Ethical and economical reasons for pain management

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Animals' survival depends on their ability to respond to challenges coming from the environment and other animals. Only with a properly working pain system are animals able to cope with these challenges. So feeling pain is considered essential for survival and has endured natural selection exactly because of that.

Pain is defined as a sensory process that results from real or potential tissue damage and has two main objectives: i) to elicit behaviour changes so as to prevent further damage (e.g. escape) or to promote healing (e.g. through rest); ii) allowing the animal to identify, remember and, if possible, avoid additional contact with the source of the noxious stimulus. Although it has a protective function it is obvious that freedom from pain is an extremely important component of any sentient being's welfare because pain (especially continuous or chronic pain) negatively impacts both physical and mental health. This is easily demonstrated by showing the energy animals will put into ways to evade painful situations. Animals will trade almost anything, such as feed or rest, in order to avoid pain. The avoidance of pain is therefore paramount in the animals' perspective.

The awareness of animal sentience is the basis for the ethical concern about animal production that is growing in modern societies. This worry is now being driven by consumers, animal activists, small animal owners and, because it is a commercial plus, by food companies. Legislation usually follows. Even farmers are increasingly conscious of the consequences of pain and will look suspiciously towards practitioners that do not adopt minimal pain management procedures.

Although many authors state that nociception should not be confused with pain, which is a conscious experience, others say it is the first, basic but inseparable part of the pain mechanism. Knowledge on pain/nociception physiology has suffered a huge development and all its stages – transduction, transmission, perception and modulation – are now much better understood. It is important to recall the main features of pain physiology to better understand its effects and the ways to manage it.

When a noxious stimuli is induced it causes a "first pain", also termed "physiologic pain", that serves a protective biological function by acting as a warning of on–going (or potential) tissue damage. This is an almost instant transmitted sensation that travels through thinly myelinated A fibres. It instigates defensive activity, like the "withdrawal reflex" or the "fight or flight behaviour". However, it should be mentioned that even short but repeated bursts of acute pain can induce long-term neuronal sensitisation.

The "second pain" or "deep pain", resulting from C fibres activation (thin, unmyelinated and slow conducting fibres), is interpreted by the SNC as a dull, diffuse, aching or throbbing sensation and is sometimes called clinic, maladaptive or pathologic pain. It causes discomfort and may have the role of prompting the animal to rest and so recover from injury.

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After tissue is damaged (trauma, surgery, stretching, infection etc…) there is usually an inflammatory reaction. Vascular components, fibroblastic and tissue cell components are activated: blood vessels carry circulating precursors that are released into the area of injury and are activated by enzymes; mast cells release histamines and other substances; macrophages activate fibroblasts, which in turn release interleukin and Tumor Necrosis Factor (TNF); cycoloxygenase activates prostaglandin and leukotrienes etc. Additional nociceptors termed “Silent fibres” are stimulated and C-fibres triggering threshold is reduced at the site of injury and in adjacent tissues, when exposed to the products of tissue damage and inflammation, referred to collectively as the “inflammatory soup”. Continuous stimulation of peripheral nociceptors also results in a use-dependent neuronal plasticity in the spinal cord that modifies the subsequent performance of the nociceptive pathway by exaggerating or prolonging the response to noxious inputs (hyperalgesia) or enabling normally innocuous inputs to activate it (allodynia).

Chronic pain is a fundamental issue in farm animal welfare because it can be prevalent, intense, resilient and prolonged (e.g. lameness in dairy cows) and its management is usually complex, costly and frustrating. Because of the long lasting negative effects it is called non-protective pain and is an important predisposing factor for disease and low performance.

It should be added that it is now consensual that most pain mechanisms do not differ significantly between species, including humans. The “Analogy Principle” holds that the similarity in anatomy (pain system), physiology (pain perception), and behaviour (expression of pain) between humans and higher animals makes it reasonable to assume that the sensation and effects of pain are analogous in both (Federation of Veterinarians of Europe – FVE, 2001). Although it is indisputable that there are differences in the brain structure and function (for example, neocortex size) between different species, this seems to be irrelevant to the existence of perceptual consciousness. Although excessive anthropomorphic associations are to be avoided – ‘we must avoid the anthropomorphic projection of our own conception of suffering onto other species”[1] – empathy is surely an important factor when attributing pain to other animals.

Concurrently with physiology advances, pharmacological research has also revealed where and how to act to reduce pain transmission and perception. New drugs have shown to be very effective in preventing and treating most types of pain, although some are still far away from the field vet medical arsenal. We will discuss below the reasons for this.

Behavioural and physiologic studies have allowed us to identify painful procedures and even grade them, meaning that we can now opt for those that are more acceptable, and scientifically justify the decision. Very importantly we are now aware of the difference between “pain detection threshold” and “pain tolerance threshold”. Contrary to traditional thinking, there are no animals “immune” to pain but merely animals more “resilient” to pain. It is nowadays clear (or it should be clear) for scientists, vets and farmers that not recognizing signs in ruminants does not mean that pain is not present.

However, it should be said that science is showing signs of being more or less reluctant to advance further in the area of pain perception and emotions in animals. As Donald Broom states in his book[2]: “the reluctance of scientists to attribute complex abilities and feelings to non-humans has slowed the development of our knowledge of sophisticated brain function in non-humans”.

Fortunately science is also proving that there are many other reasons to pursue animal pain alleviation. And some very important are the economical reasons that will be discussed further during the talk. By controlling pain, feed intake is maintained, most physiologic processes continue unaffected and recovery time after a lesion or disease is usually decreased. In contrast, as has been said, there is sufficient evidence that chronic pain is associated with sub-optimal performance, higher susceptibility to infectious disease, low product quality, reduced fertility, behavioural alterations, including increased aggressiveness, isolation, fear…

The evidence of the effect of pain on ruminants' performance is huge. For example, lame cows showed reduced ovarian activity, reduced progesterone levels, less oestrus behaviour and reduced response to hormonal treatments.[3] Another study correlating signs of lameness and milk somatic cell count showed that these increase up to four months before clinical signs of lameness are evident and continue to be higher than average up to seven months after hoof trimming. It is also well known that catecholamines and endogenous opioids reduce oxytocin production during lactation and may negatively influence milk ejection and yield.[4]

In the same way, more and more studies are linking pain control with increased profitability. For example, we showed that by using an analgesic (carprofen) after calving the welfare of dairy cows was enhanced, but also feed intake started sooner and milk yield was higher in the case of first lactation animals.[5] Another study showed that by giving carprofen to cows after hoof trimming to treat uncomplicated sole ulcer, milk yield increased by 10% in the subsequent 3 days, compared with those that did not get the analgesic that showed a 14% reduction in milk yield during the same period (G. Stilwell, unpublished). Also, 5-6 month old calves castrated by Burdizzo method under anaesthesia and analgesia (carprofen) were the first to reach the food trough when feed was distributed.[6] Many other studies have shown increase daily weight gain when calves are castrated under anaesthesia/analgesia or are castrated at a younger age.[7]

Finally another often overlooked advantage of adequate pain management is professional satisfaction. People that are asked to performed procedures which they think are being painful to animals, will usually be less caring and responsible stockpersons.

So it is evident that there are benefits which ensue from the prevention of suffering in farm animals. This is especially true for pathologic pain that lead to anorexia, chronic stress, immunodepression, frustration and hopelessness. In view of all of this it is then surprising why, in contrast with advances in human and small animal medicine, food animals' veterinarians and farmers have been slow in responding to the almost universal demand for animal pain management. Cost, lack of license for analgesic products, deficient knowledge as to their efficacy, food safety related to withdrawal periods for drug residues and lack of training, are probably some of the issues behind this delay. However, veterinarians are advised to rapidly seek for new and effective tools to address this issue as there are enough signs showing that consumers, repelled by the idea of animals suffering, will promptly move to alternatives to animal products.

We suggest that another important reason for not using adequate analgesia in ruminants is that humans are not able to identify pain or its signs are suppressed/hidden by the animals. So one of the first actions should be to develop an objective, reliable scoring tool that can be effectively used to recognise and assess pain severity in ruminants. Unambiguous pain assessment methods have to be established to optimise the training of veterinary students, animal science students, farmers and other stakeholders so as to better recognise, quantify and understand the meaning of pain signs. By identifying

correctly and promptly both behavioural and physiological indicators of pain/discomfort caused by disease, a better understanding into the relationship between pain, incidence of diseases and animal welfare will been gained. Ruminants, and especially sheep, are stoical species, and for this reason pain associated with disease is often overlooked, resulting in very poor animal welfare and frustrating clinical results. For example the AWIN project developed a face expression scale for sheep that proved to be very effective in detecting animals with acute and painful cases of foot rot.

Vets are also asked to learn and use the best pharmacological strategy available, taking into account the limitations already mentioned. This strategy should compromise, when possible: i) preemptive analgesia by initiating an analgesic regimen before the onset of the noxious stimulus to prevent central sensitization and limit the subsequent pain experience; ii) and multimodal analgesia, when a combination of analgesic drugs that act at different sites within the central and peripheral nervous systems are administered in an effort to reduce individual dosages, capture synergies and minimize side effects from each drug.[8]

On the other hand analgesic protocols should be practical in terms of frequency and route of administration, and be financially realistic.

Finally a word on the approval processes for use of an analgesic drug – many are not yet approved because approval requires evidence that the drug does indeed relieve pain. This involves two difficulties – it is not easy to measure pain in ruminants and residue testing is expensive and so not in the interest of drug companies. It is expensive to evaluate withdrawal intervals, safe levels etc… and this increases the marketing cost of the drug. And if drugs are expensive practitioners/farmers will simply not use them! More cost-effective analgesics, with shorter withdrawal periods, should be developed or made available for use in farm animals in order to improve the feasibility of multimodal analgesia for veterinarians, and licenses should be granted more readily for the use of longer-acting analgesic drugs in young animals that are not going to be part of the human food supply until they are much older. This problem could be partially solved by increasing the market price of animal derived products. This would allow consumers to be more coherent with their demands by paying more to guarantee both welfare and food safety.

In conclusion it should be made clear that there is enough evidence that routine procedures, like disbudding and castration, cause acute and chronic pain. It is also well established that there are methods to reduce suffering in animals subjected to these procedures although legal constrains, cost and availability of drugs may reduce the ability to intervene. Farmers and stockpersons, if shown how, are willing to adopt most pain control measures and not willing to do this may affect consumers perception and acceptance of animal production.

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