IMPROVING THE WELFARE OF FARM ANIMALS

INRA IS DEDICATED TO DEVELOPING ANIMAL HUSBANDRY SYSTEMS
RECONCILING SOCIETY'S CONCERNS, FARMERS' PRACTICES
AND THE QUALITY OF LIFE OF ANIMALS

INRA
SCIENCE & IMPACT

A NEW DEFINITION OF ANIMAL WELFARE

The welfare of an animal is the positive mental and physical state related to the satisfaction of its physiological and behavioural needs, as well as its expectations. This state varies according to the perception of the situation by the animal (French Agency for Food, Environmental and Occupational Health and Safety ANSES, 2018).

WHY ANIMAL WELFARE MATTERS TO THE LIVESTOCK INDUSTRY

Animal husbandry is an important part of the French agricultural economy. It plays an essential economical and societal role in many regions of the country. However, the industry is currently facing many economic, environmental and societal challenges. Since the 1970s, INRA has developed research for improving practices aiming at reducing animal stress. These improved practices are felt necessary for several reasons: - society's concern over the quality of life of farm animals, including the conditions under which animals are transported and slaughtered; - increased scientific understanding of animal suffering; and - the establishment of European laws on animal welfare. **INRA feels now necessary to go further. Livestock systems should do more than just decrease stress and suffering; they should also allow positive experiences for the animals**. To facilitate this paradigm shift, we need greater scientific understanding and innovation. Therefore, **INRA is launching a scoping study to bring together researchers from a broad range of relevant disciplines aiming at developing innovative research in the area. The study focuses on important questions arising from controversies related to farm animals themselves, farming practices, and the livestock industry. Animal welfare is central to what makes livestock systems sustainable, therefore research on animal welfare is a key component of the scoping study**, which is being carried out in close collaboration with all concerned stakeholders.

01

ASSESSING ANIMAL SENTIENCE
AND CONSCIOUSNESS FOR IMPROVING ANIMAL WELFARE

INNOVATIVE RESEARCH
FOR ASSESSING ANIMAL FEELINGS

Concern for the welfare of animals comes from the recognition that animals are sentient: they can feel emotions and feelings. However, welfare is a reflection of how an animal feels about its environment. To study the emotional experiences of animals, **INRA researchers developed an innovative approach that stemmed from human cognitive psychology. Animals' emotions result from the way they feel about ambient conditions**. Researchers discovered that sheep, pigs, and poultry react to the same emotional triggers as humans. For instance, different emotions are elicited depending on - whether the environmental conditions are familiar, predictable, or abruptly different; - whether or not conditions meet the animals' expectations; - the level to which animals can control their environment; and - the social context. **Consequently, animals can experience a range of various emotions from negative (e.g. fear or anger) to positive (e.g. pleasure)**. Furthermore, animals express postural and behavioural signs of their emotional state. In sheep, for example, emotions are conveyed by the position of their ears (see the illustration below). These signs can be used non-invasively to gauge what an animal is feeling. To expand these findings, research must now explore the neurological mechanisms underlying them.

>> To summarise, **improving animal welfare goes beyond limiting negative feelings. It also involves creating conditions that will promote positive experiences throughout the entire animal's life**. In order to reach this goal, it is especially important to consider the animals' point of view, their behavioural needs and the quality of their interactions with their fellow animals and with their carer.

| Neutrality | Surprise | Fear | Anger | Satisfaction/pleasure |

Emotions are temporary reactions, but **welfare is persistent**. INRA researchers found that animals perceive their environment differently depending on the emotions they have experienced beforehand. A study showed that sheep perceive a probe situation more positively if they received a reward beforehand. On the contrary, if they received a scare beforehand, they perceive the same probe situation negatively. **If the animal's emotional response persists, so will this bias in perception** (ANR projects Emofarm and Psysheep). **These studies will significantly**, not only improve our understanding of animal sentience but also **contribute to enrich the lives of farm animals by promoting innovative practices** [SEE PART 2].

INRA COLLECTIVE SCIENTIFIC EXPERT REPORTS
SEEKING TO UNDERSTAND ANIMAL SENTIENCE BETTER

In 2009, the French Ministries of Agriculture and Research asked INRA to prepare a **collective scientific expert report** on how to identify, understand, and reduce pain in farm animals. Since then, there has been a **complementary report on animal consciousness**, commissioned this time by the European Food Safety Authority (EFSA). Animal consciousness is defined as **the ability of an animal to experience subjectively its environment, its own body, and/or its own knowledge**. Philosophers and scientists have long suggested that animals possess some form of consciousness, but this idea recently gained support because of advances from neuro and behavioural studies. The published review of the literature focused on animal perception, emotion, cognition, and metacognition and on the underlying cerebral and neuronal architecture and mechanisms. **It showed that animals can feel emotions, handle complex situations, and assess knowledge that they have acquired. Animals can also plan future actions based on their expectations and past experiences and manage complex social relationships. Evidence has been provided that animals possess contents of consciousness. Moreover, animals consciously feel pain, which is the product of a sensory response (nociception*) and an associated negative emotional reaction**. However, the expert **report did not conclude that consciousness is exactly the same in animals as in humans** and it also concluded that there is a need for more research to improve **our understanding of different contents of consciousness across a broad range of animal species**.

* Nociception is the sensory perception of a painful or injurious stimulus.

DEVELOPING TOOLS
FOR EVALUATING ANIMAL WELFARE

As a partner in the EU project Welfare Quality® (2004-2009), **INRA significantly contributed to the development of a method for** broadly **evaluating the welfare of farm animals**, in particular poultry, pigs, and cattle. This method focuses on **four essential principles to safeguard and improve the welfare of farm animals: - proper nutrition, - sufficient living space, - good health, and - the freedom to express appropriate behaviours**. This method has since become a worldwide standard.

The Welfare Quality® project helped to **promote the use of animal-based indicators for evaluating animal welfare** on top of more generally used environmental indicators; the latter being used for revealing the risks that animals encounter. Since then, EFSA and the World Organisation for Animal Health (OIE) have adopted this approach. It also led to several other research projects and development initiatives that cover most farm animal species. However, to implement this method at farm-level remains challenging. **INRA is continuing to work with stakeholders to simplify the tools needed and increase their practical values for the livestock farmers**. Particular focus has been directed towards better evaluating common problem areas, which have now to be assessed depending on the sector or the species.

02

DESIGNING STRATEGIES
FOR IMPROVING THE WELFARE OF FARM ANIMALS

THE KEY ROLE OF THE RELATIONSHIP BETWEEN FARMERS AND THEIR ANIMALS

A positive role of the farmer within the animal's social group is very important for animal welfare. So, INRA researchers examined similarities and differences between ewe-lamb and human-lamb relationships (ANR project Bond.007). **Lambs can develop and express affiliative behaviour with their caretakers**, even if this tie will never be as strong as the one formed with their mothers. Furthermore, **positive interactions,** like being petted, **result in the release of oxytocin, a hormone found in all mammals, which is involved in social bonding**. Once a positive relationship is established, **the mere presence of the caregiver triggers the** release of oxytocin and thus calms the animal. There are **many similarities in how young lambs respond physiologically and neurologically to humans and to their mothers.**

IMPROVING PRACTICES AT FARM-LEVEL
FOR ENHANCING ANIMAL WELFARE AND HEALTH

The way in which an animal perceives its environment is affected by its past emotional experience. If an animal frequently experiences positive emotions in a given situation, it will tend always to perceive the situation positively [SEE PART 1]. Furthermore, **if a positive perception persists, enrichment strategies will be more effective**. INRA researchers studied this by assessing the efficacy of different inexpensive enrichment strategies. The most common enrichment strategies involve changes of an animal's **physical surroundings** such as the presence of brushes or platforms, which are highly regarded by animals, or the availability of food or non-food objects that can be manipulated, thus stimulating curiosity or play. Accounting for **the social needs of animals** is also an easy and low-cost way to improve their living conditions. Promoting positive interactions with humans is an efficient strategy. Another one is to allow animals to maintain relationships that they established when young for promoting social cohesion. For instance, the behavioural development of juveniles that are artificially suckled is stimulated when the animals are raised alongside young adults. Recently, the notion of **cognitive enrichment** has emerged. It involves strategies based on the cognitive capacities of animals. For example, when animals have been trained to a sound occurring a few minutes before each food delivery, they express after the sound behavioural signs of being excited that generally reflect positive emotions or anticipation of a positive event. The same is true when animals are fed more than they expected (positive contrast). INRA researchers have found that lambs raised using such enrichment strategies are **less fearful and more successful** when learning new behaviours; they also display **stronger immune responses** (ANR projects Emofarm and Psysheep, EU project Prohealth). In summary, **improving the welfare of farm animals involves more than just reducing the number of stressful experiences. The process must specifically create conditions that stimulate and enrich the lives of animals, from their own perspective.**

02

DESIGNING STRATEGIES
FOR IMPROVING THE WELFARE OF FARM ANIMALS

PRECISION LIVESTOCK FARMING
AN OPPORTUNITY TO IMPROVE ANIMAL WELFARE

New technological tools can be used in livestock systems for improving animal welfare and health, as illustrated by the scheme below. Despite the fact that technology is not a good substitute for human contact in the lives of animals, technological tools allow us to **limit risks by rapidly noticing behavioural anomalies. They also ensure that a given animal is monitored over its entire life**. Because the animals are constantly being recorded, digital tools and automated monitoring can be used to detect subtle behavioural shifts that humans might not otherwise perceive. For example, even before the appearance of any clinical signs of disease, animals become less active and groom themselves less. **The number of research projects and innovative digital tools which focus on digital monitoring animal behaviour is increasing. These projects concern for example early detection of lameness in dairy cattle or detection of respiratory problems in pigs from their vocalisations.**

High-precision livestock farming
Adapted from figure in
GIS Elevages Demain
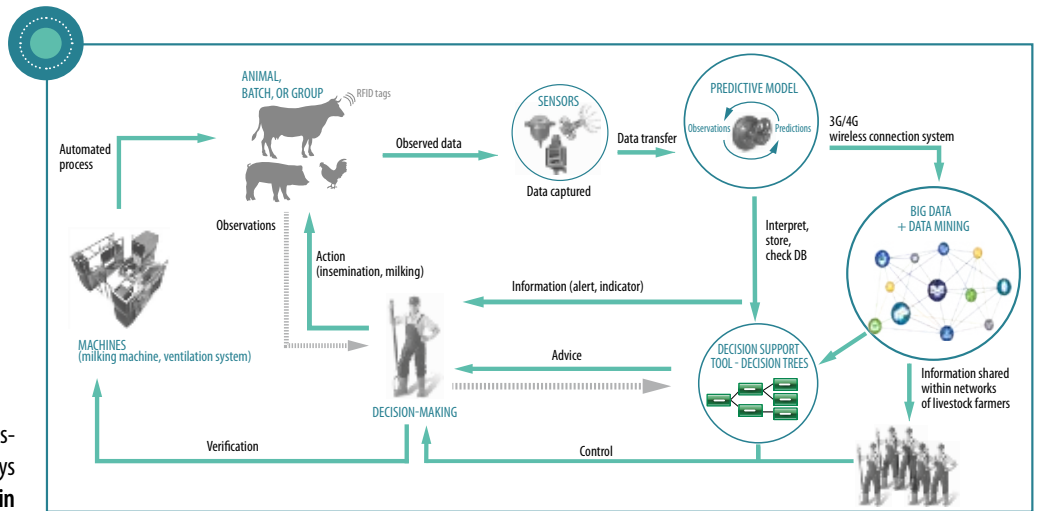
GENETIC SELECTION
A TOOL FOR IMPROVING
ANIMAL WELFARE

Genetic selection could also help in increasing animal welfare and health; several ways are currently being explored. **The main approach is to focus breeding efforts on functional traits**, such as limb quality, disease resistance (e.g., against mastitis in dairy cows), or ease of parturition. A major line of research involves exploring the genetics of "robustness", namely the ability of animals to deal with a full range of expected farming conditions. **Another approach is to breed animals with traits that eliminate the need for painful procedures** such as the production of odour-free boars removing the need for castration or the production of horn-less cows which would eliminate the need for dehorning. **The goal is to use these genetic approaches together with strategies for improving the quality of life of animals** (e.g. fostering relationships, creating good environmental conditions adapted to animal needs, monitoring of their behaviour, use of environmental conditions that are adapted to the animal needs and of automated monitoring of behaviour).

INRA RESEARCHERS ARE ALSO SEEKING TO IMPROVE CONDITIONS FOR ANIMALS DURING TRANSPORT AND IN THE SLAUGHTERHOUSE

There are many reasons to focus on the stress that animals experience when arriving at the slaughterhouse. First and foremost, as in the case of animal welfare at farm-level, it is simply **a matter of ethics**. Because animals have emotions, to ignore their suffering would be unethical. Society is becoming more and more aware of this issue, and most consumers want animal stress at slaughter to be reduced as much as possible. Second, when animal distress is limited, **safety is improved**. When animals get stressed, they are harder to manage and their reactions are harder to predict, which means slaughterhouse handlers are at greater risk. Third, the o**rganoleptic properties of meat** (e.g. taste, texture) are strongly affected by stress-related physiological reactions of animals that are induced by slaughterhouse conditions. Such consequences may continue even after death (e.g. post-mortem muscle acidification and dark colouring of meat).

Research evaluating animal stress in the slaughterhouse starts with **identifying the procedures that provoke the stressful procedures and assessing their impact on animal emotional state and meat quality.** The findings have been used to **improve the training of slaughterhouse workers and veterinarians** and for refining the risk analyses. **INRA is striving to determine the most relevant indicators of loss of consciousness**; the goal is to **limit stress and pain as much as possible before the animal's death**. The results of this research have been shared with public and private stakeholders alike (ministries, government agencies like ANSES, agri-food companies, slaughterhouses, livestock farmers, consumer organisations, and animal protection groups), and particularly with members of the **National Ethics Committee on Slaughterhouse Conditions**, which is part of the French National Food Council.

03 INCREASING AWARENESS OF ANIMAL WELFARE:
INRA IS AT THE HEART OF A RENEWED DIALOGUE BETWEEN INDUSTRY STAKEHOLDERS AND SOCIETY

FROM AGRIBEA SCIENTIFIC NETWORK AND THE JOINT TECHNOLOGY NETWORK ON ANIMAL WELFARE...

In 1999, INRA created the **AgriBEA scientific network to bring together its own researchers**. A multidisciplinary approach bringing together biological and socials scientists was then put in place to stimulate a better understanding of the complex underlying factors of relating to animal welfare. Rapidly the **network was widened to include people working in research, development and higher education**. The goal was to foster a common culture and to establish collaborative research projects. Later on, **AgriBEA also welcomed industry and animal protection groups in order to take into account society's expectations.**

The **Joint Technology Network on Animal Welfare and Livestock Systems**, which does complementary work, was established by the French Livestock Institute in 2007. The network includes R&D partners for improving the transfer of results to industry stakeholders, nurturing innovation, fostering skills and creating tools for improving the welfare of farm animals.

Specifically, these two networks contributed to recent debates taking place in France such as **the change of the legal status of the animals and the development of a National Strategy for Animal Welfare by the Ministry of Agriculture (2016–2020)**.

... TO THE NATIONAL REFERENCE CENTRE FOR ANIMAL WELFARE

Many stakeholders are involved in the animal welfare debate. They have different expectations in particular when it comes to implementing new regulations. In order to handle these challenges it was felt necessary to establish an independent body dedicated to sharing knowledge between stakeholders and facilitating initiatives. To do so, the **National Reference Centre for Animal Welfare (CNR BEA) was created in 2017**, as part of the Ministry of Agriculture's National Strategy for Animal Welfare. INRA was chosen to manage and develop this new body.

The overarching goal of the organisation is to **gather together the different stakeholders who have an interest in animal welfare**. More specifically, the objectives are to help stakeholders to improve their approaches for enhancing animal welfare; to disseminate related knowledge and innovations; and to encourage exchanges amongst all interested parties.

INRA runs CNR BEA in collaboration with France's national veterinary schools and technical institutes for agricultural and animal sciences. The three missions of the Centre are as follows:

1. Facilitating access to various resources and information with a view to **sharing and diffusing knowledge**,

2. Providing **scientific and technical support** to different ministries and stakeholders such as the private sector and animal protection groups,

3. Promoting **coordination between initial and continuous training programmes** to enhance the consistency and complementarity of the diverse programmes.

After an initial organisational period, **CNR BEA is now implementing its work programme**.

NORTH WESTERN FRANCE: A PILOT REGION FOR INNOVATION IN STAKEHOLDER PARTNERSHIPS FOR ANIMAL WELFARE IMPROVEMENTS

INRA has just created a **regional laboratory for innovation** (LIT) in France's Grand-Ouest (North Western France). This **"LIT Ouesterel"** is dedicated to studying questions related to the **welfare and health of poultry, pigs and dairy cows** in the Grand-Ouest's three main regions (Brittany, Pays de la Loire, and Normandy). LIT Ouesterel has the support of government bodies, local policymakers, different sectors of the industry, and animal protection groups. **It concerns the whole continuum from R&D to training and knowledge transfer. Many stakeholders are involved from producers to consumers, with the aim of developing shared innovative solutions** for improving the welfare of animals. The ultimate objective is to promote a collective approach for dealing with the socioeconomic and ethical needs of animal farmers. It should bring them knowledge, tools and training. It should also bring to consumers information and product labelling. The laboratory's work should encourage mutual understanding amongst stakeholders that have very different viewpoints. Its findings and outcomes will to be passed on to the national level by the CNR BEA.

LIT Ouesterel is one of the 24 grantees of 2018 from the Call for tenders launched by the French General Secretariat for Investment as part of the 3rd programme for Investments for the Future. The goal is to create a region focused on ambitious innovation.

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