



Support for public policies



RÉPUBLIQUE
FRANÇAISE

*Liberté
Égalité
Fraternité*

INRAE



Animal Welfare : Science to Inform Public Policy

November 2021

*I*n this dossier

Dossier prepared by **Giovanna Pinaud and Gisèle Parfait of the DAPP**
and **Alain Boissy of the PHASE division**



PAGE 4

Stress and behaviour in farmed animals : new knowledge for regulationsx

PAGE 5

A multidisciplinary scientific community on animal welfare

PAGE 7

2017, the National Reference Centre for Animal Welfare

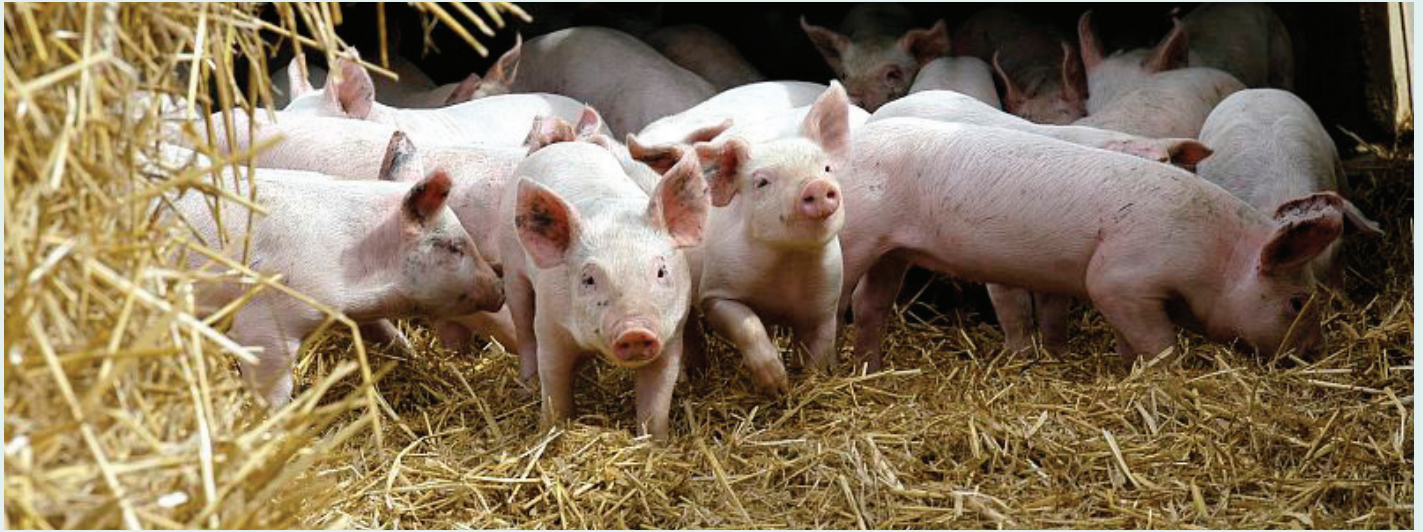
PAGE 9

Between Science and Public Policy: progress and prospects



Acknowledgements

We would like to thank all those who contributed to the production of this dossier.
A ajouter



Research conducted by INRAE has shown in particular that early rearing conditions are a determining factor in the behaviour of animals.

Animal Welfare : Science to Inform Public Policy

Although animal welfare is now a pressing expectation in our societies, the issue first appeared in the 1960s in reaction to the intensive farming conditions developed to optimise practices and increase economic profitability at the expense of animals. It was in the 1980s, under the impetus of a few pioneering researchers, that the issue of animal welfare began to be taken into account at INRAE.

This dossier retraces the major stages of the Institute's investment in this topic, through research and in support of the associated public policies...

The industrialisation of animal production, which began during the "Thirty Glorious" years, made it possible to meet the immediate need to feed the post-war French population. The demands of production, optimisation and profitability of the practices and associated infrastructures quickly revealed their limits, as the animals showed difficulties in adapting to the intensive conditions of breeding and

slaughter. Declines in performance and disease resistance, deterioration in the quality of animal products, and abnormal or unwanted behaviour were all symptoms of a poorly adapted system. All these zootechnical, health, physiological and behavioural manifestations alerted the general public to the issue of animal stress in farmed animals and, subsequently, to the issue of animal welfare. The need for scientific and

technical knowledge on these new research questions led in the 1990s to the creation of a multidisciplinary scientific community around the concept of animal welfare (AW) at INRAE. The work carried out has enabled this community to gain international recognition over the last thirty years and has contributed to the implementation of national and European regulations and public policies.



Françoise Médale
Head of the Animal
Physiology and
Livestock Systems
Division (PHASE)

The PHASE department has a staff of about 1,500, of whom 1,060 are from INRAE. About forty scientists are specifically dedicated to animal welfare. In the 1980s, the first research was launched simultaneously with the first European regulations. It initially focused on animal stress, using neurophysiological and behavioural approaches. The notion of good treatment gave way to that of animal welfare, once the positive emotions of animals were demonstrated. Social interactions between fellow animals are extensively studied, as well as early rearing conditions, which have been shown to shape the behaviour and personalities of animals. Animal welfare obviously also applies to experimental animals, a major ethical issue at INRAE.

Indicators for evaluating AW in breeding and experimentation have been put in place and are subject to continuous improvement, certain practices have been banned and alternative solutions sought, and training and awareness-raising for those involved in the sector has greatly increased. The creation of the FRCAW has undeniably confirmed France's position on the European scene and promoted the Science/Public Policy link.

➤ Stress and behaviour in farmed animals: new knowledge for regulations

From the 1970s onwards, modern breeding, transport and slaughter techniques have been regulated in order to protect farmed animals, among other things. Under the impetus of animal welfare organizations in particular, these regulations were incorporated in France through the Rural Code and in Europe through the introduction of the first dedicated directives. Europe very quickly organized itself to include science in the debate on animal protection and in the drafting of directives. The European Veterinary Committee was created with the participation of INRAE researchers.

In order to introduce new standards and less restrictive farming practices for animals, it was first necessary to better understand stress in farmed animals. Specific work on animal behaviour and stress physiology was therefore encouraged. The need for scientific knowledge on the behavioural capabilities of farm animals was considerable, as the science of animal behaviour was mainly concerned with wild and laboratory animals.

Two internationally renowned researchers, Robert Dantzer, a veterinarian, and Jean-Pierre Signoret, an agronomist, drew attention to the need to develop a scientific approach to animal behaviour. The aim was to

gain a better understanding of the needs of animals, to propose more suitable breeding conditions and to provide scientific knowledge to inform the emerging public debate on AW. This pioneering work enabled France to make an active contribution to European and international research. Jean-Pierre Signoret initiated the first studies of social, sexual and maternal behaviour at INRAE, thereby inspiring the first generation of researchers¹. As for Robert Dantzer, he developed in association with Pierre Mormède a new approach to stress in animals based on psychoneuroendocrinology. The farmed animal, previously considered as a production tool, was to become an object of scientific study in its own right.

In 1983, Marie-Christine Meunier-Salaün, an academic, and Isabelle Veissier, a veterinarian, were recruited to study the behavioural adaptation of pigs and ruminants, respectively, to their breeding conditions.

Other recruitments were then made² in the field of ethology and behavioural physiology in order to strengthen the study of behaviour and to initiate the study of reactivity and stress factors in farmed animals.

¹ M.-F. Bouissou, P. Le Neindre, J.-M. Faure and P. Poindron

² For example, A. Prunier, C. Leterrier, C. Terlouw, F. Lévy, A. Boissy, R. Nowak, A. Mills and X. Boivin.

European regulations in favour of animal welfare

Since the 1980s, some fifteen European directives in favour of animal welfare have been implemented. The first, establishing "minimum standards for the protection" of farmed animals, was enacted in 1986 and concerned laying hens kept in battery cages (Directive 86/113/EEC). This was followed by equivalent directives for pigs in 1991 (Directive 91/630/EEC) and calves in 1997 (Directive 97/2/EC). In the same year, the Amsterdam Treaty included for the first time, in an annex, the protection and welfare of animals as sentient beings (Protocol No 33). In 1998, the first European directive "concerning the protection of animals kept for farming purposes" came into force (Directive 98/58/EC). The Lisbon Treaty, which currently governs the functioning of the European Union, officially makes animal welfare a constituent and fundamental issue of the EU with Article 13 on the protection of "the welfare of animals as sentient beings". European legislation imposes so-called "minimum requirements", which are easier to monitor. It was the 2007 Directive "laying down minimum rules for the protection of chickens kept for meat production" (Directive 2007/43/EC), which for the first time required an obligation of result. The first EU directives have since been amended and are currently being updated for 2023/2024..



➤ A multidisciplinary scientific community on animal welfare

From 1992 onwards, the first incentives were put in place to encourage collaboration between different research teams on the behavioural adaptation of animals to rearing conditions. These actions led to the establishment of a multidisciplinary scientific community around the study of animal welfare. Ethologists, physiologists and zootechnicians were interested in the behaviour of the main farmed animal species: ruminants, pigs and poultry. Neurobiologists, nutritionists and geneticists came to reinforce and diversify the nascent scientific community and participated in the development of an integrative science of animal welfare. In the early 2000s, the Institute had thus some twenty researchers/engineers dedicated to the study of animal behaviour and welfare, to which were added several academics, as well as veterinary and agronomy schools.

FROM RESEARCH TO EXPERTISE: THE AGRIBEA SCIENTIFIC NETWORK

The establishment of this collaborative research process was perpetuated by the creation of the AgriBEA scientific network in 1999. Initially internal to INRAE, this network quickly expanded to include other players in research and development. Thus, researchers from the CNRS and universities as well as teacher-researchers from veterinary and agronomic schools joined engineers from animal technical institutes: the Institut de l'élevage, IFIP, ITAVI and IFCE. This network then opened up to reformist animal welfare organizations.

The AgriBEA network thus federates 150 members, half of whom are from INRAE, playing a key role in encouraging collaboration between teams. It has led to the construction of a scientific culture and the dissemination of knowledge on the emotional and cognitive capacities of farmed animals, enabling the evaluation and improvement of their well-being. To achieve this, the network has relied

on a monitoring system and an online training platform to provide information validated by the scientific community. The twenty or so seminars organized in this way have initiated a real dialogue between science, livestock professionals and associations. The diversity of scientific and technical skills has made the network a privileged interface for policy makers. The network's activities have made

it possible to respond to numerous requests for expertise and calls for national and European projects.

THE MIXED TECHNOLOGICAL NETWORK-ANIMAL WELFARE WITH THE LIVESTOCK SECTOR

The AgriBEA network has generated interest in animal welfare among the sectors. To consolidate this emerging



© Christophe Maître, INRAE

Between research and expertise: 5 major projects on animal welfare involving INRAE scientists

- European Welfare Quality project (2004-2009) aimed at developing a protocol for assessing animal welfare on farms based on environmental and behavioural indicators, which has become an international reference;
- Psy-sheep project (2011) funded by the French National Research Agency (ANR) studying the alteration of emotional sensitivity and of cognitive and social capacities induced by early stress in sheep;
- Participation in the «animal welfare» working group (2012) of the Anses' expert committee on animal health, following a request from the Directorate General for Food (DGAL) for the creation of good practice guides required by European regulations;
- European PROHEALTH project (2013) whose objective is to find new solutions to guarantee the health and sustainability of monogastric livestock production systems (poultry and pigs).
- European PPILOW project (2019-2024) which aims to validate organic and low-input outdoor production systems to improve the welfare of poultry and pigs.

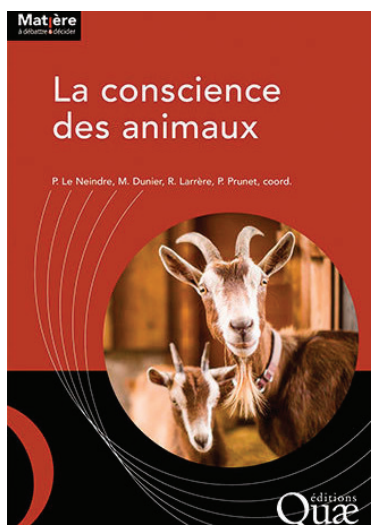


Isabelle Bouvarel
Director of ITAVI



ITAVI is a technical institute that supports professionals in the poultry, rabbit and fish farming sectors. After the post-war priorities of food self-sufficiency and profitability of livestock farms, environmental and animal welfare issues emerge in the 1990s. They are taken into account in European directives and regulations, which, for example, set standards for animals and livestock buildings. The BIRD ITAVI/INRAE joint technology unit created in Nouzilly in 2006 is helping us to think about a more sustainable poultry industry. From 2017, the FRCAW, which brings together research, technical institutes and the public authorities, will facilitate the handling of complex assessments.

Satisfying the requirements of consumers, NGOs and distributors in terms of animal welfare, guaranteeing the same level of requirements in processed products and collective catering, maintaining livestock farms on French territory while substantial investments and changes in practices requiring time and knowledge are necessary, are all challenges that require good cooperation.



Animal consciousness and animal pain: two collective scientific expertises led by INRAE

At the request of the French and European public authorities, INRAE coordinated two collective scientific assessments (ESCO), one on animal pain and the other on animal consciousness. Led by Pierre Le Neindre, who is now an emeritus researcher at the Institute in the fields of ethology and behavioural science, these ESCOs were based on biological, ethical, economic and regulatory knowledge.

The first ESCO was a response to a request from the Ministries of agriculture and research in 2009. Coordinated by the Delegation for Collective Scientific Expertise, Foresight and Advanced Studies (DEPE), it mobilised some twenty experts from different fields, half of them from INRAE. The objective was to review the state of the art of knowledge on pain in farmed animals and, in particular, how to identify, assess, treat and reduce it. This work ultimately made it possible to identify alternative practices that limit or even eliminate pain in livestock production systems. In 2015, INRAE was entrusted by the European Food Safety Authority (EFSA) with a new ESCO on animal consciousness. The DEPE coordinated the work of 17 experts, including 9 INRAE scientists, who conducted a critical review of the literature on forms of consciousness in animals. In addition to an ability to experience emotions, manage complex situations and evaluate their knowledge, animals can plan actions in relation to their past experience or future expectations, and also manage complex social relationships. The study of the levels and contents of consciousness in animals is becoming an important scientific issue given the complexity of the subject and the controversies it is bound to provoke.

interest, the technical institutes has created the mixed technological network for animal welfare and livestock production systems (RMT-BEA) in 2007, in conjunction with the AgriBEA network and led by the Institut de l'élevage. Certified by the Ministry of Agriculture, the network brings together development players (Idele, IFIP, ITAVI), targeted research (INRAE, Anses), public and private training organizations and the livestock sector. Its objective: to facilitate

the transfer of research results to the actors in the field.

National projects, funded by the Ministry in charge of agriculture, have promoted innovation and the development of skills. This collaboration has resulted in tools for assessing animal welfare in livestock farming, transport and slaughter. In 2020, the concept of «One Welfare» has brought animal welfare and human quality of life closer together through an integrated vision of welfare.

The AgriBEA and RMT-BEA networks have accompanied the law reforming the legal status of animals in the Civil Code (2015) and the first French Strategy for Animal Welfare led by the ministry in charge of Agriculture. These two networks have been replaced by the «One Welfare» mixed technology network, which works for an integrated approach to the welfare of both animals and the humans who raise them.

➤ 2017, the National Reference Centre for Animal Welfare

In 2012, the European Union launches the Strategy for Protection and Welfare of Animals (2012-2015) and encourages Member States to set up reference centres for animal welfare. The aim is to promote incentives to facilitate the application of regulations, better dissemination of knowledge and innovations and easier access to training. In 2014, the French authorities include the project to create a reference centre for animal welfare in the Law for the future of agriculture. The National Reference Centre for Animal Welfare (FRCAW), created by the Ministry in charge of agriculture in 2017, is the first action of the French Strategy for Animal Welfare (2016-2020).



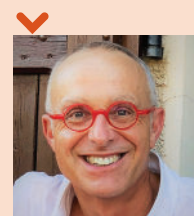
Led by INRAE, the FRCAW brings together experts in research, development and training in animal welfare: INRAE, Anses, the four agricultural technical institutes of the ACTA network and the four veterinary schools. The steering committee includes representatives of these organizations. FRCAW receives an

annual grant from the Ministry in charge of agriculture. Its actions are primarily aimed at public authorities, public and private R&D organizations, all livestock sectors upstream and downstream as well as animal welfare organizations. All these players are brought together in an advisory committee. The ambition of the FRCAW is to support the French livestock sectors in changing practices that are more respectful of animal welfare and to support public policies in this area, in line with European guidelines. Its mission is to develop and disseminate knowledge and innovations, to inform public policies through technical and scientific expertise, and to promote training in animal welfare.

INFORMING AND FORMING STAKEHOLDERS IN ANIMAL WELFARE

In order to support the evolution of practices, the FRCAW runs a resource platform that gathers regulatory information and consolidated scientific and technical knowledge. The database of this platform is enriched thanks to a major monitoring and collection effort shared between research, transfer and training organizations, which extends

the monitoring carried out by the AgriBEA scientific network. Selected news items are disseminated on the FRCAW website and through a newsletter sent out at the end of November 2021 to nearly 800 subscribers. The resource platform and the newsletter are now also diffused in English in order to promote French activities in favour of AW. The acquisition of knowledge and skills



Alain Boissy
Research director of the UMR Herbivores and director of the National Reference Centre for Animal Welfare (FRCAW)

I have been studying the behaviour of farmed animals and their emotional and cognitive capacities for over 30 years, and I have seen the issue of animal welfare arise. After the war, intensive animal production met the food needs of the time, the animal being then a «raw material». The decline in animal performance and the abnormal behaviour, health crises and the conditions of intensive livestock farming and slaughter have revealed the limits of the system. Under the pressure of animal welfare organizations and to accompany the introduction of European regulations, an international science of animal welfare emerges, first focusing on the behaviour and stress physiology of animals, then on their emotions and mental states. In France, from 1995 onwards and under the impetus of INRAE, a multidisciplinary scientific community develops through the AgriBEA network, open to animal welfare organization, and expands with the BEA Mixed Technology Network, which associates livestock professionals. The FRCAW, created in 2017, supports a collaborative dynamic to disseminate knowledge and support the public authorities. Its aim: to take better account of the well-being of all animals, for which humans are responsible.





Charlotte Dunoyer
Head of the unit
for the assessment
of risks related
to animal health,
nutrition and welfare
at Anses

Within the Risk Assessment Department of Anses, the unit I lead is dedicated to risks related to animal health, nutrition and welfare. A veterinarian by training, I started out in the animal feed sector for farmed animals, then in the sector of health issues related to wildlife at the French National Hunters' Federation, before joining Anses in 2011.

The unit has a total of 10 people, one or two of whom coordinate the expert assessments on animal welfare, a topic introduced in 2011. For each request, we set up a group of experts and often call on scientists from INRAE. A collective and adversarial expertise in this field lasts from 6 months to 3 years, and may concern either good practice guides or risk assessment issues. The expert committee (CES) on animal health and welfare had to establish the basis of its expert work on animal welfare by adopting fundamentals centred on the animal and its feelings: definitions, indicators, type of recommendations and so on. The Anses is a member of the National Reference Centre for Animal Welfare at INRAE. We are currently organizing ourselves to better distribute the Ministry's requests according to their nature."

is reinforced by access to initial and continuing training. The FRCAW does not provide training as such. It works alongside the Partnership of Animal Welfare Chair, created in 2018 at the request of the ministry in charge of agriculture and run by VetAgro Sup, which develops training courses aimed at veterinarians, breeders and the general public. The AW Chair is also involved in disseminating information and news to a very wide audience. The FRCAW and the AW Chair work together to provide the right level of information to the right audience.



Anses and the National Reference Centre for Animal Welfare: two national institutions for public expertise

Anses also organizes expert committees (CES) which carry out evaluations and expert assessments in collaboration with INRAE experts. In 2018, the CES on animal health became the CES on animal health and welfare (SABA). The latter is supplemented by temporary working groups to respond to specific requests. Regularly consulted by the public authorities, the CES SABA and the FRCAW ensure the coherence of the distribution of the issues raised. Questions relating to risk assessment are invariably reserved for the CES SABA.

INFORMING THROUGH EXPERTISE

The expertise provided by the FRCAW to the commissioning organizations provides scientific and technical support thanks to a network of more than one hundred experts. The FRCAW ensures, as far as possible, a diversity of experts to enable all the disciplines and interests concerned to be taken into account. The Centre's data entry procedure has been thought through and formalised to ensure that the order is matched to the results. Requests for expert opinions, which mainly concerned livestock since the creation of the FRCAW, have recently expanded to include companion animals. The FRCAW has been defined as the expert body for the Observatory for the protection of

domestic carnivores launched in May 2021 by the Minister of Agriculture and Food. In addition to responding to requests from the public authorities, «self-tasking» relating to topical issues is also carried out. On the European scene, the FRCAW has established close links with its European counterparts in Sweden, Finland, Italy and Greece, and interacts with the three new European reference centres, dedicated to pigs, poultry and other small farmed animals, and ruminants and horses. Links with the European centres are all the easier since INRAE and Anses are partners in the centres dedicated to ruminants and horses, poultry and other small farmed animals, respectively. A global expertise strategy between the FRCAW and the European reference centres is currently being developed.

➤ Between Science and Public Policy: progress and prospects

The scientific community for animal welfare at INRAE includes about 60 researchers in the divisions Animal Physiology and Livestock Systems, Animal Genetics, Animal Health, and Action and Transitions. Since 2019, the Farm Animal Health and Welfare (SANBA) metaprogramme also supports inter- and trans-disciplinary approaches between the various divisions. The humanities and social sciences are still poorly represented, although such skills are crucial to making this research a fully developed societal issue.

Overall, scientists have made major advances in knowledge about animal welfare by actively participating on the international scene in the development of the discipline. This is reflected in the HAL INRAE portal, which lists some 600 publications in a journal,

some 60 reports and 600 conference papers, as well as some 40 books, all of which bear witness to the dynamism of this topic in the scientific community. Pioneering work has shown the sensitive nature of animals and their cognitive skills. Not only do they experience negative emotions, but they actively seek out positive emotional experiences. INRAE has furthermore been mandated by EFSA to conduct a collective expertise on the consciousness of animals. Several researchers have thus participated in the update of the integrated definition of animal welfare (Anses, 2018) which highlights the psychological experience of animals and their behavioural needs. The acquisition and dissemination of new knowledge makes it possible to support public policies devoted to the protection and welfare of animals.

Welfare of animals used in experiments at INRAE

Animal welfare at INRAE is not only dealt with from the point of view of livestock farming but also in the context of animal experimentation. The use of animals for scientific purposes requires an exacting ethical approach. This approach is governed by the “3Rs” rule (reduce, refine, replace) in order to minimise the pain and suffering of animals in the context of experiments. In addition to the biosafety and ethical aspects, the on-site implementation of animal welfare regulations is ensured by the animal welfare structure for each of INRAE’s experimental units. In order to guarantee the quality of life of animals bred for use in experiments, FRCAW provides its skills and experience to support the animal welfare structures in the design and implementation of welfare evaluation grids for all animals bred within INRAE’s units.



The Ministry of Agriculture and Food supports animal welfare research



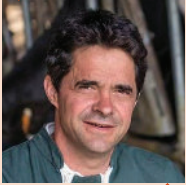
The Ministry of Agriculture and Food is convinced that the improvement of animal welfare is a major factor for the future of the European livestock sector, in line with the strong and growing social expectations on this subject. It is necessary to develop the legislation on animal welfare in the light of new scientific knowledge, particularly on pain mechanisms. The creation in 2017 of a National Reference Centre for Animal Welfare (FRCAW), which was set out in the Law for the future of agriculture, was the first action to be taken under the 2016-2020 national Strategy for Animal Welfare. The FRCAW is supported by INRAE, the framework agreement was signed on 28/02/2017 for 5 years (2017-2021), by INRAE, four agricultural technical institutes (Idele, IFIP, IFCE and ITAVI) represented by ACTA, the four national veterinary schools (VetAgroSup, ENVA, Oniris, ENVT) and Anses. The Directorate General for Food (DGAL) has provided financial support since its creation. At the end of its first mandate, the DGAL congratulates the FRCAW for its expert work and invites it to continue its work of disseminating knowledge to stakeholders. It affirms the need to perpetuate the FRCAW. It considers that the model of the FRCAW should be promoted at European level, at a time when the European Union is in the midst of renewing its regulations on animal welfare. Furthermore, the DGAL expects the FRCAW to be a major player in the construction of the new national Strategy for Animal Welfare currently being drawn up.



To mention just a few examples of the progress made, the modification of housing conditions for veal calves, the ban on castration of male piglets, and measures to protect animals at the time of slaughter. To the indicators characterising the AW on the farm, animal-centred indicators from the European Welfare Quality® project

have been added. The scientific community contributes its knowledge and expertise and provides an interface with animal welfare stakeholders. The innovative training and information methods set up within the framework of the AgriBEA and RMT-BEA networks and subsequently the FRCAW have made it possible to support professionals in

the livestock farming and veterinary medicine sectors in order to initiate changes in practices in favour of AW. A long road has been travelled but there is still a lot to be done: taking into account both the relationship of the young animal with the breeder and with its fellow animals as well as the cognitive capacities of the animals ■



Luc Mounier
Enseignant-chercheur et coordinateur de la chaire bien-être animale à VetAgro Sup (Lyon)

A veterinarian by training, I did a PhD at INRAE from 2002 to 2005 on the welfare of bull calves. The following year, I joined the veterinary school in Lyon where I dedicate myself to animal welfare. I am convinced that scientists have a role to play in sharing a “One Health” approach to animal welfare. Scientific mediation is essential to forge links between farmers, veterinarians, researchers, associations, the general public and so on. In 2016, I coordinated an MOOC on animal welfare followed by the publication of three awareness-raising books published by Éditions Quæ. In 2018, we created a chair on animal welfare at VetAgro Sup with 3 missions: scientific production, training and information as well as the promotion of exchanges between stakeholders. We have quite distinct and coordinated positions with the National Reference Centre for AW. Alain Boissy is a member of our steering committee and I have represented the veterinary schools on the steering committee of the FRCAW since its creation in 2017. Animal welfare is really entering the consciousness, practices and public policies.



© Dorathée Ledoux, VAS

The French Animal Welfare Strategy

In order to respond to public demand for better consideration of animal welfare, the Ministry of Agriculture and Food introduced France's first Strategy for Animal Welfare (2016-2020) in 2016. This commitment was reinforced by a plan of 20 priority actions structured into 7 objectives:

- Know and innovate, in order to adapt to a changing world;
- Make the professionals the primary actors in the well-being of their animals;
- Continue to develop practices in favour of animal welfare;
- Reaffirm the requirement to protect animals in the slaughterhouse;
- Support farmers in serious difficulty and remedy shortcomings in care;
- Fighting against the abandonment of animals kept as companions or for leisure;
- Do the right thing and make it known.

This strategy was co-constructed within the French national council for the orientation of animal and plant sanitary policy (CNOPSAV), which brings together scientists, particularly from INRAE, representatives of livestock farming and animal welfare organizations.

It is part of the agroecological policy for sustainable livestock farming. Although the measures put in place mainly concern farmed animals, they also target companion animals, the equine sector and animals used for scientific purposes.

Currently, the Ministry has re-launched new consultations between all stakeholders to implement a new national strategy for the next five years.

Support for public policies Collection
Director of publication: Nicolas de Menthèrie
Director of the collection: Gisèle Parfait
Conception and redaction: Giovanna Pinaud,
Gisèle Parfait
Design and layout: EliloCom - www.elilocom.fr
Printing: Biprint



Direction de l'Appui aux Politiques Publiques
Centre siège d'Antony
1, rue Pierre Gilles de Gennes
92160 Antony

Rejoignez-nous sur :



<https://www.inrae.fr/>

**Institut national de recherche pour
l'agriculture, l'alimentation et l'environnement**



**RÉPUBLIQUE
FRANÇAISE**

*Liberté
Égalité
Fraternité*

INRAE