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Robyn is a Registered Veterinary Nurse who qualified with a degree from Myerscough School of Veterinary Nursing in 2016 and is due to start her RCVS Diploma in Advanced Veterinary Nursing in 2018. Robyn has worked on a volunteer basis with animals since she was four and her passion for this profession has only grown since then. She spent years of her life at the Horse and Pony Protection Association (HAPPA) and later at a local rescue and rehabilitation yard. Here she met a veterinary surgeon who inspired her, and she went for her first work experience in 2008 at the busy mixed practice where this vet worked. Since graduation Robyn has developed particular interests in the areas of wound management, wildlife and rabbit medicine and clinical care. She has also travelled to Thailand to volunteer her knowledge and skills working with elephants, horses, goats, pigs, water buffalo, cats and dogs.

Rabbits have been a particular interest of Robyn as she found herself rooting for the underdogs of practice. She saw a lack of knowledge of how to manage geriatric rabbits and rabbit chronic pain and knew she wanted to make a positive impact.

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# Management of chronic pain in rabbits: Don't pull your 'hare' out!

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**ABSTRACT:** Rabbits may be the third most popular pet; however, 35% of rabbit owners are not registered with a veterinary practice. This means that recognition of chronic pain disorders in these patients is particularly challenging. Musculoskeletal disorders such as osteoarthritis and lumbar spondylosis are common problems seen in rabbits. When it comes to management or palliative care for chronic cases there is so much Veterinary Surgeons and Registered Veterinary Nurses can do to improve the welfare of rabbits suffering from chronic pain conditions. This article aims to address a few of these points.

**Keywords:** Rabbit; chronic pain; rabbit osteoarthritis

## Introduction

Gone are the days that we think it is acceptable to pull rabbits out of magician's hats and rabbit welfare and ownership has seen many improvements. Rabbits may be the third most popular pet, but the People's Dispensary for Sick Animals (PDSA) has reported that compared to dogs and cats, rabbits still fare least well with regard to veterinary care, with 35% of rabbit owners not being registered with a veterinary practice (Thomson, 2016). This means that recognition of chronic pain disorders in these patients is particularly challenging.

Musculoskeletal disorders such as osteoarthritis (OA) and lumbar spondylosis are common problems seen in rabbits (Longley, 2008). When it comes to management or palliative care for chronic cases there is so much Veterinary Surgeons (VSs) and Registered Veterinary Nurses (RVNs) can do to improve welfare. With a mix of enthusiastic, knowledgeable owners and VSs and RVNs who aim to increase their awareness of rabbit medicine and behaviour we have the chance to improve a rabbit's quality of life.

To be able to alleviate chronic pain associated with musculoskeletal disorders, one must first be able to recognise it. Chronic pain such as OA can manifest in many ways, for example, reluctance to move, lack of grooming, change in gait,

stiffness and change in behaviour. These changes can be exceptionally subtle and it takes a dedicated, observant owner and an in-depth questioning/history from the VS or RVN to discover these painful disorders. Different species may have different behavioural responses to noxious stimuli (Hawkins, 2006). As prey species, rabbits tend to mask symptoms of disease or weakness, especially in an unusual environment or in the presence of an observer. Although we now have a way of assessing acute pain in rabbits, the Rabbit Grimace Scale by Newcastle University (Figure 1), there is far less chance to observe and assess chronic pain. Unless an observant owner mentioned a change in behaviour/gait, the VS or RVN may often not pick up the underlying pain within the time constraints of a consultation. With no apparent pain-related behaviour during a routine examination for a health check or vaccination, recognition of clinical signs is therefore difficult (Mancinelli, 2015a). It is necessary to question the owner about changes in the rabbit's behaviour or locomotion that could lead to a clinical finding. Observation of a rabbit's gait can be very informative; however, as mentioned, it can be challenging. It is worthwhile letting a rabbit move around the consulting room prior to performing a clinical examination. Owners are often unaware that their pet rabbit has difficulty moving for a number of reasons; they may not be familiar



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# The Rabbit Grimace Scale

Research has demonstrated that changes in facial expression provide a means of assessing pain in rabbits.

The specific facial action units shown below comprise the Rabbit Grimace Scale. These action units increase in intensity in response to post-procedural pain and can form part of a clinical assessment alongside other validated indices of pain.

The action units should only be used in awake animals. Each animal should be observed for a short period of time to avoid scoring brief changes in facial expression that are unrelated to the animal's welfare.

|   | Action units    |                        |                       |
|---|-----------------|------------------------|-----------------------|
|   | Not present "0" | Moderately present "1" | Obviously present "2" |
| <b>Orbital tightening</b> <ul style="list-style-type: none"> <li>Closing of the eyelid (narrowing of orbital area)</li> <li>A wrinkle may be visible around the eye</li> </ul>  |                 |                        |                       |
| <b>Cheek flattening</b> <ul style="list-style-type: none"> <li>Flattening of the cheeks. When 'obviously present', cheeks have a sunken look.</li> <li>The face becomes more angular and less rounded</li> </ul>  |                 |                        |                       |
| <b>Nostril shape</b> <ul style="list-style-type: none"> <li>Nostrils (nares) are drawn vertically forming a 'V' rather than 'U' shape</li> <li>Nose tip is moved down towards the chin</li> </ul>   |                 |                        |                       |
| <b>Whisker shape and position</b> <ul style="list-style-type: none"> <li>Whiskers are pushed away from the face to 'stand on end'</li> <li>Whiskers stiffen and lose their natural, downward curve</li> <li>Whiskers increasingly point in the same direction. When 'obviously present', whiskers move downwards</li> </ul> |                 |                        |                       |
| <b>Ear shape and position</b> <ul style="list-style-type: none"> <li>Ears become more tightly folded / curled (more cylindrical) in shape</li> <li>Ears rotate from facing towards the source of sound to facing towards the hindquarters</li> <li>Ears may be held closer to the back or sides of the body</li> </ul>      |                 |                        |                       |

Read the original paper: Keating SCJ, Thomas AA, Flecknell PA, Leach MC (2012) Evaluation of EMLA cream for preventing pain during tattooing of rabbits: Changes in physiological, behavioural and facial expression responses. PLOS ONE 7(6): e44437. doi:10.1371/journal.pone.0044437

For guidance on using the Rabbit Grimace Scale, additional images of each action unit, research papers that underpin this technique, and for grimace scales in other species, visit: [www.nc3rs.org.uk/grimacescales](http://www.nc3rs.org.uk/grimacescales)

To request copies of this poster, please email: [enquiries@nc3rs.org.uk](mailto:enquiries@nc3rs.org.uk)

The NC3Rs provides a range of 3Rs resources at [www.nc3rs.org.uk/resources](http://www.nc3rs.org.uk/resources)

Images kindly provided by Dr Matthew Leach, Newcastle University and Dr Patricia Hedengvist, Swedish University of Agricultural Sciences

The Rabbit Grimace Scale would not have been developed without the continuing work of the Pain and Animal Welfare Sciences Group (PAWS) at Newcastle University

Figure 1. The Rabbit Grimace Scale forms part of the continuing work of the Pain and Animal Welfare Sciences Group (PAWS) at Newcastle University into developing more effective means of assessing pain and welfare in a range of animal species. Although based more on acute pain, familiarising yourself with rabbit pain behaviour can help towards understanding and recognition of chronic pain in rabbits (Leach, 2018).

with normal rabbit locomotion or may not actually see their rabbit mobilising because it spends most of its life confined to inappropriate accommodation. The rabbit can be placed on the floor to observe its gait; however, many rabbits dislike smooth flooring and benefit from a towel placed on the floor for them to hop over (Varga, 2013).

### Indicators of chronic pain

A common sign of arthritic pain or spinal spondylosis is the lack or inability to groom, especially the rear end, although this can also be associated with other issues such as obesity. Benato (2018c) agrees, stating that these rabbits tend to gain weight and groom themselves less often. Myiasis (flystrike) therefore is a great concern and owners should be encouraged to groom and wash their rabbit's rear of all faecal material and use necessary precautions to prevent myiasis (Thompson, 2016). Chronic pain can often see a change in behaviour such as no longer using the litter tray or not moving away from urine and faeces. Urine scalding must also be taken into account and barrier creams applied. If the rabbit was used to a litter tray it may need to be considered that the rabbit can no longer access it due to pain or discomfort, so a larger, wider and lower tray/area should be provided.

Caecotrophs are imperative to a rabbit's nutritional needs; some rabbits, especially those with spinal and/or hip OA or spondylosis, can no longer eat the caecotrophs directly from the rectum. Consequently, owners may start to find caecotrophs in the hutch or around the perineal area. It is important to make sure they are able to eat them; therefore, if the owner is noticing caecotrophs in the living area they could re-offer if the rabbit isn't turning to eat them themselves; if in the perineal area they should be cleaned to avoid myiasis.

### The importance of good husbandry

An assessment of pet rabbit health – “the need to be protected from pain, suffering, injury and disease” – in the PDSA animal Well-being Report (YouGov, 2015) left much room for improvement. Vets and RVNs can advise owners on several areas of welfare. A more appropriate home set up can encourage movement and prevent micro-trauma from falls or slips which, no matter how small, will progress the clinical signs of arthritis (CAM, 2018). Improving husbandry of an older rabbit

presenting signs of musculoskeletal issues, the owner needs to be proactive. Environmental changes are crucial in these cases of chronic pain to prevent slipping and unnecessary discomfort. Flooring should be non-slip and the accommodation needs to be mainly single-storey. Low play boxes can be provided unless the case of chronic pain contraindicates it. The environment should be maintained around 15–21°C (Benato, 2018a). Muscle condition scoring can be helpful in documenting and following disease progression; while there is no formal scale yet, a personal scale and documentation can be extremely beneficial. Exercise is important, not only for musculature but for mental stimulation. Rabbit hutches on sale commercially are frequently too small. It has been shown that rabbits confined in small cages housed on hard flooring have compromised locomotion and the mechanism of weight-bearing can ultimately increase the pressure on the underlying bones of the rabbit's feet, resulting in ischaemia and avascular necrosis (Harcourt-Brown, 2002; Mancinelli, 2015b; Oglesbee, 2006). Conditions commonly associated with this confinement include obesity and spinal pain, which will cause further deterioration in the rabbit's health (Richardson, 2000). Rabbits should be able to lie down, stretch out and stand on their hind legs without their ears touching the top. The hutch area should be long enough for the rabbit to perform three hops from one end to the other. A run area should be large enough for the rabbit to run and access to this area should be provided at all times. This means that a rabbit with chronic pain can find a comfortable position to rest in, and can also be encouraged to move, with exercise encouraged daily (Benato, 2018c). A study conducted by Ma et al. (2018) has concluded that exercise can have a positive effect on OA. Furthermore, providing toys can encourage exercise and the opportunity for digging is an important natural behaviour (Thompson, 2016). It is therefore of great importance to stress the need to provide an area that is modified to promote a range of movements and encourage mobility.

### Medicine

There are many drugs that may help these cases, many prescribed under the cascade; this article will highlight two commonly used drugs.

### Non-steroidal anti-inflammatory drugs

Non-steroidal anti-inflammatory drug (NSAIDs) act both centrally and peripherally to block nociception and decrease inflammation, thereby limiting the information directed to the central nervous system. Their anti-inflammatory, analgesic properties and their side effects are due to the inhibition of cyclooxygenase (COX) enzyme in the arachidonic acid pathway (Hawkins, 2006).

Meloxicam is the most commonly used NSAID in rabbit medicine and there is ongoing research to evaluate its efficacy, analgesic effects, safety and the side effects of meloxicam administered to rabbits at different dosages. Rabbits seem able to metabolise meloxicam faster than dogs, humans and rats. It comes in a honey-flavoured syrup and therefore is very palatable to rabbits, making it a very useful and easy drug for long-term use in chronic pain cases.

Meloxicam appears to be clinically safe in rabbits when used at appropriate dosages. In some cases dosages as high as 1 mg/kg may be necessary to achieve a clinically effective concentration in this species (Mancinelli, 2016). Furthermore doses of 1.5 mg/kg once-daily showed no adverse effects and no drug accumulation (Varga, 2013). Benato (2018b, c) suggested twice-daily use, especially at the beginning of treatment, that can gradually be reduced until the lowest dose is found; some practitioners are commonly using as much as 0.6 mg/kg twice-daily (Varga, 2013).

### Tramadol hydrochloride

Tramadol is a synthetic, centrally acting opioid analgesic that inhibits the reuptake of adrenalin and serotonin. As with many of these drugs, rabbits are a short way behind our canine and feline friends in studies regarding tramadol. In addition to its analgesic properties, for the management of mild to moderate pain in rabbits, tramadol may also have some mild anti-anxiety effects. Forney (2017) has suggested its uses include post-operative pain, fracture care and pain after dental procedures. However, it may be used alongside NSAIDs so its use in chronic pain should be considered (Forney, 2017). Anecdotally, doses of 10 mg/kg orally once- or twice-daily have been suggested for use in rabbits (Duvall, 2017); Benato (2018b) concurs, suggesting 10 mg/kg dose once-daily.

## Additional therapies

Some owners are keen to explore other options for chronic pain management, but it is important to stress to these owners that these are to be used in conjunction with and not instead of medical management. K laser therapy, cold laser therapy and acupuncture, as well as the use of nutraceuticals, are some of the additional therapies that can be used in the role of chronic pain management.

### Laser therapy

K laser and cold laser are gaining popularity. Cantwell (2010) suggests that laser therapy has been shown to have analgesic and anti-inflammatory effects; frequency of treatment depends upon the condition being treated. By using what is known as photobiostimulation, the energy (in the form of photons) from the laser is transmitted to the cells of injured tissue. By increasing cellular activity (photons stimulate mitochondria to accelerate the production of adenosine triphosphate), the energy promotes healing; local blood circulation is also stimulated. This therapy is non-invasive and there are relatively few contraindications (Bradley Bays, 2013).

### Acupuncture

Acupuncture is a modality that can help with many issues in both human and animal medicine. Possible local and systemic mechanisms behind the acupuncture effect are based on the release of several neurotransmitters, changes in cell signalling, modulation of the *N*-methyl-D-aspartate receptors and reduction of hyperalgesia and allodynia in patients suffering from chronic pain. A study in rats has shown that acupuncture reduces metalloproteinases and increases their tissue inhibitors (Silva et al., 2017). Metalloproteinases are described specialised endopeptidases that degrade extracellular protein assemblies which provide cells with much of the structural apparatus; reduction in these suggests a chondroprotective effect (Silva et al., 2017). Benato (2018c) agrees that this can be considered alongside medical treatment; however, these therapies are reported but not commonly used so should be used on a case-by-case basis.

### Nutraceuticals

Nutraceuticals are used by many as an extra therapy for chronic pain in other species; they have little to no side effects and rarely interact with medicine. One study on a rabbit model of OA conducted on oral glucosamine hydrochloride concluded that the data suggested that the protective effects of glucosamine hydrochloride may play a useful role in the clinical treatment of OA (Jeong et al., 2017). Benato (2018c) agrees that glucosamine supplementation may help reduce the strain on the joints and support their function.

## Conclusion

There is so much that can be done to improve the welfare of the nation's pet rabbits. As our nation's pet rabbits grow older, we shall no doubt be seeing more chronic pain issues in practice; we cannot let it go unnoticed and untreated. It is imperative that the veterinary team are on board and eager to learn, to help continue the improvement of the standards of care provided to our rabbit patients. Just because rabbits don't often show overt clinical signs of pain doesn't mean there is no chronic pain present, and a little detective work and time often allows the truth to be found.

## Disclosure statement

No potential conflict of interest was reported by the author(s).

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## Appendix



Above shows “Annie” looked after by Snors Sanctuary. Diagnosed with hip OA she is showing signs in this picture of muscle wastage, grooming issues and significant mobility issues. She suffered from urine scalding, a complication mentioned in the article. This condition required extensive care from the Sanctuary to manage the condition, such as, regular grooming/bathing, application or barrier creams, physiotherapy, medications such as meloxicam and laser therapy Snors (2018).



Exceptional husbandry for rabbits suffering with chronic pain. The above images show well-padded, non-slip flooring to prevent slips and trauma that can exacerbate the conditions. It shows mental stimulation such as low, well-padded boxes, foraging and toys.

Pictures from SNORS (special needs older rabbit sanctuary) SNORS (2018).