Animal pain

Identifying, understanding and minimising pain in farm animals

There is a growing awareness in modern society that farm animals may suffer pain. Pain in animals is perceived in a wide variety of contexts ranging from animal experimentation, through mistreatment of pets and performing animals to the husbandry and treatment of farm animals. This awareness inevitably makes dialogue difficult between animal rights activists who are against any use of animals, those who advocate improving animals' living conditions and economic stakeholders who emphasise the constraints that face them in their sector of activity.

It was in that overall context that a series of meetings, entitled Rencontres *"Animal et Société",* was arranged in 2008 at the initiative of the President of the French Republic. These meetings brought together professionals, scientists, elected representatives, public authorities and relevant associations to identify key issues in all aspects of the relationship between humans and animals. The participants eventually agreed that the concept of pain in animals needed to be defined as it is central to the debate. One of the outcomes of the *Rencontres* was to call for a multidisciplinary scientific assessment (ESCo: *expertise scientifique collective*) of animal pain. As a result, the French Ministries of Agriculture and Research commissioned INRA to assess this controversial societal issue scientifically in light of current knowledge on pain in farm animals and to define the various conditions of pain and suffering in animals.

This assessment focused on farm animals. It enlisted the help of researchers from many fields, including the life sciences and human and social sciences and was based on a body of 1,400 scientific articles and international reports. The assessment provided a new perspective on the biotechnical and societal components of the issue of animal pain and practical information on how it can be reduced. It also identified gaps and scientific controversies and pinpointed areas requiring further research. The assessment resulted in the drafting of a report and a summary, which are available on-line on the INRA Web site.

The ESCo began with the premise that animal production and its purpose are legitimate. The assessment thus excluded extreme positions held, on the one hand, by those who reject any exploitation of domestic animals for the benefit of mankind and, on the other hand, by those who refuse to accept that any animals can feel pain.

I. Context, scope and implementation of the ESCo

The ESCo commission: identifying, understanding and minimising pain in farm animals

The French Ministries of Agriculture and Research commissioned a multidisciplinary scientific assessment (ESCo: *expertise scientifique collective*) of perception of pain by animals at all stages including the time of slaughter. The first consideration of the inquiry was the definition of pain in animals with regard to related concepts such as suffering and discomfort, and the ways in which pain is expressed: Are all animals capable of feeling pain and, if so, how? Is it related to their phylogenetic position? The second question concerned the measurement of pain: what tools have we to identify and quantify pain and are they readily available? The effects of pain on an animal's behaviour and performance were also documented. Lastly, the assessment identified feasible alternatives and solutions to reduce pain. While considering all of these issues, ethical and socioeconomic issues relating to animal pain were placed in perspective.

A multidisciplinary approach to the questions asked

Before starting to examine the neurophysiological phenomenon of pain, the enquiry took a fresh look at the question and placed it in its historical context, tracing how it has evolved, identifying the ethical, legal, economic and cultural components and identifying how it is currently being addressed.

To study pain the existing knowledge was analysed from both human medicine and veterinary medicine perspectives. The capacity to measure pain in animals using criteria that are reliable and preferably applicable in routine practice is clearly a central question for the ESCo, since it means that pain can be identified and characterised, enabling ways of dealing with it to be tackled.

Two chapters are devoted specifically to pain in livestock production. Rather than attempting an exhaustive analysis of practices considered to be painful, the ESCo concentrated on situations on-farm or at slaughter that are likely to involve pain, seeking, wherever possible, alternatives or solutions to reduce or even eliminate pain.

The competencies needed to deal with the questions put to the expert group covered a wide range of disciplines in the life sciences (neurophysiology, human clinical medicine, veterinary medicine, genetics, ethology) as well as human, economic and social sciences (history, anthropology, philosophy, ethics, law, economics). The scientific assessment brought together around twenty experts from INRA and other research establishments including Assistance publique-Hôpitaux de Paris, Collège de France, CNRS and Veterinary Schools both in France and abroad.

II. Outcomes of the assessment

The issue of animal pain has gradually become an issue for society

A bibliographic search of the latest scientific information in the human, social sciences and law shows that the subject of animal pain has been dealt with in a large number of fields, including history, anthropology, philosophy, law, economics and sociology. These different approaches point to the difficulty of isolating the notion of animal pain from other related concepts such as animal suffering and animal welfare. They do, however, agree in their conclusions on the importance attached by professionals from widely different backgrounds to the living conditions of animals and on the rejection of pain, irrespective of whether it affects humans or the animals placed under their responsibility.

The growing interest in the issue of pain in farm animals is the result of many, gradually evolving changes in society:

- There has been considerable progress in the recognition and management of pain in humans and, by extension, in animals. In the past, pain was considered to be inevitable to a certain extent, but there are now solutions to reduce it, or even eliminate it.

- Our increasingly urbanised populations have far less direct contact with farm animals and, in practice; the only animals they regularly encounter are their pets, whose status and relationship with humans are much different from those of farm animals.

- The production systems developed by the livestock sectors to meet production requirements raise questions about the pain they can trigger.

- Many different stakeholders are now involved in the debate. In the past only the producer had to take decisions but now all those engaged in the production chain, from the farm to the treatment and distribution network, and many others, such as animal protection groups, are involved in the debate.

The study of human pain can help to clarify and examine the specificity of animal pain

Only recently has pain, whether human or animal, become a major subject of research. Research on pain in humans came into prominence in the 1970s, as reflected in the steady growth in the number of publications, and this has probably had a spin-off effect for research into pain in animals. The central aim of the studies in humans was to understand the physiological mechanisms of pain with a view to sedation.

The analysis of the physiology of pain in the ESCo assessment therefore involved a wider

range of disciplines than is usual for this topic, including not only neurobiology and physiology, but also ethology, veterinary science and zootechnology. The literature search highlighted the difficulty of defining pain precisely especially when coupled with related notions in common usage, such as animal suffering and animal welfare.

There are different categories of pain

Research into pain in humans is characterised by a significant broadening of the very notion of pain. There are various types of pain, depending on its localisation and duration. For instance, we can distinguish between acute pain and chronic pain which can become pathological if left untreated. In addition, we now consider pain in a wider range of subjects such as handicapped people unable to speak, and infants. In non-verbal humans for whom self-evaluation of pain is not feasible, hetero evaluation is the only solution. This is the only method that can be envisaged in animals

Pain involves nociception, emotion and awareness

There are internationally recognised definitions of pain in humans that have been transposed to animals. Elementary sensitivity is called nociception but pain can be categorised into three components: nociception, emotion, and awareness including cognitive abilities. Nociception is the basic capacity to detect stimuli that have the potential to threaten the integrity of the organism and trigger protective responses. Emotion can trigger willingness to protect the subject by escaping from the stimulus so as to alleviate its adverse effects. The existence of a form of emotion, associated with awareness that leads to action has become a key factor in recognising the capacity of animal species to feel pain, thanks to the development of the cognitive sciences. This notion of sensory consciousness, the forms ascribed to it such as state of awareness, primary consciousness prompting action, and reflexive consciousness, and the species that have this capacity are currently subjects of study among scientific communities.

The capacity to feel pain varies according to the species

Given the diversity of animal species, any attempt to transpose a finding obtained in one species to other species is only relevant within the framework of a phylogenetic analysis. Indeed, many researchers doubt that all vertebrates and some invertebrates have the same capacity as mammals to mobilise emotions, avoidance behaviour in response to a nociceptive stimulus and a form of sensory consciousness.

Pain, along with its sensory and emotional components and the associated forms of "consciousness" are present in mammals and, probably birds, although this is still a subject of debate among scientists. Fish and invertebrates such as cephalopods, are still being studied to determine whether they are capable of feeling pain.

Pain measurement tools for farm animals need further development

Evaluation by humans of pain experienced by animals, including negative emotions, can only be done indirectly. It is carried out using a range of pathological, physiological, behavioural and production indices. There are many such indices for mammals, but fewer for birds and still fewer for fish. These indices can be used to develop multiparametric scales, enabling pain to be reliably diagnosed on a large scale but, to date, such scales have been developed only for dogs, cats and horses.

Pain at the time of slaughter

Animals may be highly traumatised during handling procedures or interactions between animals before they reach the slaughter line. Most studies on the effectiveness of pre-slaughter stunning and/or bleeding methods focus on measurements indicating the state of consciousness or unconsciousness, or the brain's capacity to perceive stimuli from the environment. This is done through the electroencephalogram and the reaction of the brain to stimulation. Slaughter techniques with stunning result in unconsciousness if correctly performed. However, for a significant percentage of cattle slaughtered without stunning, there is a delay before they lose consciousness.

Farm practices can be a source of pain

To characterise painful events in farm animals, it was deemed appropriate to place them in the context of the production systems in which they occur. The main priorities of animal production systems are cost-effectiveness, food safety and the health of the animals. Certain types of systems increase the likelihood of pain. These include systems in which there is insufficient space, an unadapted environment, the risk of nutritional or physiological imbalance inherent in certain practices designed to optimize an animal's potential, an unstable social environment and some inappropriate handling practices. Moreover, high-pressure work patterns and organisational systems that do not allow staff to pay sufficient attention to pain may be detrimental both to the animals and to the producers themselves. Other production systems, and especially those developed within the framework of "organic" products, emphasize in their specifications the prevention and treatment of animal pain.

Painful procedures such as beak trimming of poultry and teeth clipping and tail docking of piglets may have to be performed on farm animals due to production constraints but also to meet organoleptic quality criteria for products in the case of castration of piglets and comply with requirements for safety of workers by castration and dehorning of cattle.

Possible solutions to reduce pain in farm animals

The assessment outlines alternatives for eliminating or reducing pain that are already in use or currently being developed in production systems in several countries. These correspond to a three-pronged "suppress, substitute, soothe" or 3S approach, by analogy with the "3R" approach of "reduction, refinement, replacement" applied in the context of animal experimentation.':

- The first solution is to suppress sources of pain that bring no advantage to the animals and the producers. Thus, tail docking of cattle has recently been eliminated. Tooth clipping of piglets appears to be avoidable. Instead of dehorning, producers may introduce cattle that are genetically without horns. The consideration of functional traits in genetic selection is starting to reduce the risk of mastitis in cows, lameness in cattle, poultry and pigs, and newborn mortality in piglets, all of which are painful to these animals. This type of selection is currently a major area of research.

- The second solution is to substitute a technique that is painful with another that is less painful. Examples include castration of cattle as soon as possible after birth; in pigs, this is already done before 8 days. In cattle, there are techniques of castration that seem to be less painful than others. If cattle are dehorned, it should be performed at the earliest possible age, cauterising the region that produces the horn. In the case of piglets' teeth, grinding is preferable to clipping. Debeaking of poultry has been replaced by beak trimming, a less painful procedure. Animal production and containment systems can be redesigned in a way that minimises the risk of injury and bruising caused by aggressive interaction between animals or impacts suffered when animals are being moved, especially to and within abattoirs.

- The third solution is to soothe pain in situations where pain is induced knowingly, as in the case of mutilations, or occurs unpredictably, as in the case of lameness in cattle. Systemic or local pharmacological treatments can be applied to soothe pain. These treatments take into account the duration of the pain which, in the case of some mutilations or certain afflictions may persist after the procedure. The administration of these treatments often requires a veterinarian, which involves an additional cost for the producer. Nevertheless, there are some exemptions for some procedures like castration of farm animals other than equids which can be performed by producers, This opens up the possibility of delegating to producers the practice of local anaesthesia, provided it is recognised as being an integral part of the procedure. In Switzerland, for example, animal producers that are trained in the technique by veterinarians may subsequently administer anaesthesia.

Initiatives taken in fields other than animal production may also inspire actions designed to reduce pain in farm animals.

- The French Government has introduced a plan to minimise pain in humans. It highlights three essential issues that are equally applicable to reducing pain in animals:

– implementation of techniques to evaluate and monitor subjects experiencing pain;
– training of staff;
– the need for basic and applied research.

• In Switzerland there is a body that monitors agricultural practices over time. In particular it seeks to characterise animal production systems and their consequences in terms of pain.

• Animal products, in particular from "organic" farming, are now being marketed that emphasise the efforts made by all the operators in the production chain to minimise animal pain. This approach could be an alternative to regulations as a means of bringing about a change in farming practices.

• The fact that at the international level the World Organisation for Animal Health (OIE) takes pain into account with the aim of defining standards shows that animal pain is a concern that is shared worldwide.

This assessment helps to clarify the concepts and analytical methods used to detect pain in farm animals. It also helps to identify current situations where pain occurs and solutions to eliminate or at least alleviate such pain. The findings on this topic are consistent and conclusions can be put forward with some confidence. However, the assessment also reveals areas where further knowledge is required, as highlighted in a special section of the summary of the report, to shed more light on this issue by removing uncertainty and resolving controversies in a field where research remains relatively limited.

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The full report of the multidisciplinary scientific assessment and a 98-page summary of the report (both in French) are available on the INRA Web site:
www.international.inra.fr/the_institute/scientific_expertise/expert_reports

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