procedures for researchers leading projects, with the creation in 2022 of the national portal for calls for projects: appelsprojetsrecherche.fr.

New biotechnology missions

Technologies that enable direct intervention in the genes of living organisms are being developed in many sectors, including research, industry, agriculture and health. The Agency has several expert appraisal missions relating to the use of genetically modified plants in food or feed. On 1 January 2022, these were extended to include environmental risks arising from different biotechnology applications.

Ever since its creation, the Agency has contributed to the assessment of health risks associated with the use of genetically modified plants in food or feed. The competent French authorities rely on the Agency's expert appraisals when deciding whether to grant marketing authorisation for GMOs in Europe. As the French Agency for Veterinary Medicinal Products, ANSES is also responsible for evaluating, approving and verifying any veterinary medicinal products derived from biotechnology. And lastly, its Plant Health Laboratory develops or validates methods for detecting genetic modifications in plants, whether or not they have been authorised in France.

Since 1 January 2022, ANSES has also been assessing the environmental risks of organisms that meet the regulatory definition of a GMO and for which applications for use in an open environment have been submitted. This could be for the cultivation of plants in open fields including at the experimental stage, clinical trials of veterinary medicinal products, or as part of marketing authorisation applications at European level for veterinary and human medicinal products.

For medicinal products for human use, ANSES may be asked by the French Health Products Safety Agency (ANSM) to conduct environmental risk assessments prior to their placing on the market and, in some cases, prior to the granting of authorisations for early access or compassionate use to treat rare diseases, for example.

To fulfil these new missions, the Agency strengthened its groups of independent experts. In January 2022, ten new experts joined its Working Group on Biotechnology, which has expanded its scope to cover environmental aspects and gene therapy. In addition, ANSES has set up a specific expert committee on socio-economic analysis which, although not dedicated to biotechnology issues, has already begun work on this topic.

As part of its approach of openness to society, ANSES also set up a "Biotechnology, environment and health" dialogue committee in 2022. This provides a forum for discussing ANSES's scientific methods and work with stakeholders. On the other hand, it does not deal with issues connected with the societal and ethical implications of biotechnology.

For more information, read the ANSES activity report devoted to its biotechnology missions (in French)



Improved monitoring of GMOs in the environment

Following the identification of genetically modified (GM) rapeseed plants growing near Rouen, the Agency assessed the effectiveness of the measures applied to prevent the accidental release of GMOs into the environment. The Agency suggested new measures to be coordinated at European level as part of the post-authorisation monitoring of these products.

ANSES's recommendations

- Extend monitoring to all unloading and transport areas and their immediate environment, in order to avoid the risk of GM plants persisting in these areas following the accidental release of seeds.
- Describe in greater detail the measures relating to the conditions of transport, unloading, storage and handling of GM seeds.
- Map the areas most at risk of release in France: ports where GM seeds are imported, industrial sites where GM seeds are stored or processed, and railways, waterways and roads used to transport goods.



Scientific advances and new approaches

Continuous progress

Better control of health risks entails making advances not only in knowledge, but also in the way it is produced and used. In 2022, ANSES continued to innovate in its approaches to ensure and promote high-quality scientific work, while maintaining a dynamic ethical framework.



Exposome: unprecedented structural work with the Scientific Board

The exposome concept aims to gain a better understanding of the combined effects of exposure to risks, at any given time or over the long term. In particular, it can help identify the non-genetic causes of chronic diseases such as cancer and cardiorespiratory diseases.

Recognised by the scientific community and enshrined in French law, ANSES wanted to speed up practical adoption of the exposome in its work and core activities. To this end, a special Exposome Working Group was set up, reporting directly to the Agency's Scientific Board. On the basis of case studies, it makes proposals for integrating the exposome approach into the Agency's expert appraisal work, while analysing the consequences. Its recommendations were published in a report in 2022.

They imply a change in the Agency's practices, particularly the acculturation and upskilling of its teams and expert groups, and the further development of suitable methods and tools. Ambitious structural work has been undertaken, involving all the Agency's scientific teams. The PNR EST has also incorporated the concept of the exposome, in order to encourage proposals for research projects that take greater account of multiple or combined exposure.

Collective assessment of research laboratories

Every five years, ANSES has its research and reference activities assessed by European and international peers from outside the Agency, in order to get an independent view of the relevance and scientific quality of the activities carried out in its laboratories. The assessment carried out in 2022 testified to the excellence of their scientific output and the progress made in terms of cross-cutting strategic management. On this basis, and with the support of its Scientific Board, ANSES identified some courses of action to improve the robustness and recognition of the work carried out. Particular emphasis was placed on the challenges of managing and capitalising on the data produced or collected.



A partnership with technology transfer accelerators to promote discoveries and innovation

The results of ANSES's research can lead to industrial and commercial developments that safeguard health and veterinary public health, such as diagnostic tools and vaccines. To this end, ANSES has developed a promotion policy to make its researchers more aware of the possibilities of transferring their work to public- and private-sector players, and to support them from the filing of patents through to the exploitation of this intellectual property.

In 2022, wishing to strengthen the promotion of innovation while remaining independent of private-sector players, the Agency signed a partnership agreement to support a technology transfer accelerator (SATT), Ouest Valorisation, in identifying innovations with industrial potential through to the negotiation of contracts for the transfer of innovations to companies.

Ethical standards: analysis of intellectual ties

ANSES analyses personal ties based on the public declarations of interest (PDIs) made by its employees and experts, according to its guide to analysing declared interests. Although ties of an intellectual nature have no regulatory definition, they can have an impact on the implementation of the expert appraisal.

In late 2022, ANSES published its guidelines for conducting the individual analysis of intellectual ties, which had previously been supported by an opinion from its Committee for Ethical Standards. This reference document describes the approach to be implemented for five different scenarios: belonging to a particular school of thought, conducting expert appraisal work directly related to the subject of the expert appraisal in question, taking a public stance on given issues, the situation of whistleblowers, and the existence of research work financed by ANSES. This testifies to the Agency's efforts to ensure its independence and allow expression of a wide diversity of viewpoints within its expert groups.

Three noteworthy research results in 2022



Impact of glyphosate observed on several generations of trout

In 2022, ANSES's Plouzané Laboratory completed a series of studies on the effects of glyphosate, alone or in commercial herbicides, on the health of rainbow trout. Several generations of trout were exposed over a long period to concentrations such as those measured in natural environments. Because of their complexity, few transgenerational studies of this type are conducted on aquatic animals. This research revealed biological and behavioural effects – reduced reaction of larvae to changes in luminosity, reduced diversity of micro-organisms in the gills – that were more pronounced in the offspring of the exposed parents and/or grandparents. In addition, for several parameters relating to immunity, metabolism or development, the product formulation could increase or decrease the effect of glyphosate alone, or even cause an effect that was not observed with the pure active substance. Better knowledge of the toxicological mechanisms at play would enable them to be taken into account in the assessment of plant protection active substances and products.

Vaccination does not prevent the evolution of a coronavirus in chickens

Chicken flocks are systematically vaccinated against infectious bronchitis virus (IBV). ANSES's Ploufragan Laboratory observed that the virus continued to evolve even in the presence of vaccine-induced immunity. It is therefore critical to establish vaccine strategies that aim to stop viral infection completely. As IBV belongs to the coronavirus family, these results also call for better anticipation of the consequences of vaccination against coronaviruses in human health.



Hedgerows encourage plant diversity without harming cultivated fields

Hedges bordering cultivated fields provide many services but are often perceived as sources of weeds. Scientists from ANSES, in partnership with teams from INRAE, the University of Rennes 1 and CNRS, studied the impact of hedged farmland on these wild plants. The results show that these landscapes promote weed diversity without however increasing their abundance in fields. Diversifying the weed flora may limit development of the most competitive weeds. It can also promote biodiversity and the associated ecological functions such as pollination, biocontrol of pests and decomposition of organic matter. Hedgerows could therefore favour the sustainable management of weeds and the conservation of biodiversity in fields.

ANSES involved in five ambitious new European projects

These five projects involving the Agency were selected by the European Commission's Horizon Europe research framework programme in 2022.

PARC – 2021-2027

Coordinated by ANSES. 200 partners from 28 countries and European Union agencies. Goals: to advance research, share knowledge and improve skills in chemical risk assessment.

SPIDVAC – 2022-2025

Coordinated by the German Friedrich Loeffler Institute and ANSES. 13 partners. Goals: to create and improve vaccines against three animal diseases that could potentially arrive on livestock farms in Europe in the near future: African horse sickness, foot-and-mouth disease and peste des petits ruminants.

BROILERNET – 2022-2026

Coordinated by the Swedish University of Agricultural Sciences. 25 partners including ANSES.

Goals: to create a network of researchers and players in the broiler industry to improve rearing practices. ANSES will primarily be involved in the part dedicated to animal welfare.

HOLIFOOD – 2022-2026

Coordinated by Wageningen University (Netherlands). 17 partners including ANSES.

Goals: to improve risk analysis for food safety. The project will take account of economic, social and environmental aspects, as well as issues of climate change and sustainable development.

ISIDORE – 2022-2025

154 partners.

Goals: to provide cutting-edge facilities, experimental models and diagnostic tools for studying infectious diseases and emerging pathogens that could potentially cause outbreaks.

Interview



Brice Laurent
Director of the Social
Sciences, Economics
& Society Department

Strengthening the Agency's expert appraisals through dialogue. ”

What are the ambitions of ANSES's new Social Sciences, Economics & Society Department?

For a number of years now, the Agency has wanted to increase momentum and strengthen its skills in the human sciences. The aims are to gain a better understanding of the impact of economic and social factors on risk exposure, and develop methods to improve the analysis of situations marked by uncertainty or controversy.

The department, which was created in 2022 from a pre-existing core of skills, now has a dozen people, including economists, sociologists and political scientists. We have also set up an expert committee specialising in socio-economic analysis,

which operates like all the other external expert committees working on risk assessment at ANSES. Methodological work is under way to develop benchmarks and define best practice in the field of socio-economic analysis, for example in assessments of the socio-economic determinants of exposure to risk factors, economic assessments of the health burden or the analysis of different management options. The aim is not to take the place of the authorities but to provide them with the most robust evidence possible on which to base their decisions. In each case, the economic and social sciences help explore the scope of possibilities in order to fuel public debate.

How can work in the economic and social sciences strengthen expert appraisal at ANSES?

The work carried out by ANSES raises economic and social issues and is linked to societal choices and debates that often go beyond the question of risk: the opportunities offered by new technologies such as 5G, changes in agricultural models, etc. Climate change also raises crucial questions about inequalities in exposure, technologies for adaptation or limiting emissions, analysis of vulnerabilities, etc. In this context, expert appraisal work in the economic and social sciences is carried out in all the Agency's fields, sometimes under the department's direct supervision – for example on the use of copper in agriculture – with methodological development work on the analysis of alternatives. We also pay close attention to emerging issues.

As part of the new mandate on biotechnology entrusted to ANSES, we are taking part in an expert appraisal on new genome-editing techniques and their application to plants. We are also supporting a research project on the ecosystem services provided by pollinators, in order to assess sources of vulnerability and develop new analytical approaches.

Lastly, the economic and social sciences more generally help us better understand and decipher controversies related to ANSES's activities, monitor their evolution and draw lessons from them in order to improve our practices.

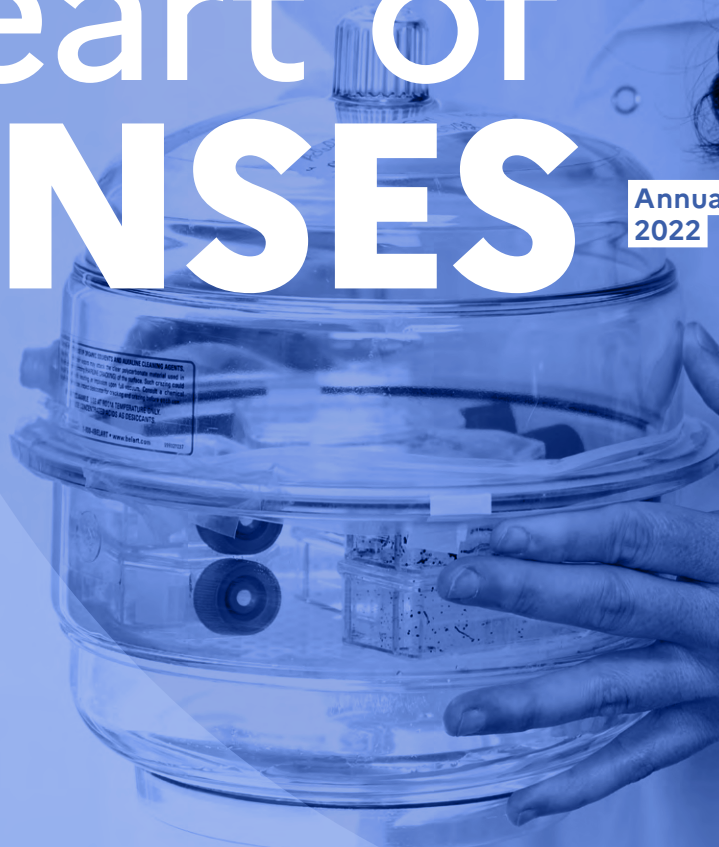
How can it maintain and reinforce dialogue with stakeholders?

We coordinate four committees and platforms for dialogue with stakeholders specific to ANSES. The aim is to establish quality dialogue on the Agency's work, ensuring that a diversity of opinions is expressed, thereby helping to generate constructive public debate. In setting up the "Biotechnology, environment and health" dialogue committee, which was inaugurated last October, it was essential to maintain a balance in the representation of professional players and associations from the agricultural and medical worlds. The aim was to go beyond taking sides and delve deeper into positions that are often more complex.

Generally speaking, we always strive to reconcile dialogue and expertise. Collective expert appraisals are based on a rigorous methodological framework and an analysis of the declared interests of the scientific experts. We are convinced that we can strengthen the Agency's expertise through dialogue, while maintaining our high standards of independence. We would like to make even greater use of dialogue forums than we do today. Participatory research is another promising avenue that we are exploring, with, for example, the identification of environmental and health signals.

At the heart of ANSES

Annual Report
2022



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The 2023-2027 goals and performance contract

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Key events

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Snapshots

PAGE 20

A daily commitment

PAGE 22

Organisation chart

1400
employees

16
sites and
9
laboratories in France,
including in the
overseas territories

**Over
100**
reference mandates,
including 13 European
and 28 international
mandates

An annual budget
of around
€160M

ANSES

Since 2010, ANSES has been providing the scientific benchmarks needed to protect against health risks related to food, the environment and the workplace, as well as against risks affecting the health of animals and plants.

An agency of scientific expertise, it monitors and assesses these health risks, and devotes research activities to them. It contributes to advancing scientific knowledge to support public decision-makers, including during health crises.

ANSES is a public administrative body reporting to the Ministries of Health, the Environment, Agriculture, Labour and Consumer Affairs.

**Science driving a safer,
healthier world for all
and dedicated to One Health.**

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2022 in figures

65

formal requests
received, 12 of which
were urgent

6

expert committees
and 5 working groups
renewed

16

scientific events
organised

148

opinions and reports
published

377

**category A
and A+ scientific
publications**
(up from 2021 - 355)

42

projects funded
by the National
Research Programme
for Environmental and
Occupational Health

Over 4500

authorisation, refusal or withdrawal decisions for products:

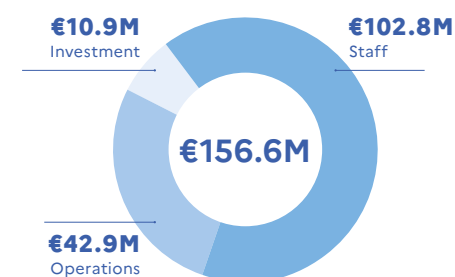
1768 for plant protection products, fertilisers,
growing media and adjuvants

242 for biocidal products

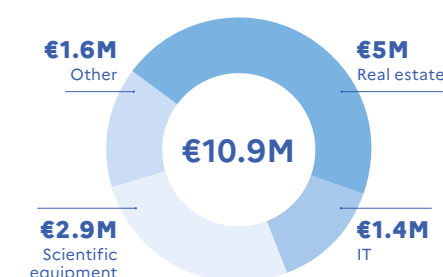
2567 for veterinary medicinal products



**TOTAL 2022 BUDGET
EXPENDITURE**



**TOTAL
INVESTMENT**



Benoit Vallet

Director General of ANSES



On the context of the last few months

I took up my position as head of ANSES in November 2022, at a time when our country was reeling from a summer heatwave and the now widely acknowledged reality of climate change. After the COVID pandemic, the need for major transitions is now firmly on everyone's agenda, including that of our Agency. This includes transitions towards new forms of agriculture, a topic on which ANSES is regularly consulted, and threats to be managed, whether relating to avian influenza or to the northward spread of disease vectors. And, more generally, transitions towards greater respect for the environment and for human, animal and plant health.

We therefore need to consolidate and accelerate a number of strategic commitments at ANSES. Our new goals and performance contract (COP) has been drawn up with our supervisory ministries to support our efforts in this regard.

On the goals of the 2023-2027 COP

The 2023-2027 COP updates the course set by the previous contract, pushing the boundaries on aspects that have assumed greater importance since 2018: taking account of the various health dimensions in our expert appraisal methods and in the issues investigated, developing knowledge and data, whether from research or the field, stepping up our international involvement in the face of problems that are often unconstrained by national borders, the need to be both robust and agile in our scientific output, particularly when confronting crises, to name but a few. This contract with our governance bodies is important for the Agency's activity, which by its very nature has a strong interministerial resonance that is set to increase.

I am delighted to see that several of the milestones developed when drafting the COP had already taken shape before the summer of 2023. These include the more international scope of our Scientific Board's composition and the establishment of a dialogue committee on biotechnology.

On ANSES's engagement in society

As a medical doctor by training, it matters to me that ANSES plays a full and active role alongside other public health players, in relation to our main peers in this field – *Santé Publique France*, the ANSM, the HCSP – while working more closely with human health practitioners, at a time when the links between environment, food and chronic diseases still raise major questions of identification and prevention. And let's not forget the field of occupational health...

The Agency's many activities and topics also present a challenge in terms of ensuring that its work is sufficiently clear to all, and next year our remit will be extended once again to cover risks associated with cosmetics. My aim is to establish an agency that has its place in the landscape and is increasingly useful and coherent for all players in society: one that is particularly attentive to the public decision-makers and organisations that make regular use of our work and with which we have regular exchanges, but also to our most direct ecosystem: our governance bodies in all their diversity, the 800 scientific experts who contribute to our work, and all 1400 of our employees, whose commitment and skills I salute.



Patrick Dehaumont

Chair of ANSES's Board of Administrators since May 2023

"ANSES produces scientific benchmarks, but also helps shape the debate in the face of multiple health and environmental crises."

ANSES conducts research and expert appraisals, and provides support for public decision-making, all based on science. It works at the forefront of global health issues that are being intensified by climate change and globalisation. Along with all the administrators, I support its commitment to adopting a "One Health" view of the questions it is asked and consolidating its skills accordingly, for all the relevant disciplines and methods. If it is to produce robust, agile, independent and transparent expert appraisals, it needs access to more research and more big data, and must establish quality dialogue on the debates that are really essential. We are mindful of all the initiatives and resources in this regard, for the benefit of society and health in all its aspects.

The 2023-2027 goals and performance contract

The new goals and performance contract (COP) between ANSES and its supervisory ministries sets out its strategic objectives for the coming five years. It was approved by the Agency's Board of Administrators on 14 March 2023. It maintains continuity with the previous COP but now also includes emerging issues related to changes in the health context and the expectations placed on the Agency.



Five themes:

1. A strengthened health risk assessment mandate based on a "One Health" approach
2. Scientific excellence harnessed to respond to emerging health threats and crises
3. An ambitious research and reference policy to safeguard health in keeping with the "One Health" approach
4. A strong presence at national, European and international level
5. Transparent, efficiency-oriented action

Implemented through:

27 indicators
38 milestones

Insight



Catherine Rigoulot

Director of the Coordination Support, Quality & Audit Department

A strategic, well-balanced and constructive COP to meet new challenges. “

How and with whom has this new COP been developed?

It is the result of a sustained effort with all our supervisory ministries since the summer of 2022. Four thematic working groups were set up to take stock of the previous COP, considered satisfactory overall, and to define our future strategic goals. ANSES then drafted the document and defined the indicators and milestones for measuring progress in achieving these goals.

A completed draft COP was presented to our Social Committee and Scientific Board, and then to our Board of Administrators in March 2023. It was a real challenge to develop the new COP against such a tight deadline! But we achieved it thanks to major efforts with our supervisory bodies, and rigorous organisation.

What were the challenges?

We faced major challenges of several types. In terms of form, we needed to respond to the shared desire of ANSES and its supervisory bodies to keep the COP tightly focused on genuinely strategic issues. Regarding content, it was very important for the Agency to build this COP on the previous one in order to consolidate the changes already made, strengthen its health risk assessment missions and give them more perspective. And of course, we had to take account of new challenges, in a national and global context marked by health crises and transformations in society and the environment – climate change and biodiversity loss to name just two. The final document lives up to our expectations: ANSES now has a strategic, well-balanced and decisive COP. It does not cover all our activities in detail – that is not its purpose – but it does highlight our missions to safeguard public health, the "One Health" dimension of all our scientific activities and our place at European and international level, and outlines our prospects

for meeting the challenges of the future. A large part of the COP is also devoted to the transparency of our actions, our high ethical standards and our internal procedures, which aim to ensure efficiency.

What's next?

Now it's a matter of assimilating this new framework and using it as our backbone for the next five years. All the goals, indicators and milestones are currently being integrated into our various internal organisational and operational processes, particularly in our quality and risk management system. The COP is also reflected in the activities of our teams, who are already hard at work to achieve the goals set for 2023. As with its development, its implementation will be closely managed and monitored internally, to enable the Agency to meet the numerous deadlines and report on attainment of the different goals. This will be an opportunity for us to highlight the achievements and changes made in fulfilling our public service missions.

Key events



↑ Exterior view of the project.
© Pargade Architectes

Foundation stone laid in Lyon for the joint ANSES-ANSM building

Scheduled for completion in 2024, this building will house the ANSES Lyon Laboratory and part of the Laboratory Controls Division of the French Health Products Safety Agency (ANSM). In line with the “One Health” approach, the new building will combine cutting-edge technological facilities with laboratories ensuring a high level of biosafety in human, animal and plant health, as well as office space. This 8300m² building will house 150 employees and eventually be surrounded by a mini-forest

Inauguration of the “Biotechnology, environment and health” dialogue committee

Since 1 January 2022, ANSES has been carrying out new assessment tasks on organisms and products derived from biotechnology, both in the agri-food sector and for medical applications. On 10 October, the Agency set up its fourth dialogue committee to discuss with and inform stakeholders about the Agency’s scientific work in this field, and listen to their expectations and questions.

Renewal of the Agency’s governance bodies

As the Scientific Board’s mandate had come to an end, a call for applicants to renew it was issued in 2022. In order to gain a better understanding of global health issues, ANSES decided to broaden the composition of its Board to include European and international scientists, in line with the orientations of its 2023-2027 goals and performance contract.

The Board of Administrators was renewed in early 2023, and is chaired by Patrick Dehaumont. The Internal Audit and Risk Management Committee was also renewed and its Chair, Christophe Brard, was reappointed.

In brief

11/05

As part of the French Presidency of the EU, launch of the European Partnership for the Assessment of Risks from Chemicals (PARC), coordinated by ANSES.

10/10

Laying of the foundation stone for the International Equine Campus in Goustranville (Normandy), in which ANSES is a partner.

23/11

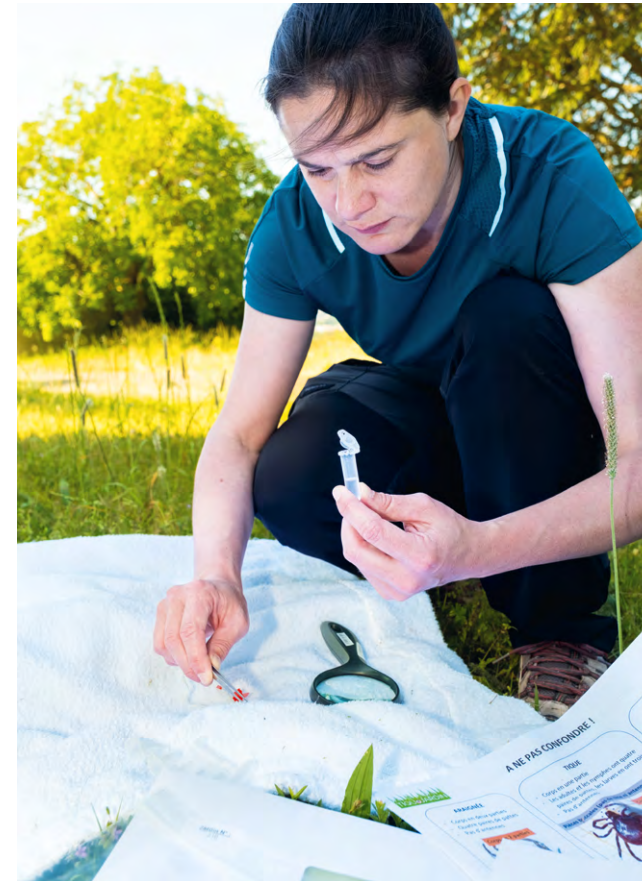
Scientific conference on “Radiofrequencies and health: research in a fast-moving environment”, organised with the International Agency for Research on Cancer (IARC).

30/11

Following the certification audit in October 2022, the ISO 9001 certification of ANSES’s quality and risk management system was renewed for another three years.

STUDYING FUNGI THAT AFFECT PLANTS

Carole, a mycologist, is examining pine needles collected from the forest. They have been incubated in a humidity chamber to stimulate development of the pathogenic fungus that has potentially infected the plant. She will then examine the fungus under the stereomicroscope in order to identify it. Based in Nancy, the Plant Health Laboratory's Mycology Unit receives samples from all types of plants – fruit trees, field crops, horticultural plants, etc. – to diagnose fungal contamination. The unit also develops polymerase chain reaction (PCR) tests to detect quarantine fungi and conducts research to shed light on where they come from and how they spread.



COLLECTING TICKS IN THE FIELD

Laure, an animal health eco-epidemiologist at the Nancy Laboratory for Rabies and Wildlife, collects ticks from natural environments, forests and gardens. These sampling campaigns help determine the tick species present and their distribution. Laboratory research into the pathogens they carry will enable us to better understand their circulation and control the spread of the diseases they transmit.

STUDYING THE IMPACT OF REARING PRACTICES

Jean-Michel, an animal technician, is weighing chicks. He works on the Ploufragan Laboratory's laying-hen farm. The research teams here study the impact of different rearing practices (such as access to the outdoors) on hen health and welfare, and the quality of their production.





MAINTAINING A DIALOGUE WITH STAKEHOLDERS

Mathieu, a sociologist of science, is preparing the agenda for the next meeting of ANSES’s dialogue committee on biotechnology. Three other dialogue bodies cover, respectively, radiofrequencies, nanomaterials and plant protection products. All have been set up to enable ANSES to interact with the associations, professional organisations and trade unions that are interested and involved in these controversial subjects. These bodies provide an opportunity to share information on the state of scientific knowledge and ANSES’s work. They are also a key forum for listening to questions raised by society in connection with health and environmental risk assessment.

HOSTING STUDENTS

Rim, Marilyne and Nesrine, who are carrying out internships for a Master in Public Health, are just three of the many students, apprentices, doctoral and post-doctoral researchers that ANSES is keen to host at its 16 sites. At any given time, the Agency supervises nearly 90 PhD theses, either on its own or with scientific partners such as INRAE, CIRAD, Ifremer, CEA, veterinary schools, technical centres and universities.



HIGH-THROUGHPUT GENOMIC ANALYSES USING THE CUTTING-EDGE IDENTITYPATH TECHNOLOGY PLATFORM

Mai-Lan is carrying out a high-throughput PCR analysis of nucleic acid samples using the IdentityPath platform. Each dot on the screen corresponds to an identified genetic marker, and its colour relates to the load of that genetic marker in the sample. This approach is used to identify and characterise nucleic acid sequences specific to a virus, bacterium or parasite. The platform can rapidly determine the “genetic identity card” of the main pathogens of diagnostic or epidemiological interest studied at ANSES. This reveals new genetic markers, which will be used to improve risk assessment and achieve more targeted monitoring of pathogens. In 2022, more than 16,000 nucleic acid extracts were tested in this way for the Agency’s laboratories, and more than a million results were produced using the PCR amplification technique.



HANDLING HIGHLY PATHOGENIC VIRUSES IN THE iCUBE PLATFORM

Cindy, a virologist, is analysing a virus titration. The iCUBE’s biosafety level-3 (BSL-3) laboratories are used to handle highly contagious and/or vector-borne viruses. In line with biosafety rules, special procedures are applied to ensure the handler’s safety against viruses that can be transmitted to humans, such as West Nile virus, or to protect the environment from viruses that infect only animals, such as the one responsible for foot-and-mouth disease. Pathogens are primarily contained by maintaining negative air pressure in the laboratory in relation to the outside atmosphere. Appropriate personal protective clothing and equipment are mandatory, and surfaces, equipment and waste are decontaminated. Clearance is required to work in a BSL-3 facility.



EXPERT GROUP MEETING

At ANSES’s Maisons-Alfort site, the Expert Committee on “Assessment of the risks related to air environments” is holding its May meeting to work on air pollution. The group’s Chair leads the debates. At ANSES, around 80 such groups bring together French and foreign scientific experts from research organisations and universities, whose skills are considered benchmarks in a variety of disciplines. Each group meets regularly, for one or two consecutive days, to conduct a critical analysis of the various data and then draw up collective expert appraisal conclusions on the health risks they have been convened to examine, in support of ANSES’s opinions.



SUPPORTING THE EXPERTS’ WORK

Carole, who is tasked with managing formal requests, is discussing a current opinion on biotechnology with Lucie, scientific expert appraisal coordinator. Carole is responsible for process monitoring and reporting, from registration of the formal request to the Agency through to publication of the opinion and expert appraisal report. Her department colleagues are in charge of calls for applications to form the expert groups, on the basis of their CVs and public declarations of interests. They also organise the expert groups’ meetings. Over 800 scientific experts are mobilised by ANSES every year.

A daily commitment

As a public and civic employer, ANSES took a number of initiatives in 2022 to recognise the skills of its staff and their activities, and play an active role in the energy transition.

Accolades that recognise our staff's expertise

As part of its ongoing initiatives to highlight the skills of its employees, the Agency launched two internal titles in 2022: "ANSES Research Director" and "ANSES International Expert". These recognise people for their high-level scientific skills and ability to provide a strategic vision in their field, pass on their knowledge and know-how within and outside the Agency, share them at European and international level, and promote the attractiveness of research and expert appraisals at the Agency. The 10 winners were selected by an internal multidisciplinary jury. They each have a mandate of five years.

5
international experts
and five ANSES research directors
were nominated in 2022

Inclusion of people with disabilities

ANSES recruits, supports and develops diverse talent committed to serving public health. For many years it has been working to promote the inclusion of people with disabilities. In 2022, the Agency was a finalist for the Inclusion Prize awarded by the Fund for the Integration of Disabled People in the Civil Service (FIPHFP), in the Communication/Awareness category, for "HandiActe", its project to raise awareness through drama.

Each year the Agency also takes part in DuoDay during Disability Week. On 17 November, therefore, volunteer staff gave some disabled visitors an insight into their jobs.

11
disabled visitors at the Angers,
Fougères and Maisons-Alfort sites



Mobility challenge

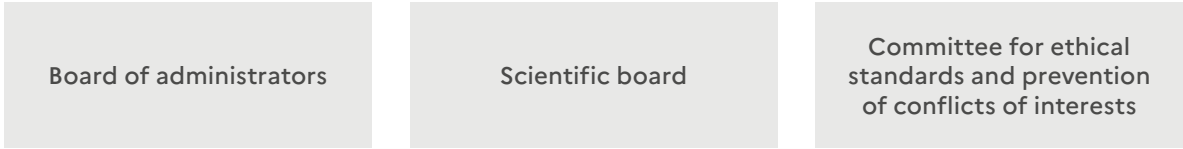
European Mobility Week is organised every year in numerous cities across the continent. Its aim is to encourage citizens and local authorities to opt for more environmentally-friendly ways of getting around: public transport, car-pooling, cycling, etc. For the 2022 event, dedicated to the theme "Better connections", ANSES suggested a "Fortnight without my car". This challenge, which was open to everyone, gave staff the opportunity to try out new mobility solutions, which some of them have since adopted more permanently.

8
teams based at the Fougères,
Lyon and Maisons-Alfort sites

Energy renovation thanks to France Relance

Two energy renovation projects have been selected under the government's France Relance plan. With funding from the European Union amounting to €107,174.40, they will help reduce the energy footprint of buildings at two of the Agency's sites: the Laboratory for Rabies and Wildlife at Malzéville in Meurthe-et-Moselle, and the Ploufragan Laboratory in Côtes d'Armor.

The renovations are part of an overall sustainable development approach and will also improve working conditions for staff. In Malzéville, the funding will be used to improve energy efficiency in order to comply with the provisions of the French Tertiary Decree. On the Ploufragan site, an energy recovery system will be installed in a building's air-conditioning circuit.



ANSES organisation chart

