

# Pain Recognition in Ferrets



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## KEYWORDS

• Ferret • *Mustela putorius furo* • Pain recognition • Grimace scale • Behavior

## KEY POINTS

- Recognition of pain in ferrets can be challenging.
- Pain assessment requires a combined evaluation of physiologic and behavioral parameters, as most of these on their own are nonspecific.
- Similar to other animals, a grimace scale seems to be a useful tool to recognize pain in ferrets.

## INTRODUCTION

Over the past decades, increasing attention has been paid to animal welfare, which involves the minimizing of suffering, pain, and discomfort. To minimize pain and deliver effective pain management, an understanding of the pathophysiology of pain and knowledge of the pharmacologic and pharmacodynamic effects of analgesics is required. In addition, it is equally important for veterinarians (and caregivers) to have the knowledge and skills to accurately assess whether an animal is suffering from pain or whether the administered analgesia is sufficient to provide effective pain relief. However, the recognition and accurate assessment of the severity of pain can be challenging as animals are unable to verbally communicate, and often tend to hide their pain.<sup>1</sup> Signs may also be subtle, hence being easily overlooked by the inexperienced observer that is not familiar with the normal physiology and behavior of the species involved.<sup>2</sup> Pain assessment in animals heavily relies on the assessment of behavioral, physiologic, and other clinical parameters that serve as indirect indicators of pain, and is therefore subject to some degree of variability among observers. While the basic principles of pain recognition apply to all species, there are also signs that are more species-specific. Hence, a sound understanding of the species-specific behaviors and pain signs is required. This review will focus on pain and pain recognition in ferrets.

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Vet Clin Exot Anim 26 (2023) 229–243  
<https://doi.org/10.1016/j.cvex.2022.07.011>

[vetexotic.theclinics.com](http://vetexotic.theclinics.com)

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### ***Pain in Ferrets – Definition, Causes, and Pathophysiology***

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Like other animals, ferrets can experience pain for numerous reasons, including acute or chronic inflammatory diseases, neoplasia, trauma, surgery, and/or diagnostic procedures. Pain may either originate from the triggering of nociceptive nerve fibers by inflammation, chemical, or physical damage (*nociceptive pain*), or from a lesion or disease within the nervous system itself (*neuropathic pain*).<sup>3,4</sup> Two types of nociceptive pain can be distinguished, that is, *somatic pain*, which results from injuries to musculoskeletal tissues such as the skin, muscles, bones, joints, or connective tissue, and *visceral pain*, which arises from distension or inflammation of internal organs. Somatic pain is often well localized and described as intense, dull, throbbing, or sore, while visceral pain can present as gnawing, squeezing, or cramping, and is usually more diffuse and difficult to localize.<sup>5,6</sup> Visceral pain has also been associated with autonomic changes (eg, nausea, gastrointestinal disturbances, changes in body temperature, blood pressure, and heart rate), and may be referred to other parts of the body due to convergence on pathways within the spinal cord that also convey somatosensory information.<sup>5,7,8</sup> Neuropathic pain in humans can involve burning, shooting, stabbing, or tingling/electric-like sensations that can either be diffuse or follow a specific nerve path.<sup>5</sup> It is important to identify what type of pain is experienced, as effective pain management differs across the various types of pain. For example, non-steroidal anti-inflammatory drugs such as meloxicam are often effective in alleviating somatic pain, whereas neuropathic pain can respond favorably to gabapentin, a gamma-aminobutyric acid (GABA) analog.

Unfortunately, when assessing the patient, difficulties often arise when trying to assess whether the animal is in pain, let alone identify the type of pain involved. Challenges may also arise in relation to the recognition of chronic pain. Acute pain is often readily identified due to its immediate association with surgery, trauma, or disease of sudden onset, such as the pain associated with a trichobezoar or foreign body leading to ileus and distension of the gastrointestinal tract, or pain resulting from a bite sustained by another ferret or trauma resulting in a leg fracture. In contrast, chronic disease conditions such as neoplasia, dental disease, or arthritis, and their associated pain, often generate more subtle signs which are harder to recognize and assess. Moreover, pain can last well beyond the expected healing time for an injured tissue,<sup>9</sup> making it more difficult to identify whether an observed behavior or other sign is indicative of (chronic) pain or not.<sup>10</sup> Nevertheless, if a specific disease condition is identified, based on the analogy principle inferences can be made from knowledge obtained from human patients to help determine whether and to what extent pain is experienced. In addition, it can be taken into account that the various body tissues and organs have different sensitivities to painful stimuli. Examples of tissues that are considered very sensitive to pain include the mucous membranes, cornea, and dental pulp, whereas parenchymatous organs are often found to respond less to pain.<sup>11</sup> These principles and guidelines can help veterinarians to make decisions on whether and from which analgesic regimen and additional recommendations regarding husbandry and/or diet (eg, provision of soft bedding for ferrets suffering from chronic arthritis, or offering soft, liquid foods to animals with periodontal disease) the patient may benefit. Additionally, certain physiologic, biochemical, and behavioral parameters can be assessed, which can provide additional information regarding the need for and efficacy of an analgesic regimen in the individual patient.

### ***Physiologic Parameters***

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One way to assess pain is by the evaluation of physiologic parameters that change in response to a painful stimulus. Nociception leads to the activation of the sympathetic

nervous system, which in turn leads to catecholamine release (epinephrine, norepinephrine) which induces a series of cardiovascular, respiratory, and other physiologic changes as part of the fight-or-flight response. Some typical effects include an increase in body temperature, heart and respiratory rate, blood pressure, peripheral vasoconstriction, sweating, and pupillary dilation.<sup>12</sup> While many of these parameters can be measured in ferrets (**Table 1** for reference ranges), the handling and restraint needed to record them can influence the recorded values. For example, heart/pulse rate, body temperature, and respiratory frequency may easily and quickly rise following agitation (**Fig. 1**). A study evaluating the use of respiratory and heart rate in dogs indicated limited value of these parameters when assessing pain in hospitalized animals.<sup>13</sup> While no studies have been performed to evaluate the value of clinical parameters for pain assessment in ferrets, findings are likely to be similar. Hence, the weight attributed to these clinical parameters remains questionable.

Evaluating blood pressure is generally more difficult to perform in awake ferrets due to their activity level and liveliness. In a study evaluating noninvasive blood pressure measurement in healthy animals, attempts were made to measure blood pressure in conscious animals by scruffing the loose skin on the back of the neck. Using this technique, the authors were unable to obtain reliable measurements, hence rendering sedation with butorphanol and midazolam (0.2 mg/kg IM each) as the sole method to successfully obtain reliable measurements.<sup>14</sup> However, as butorphanol and midazolam can provide some analgesia, and lead to altered mentation, the usefulness of blood pressure measurements in relation to pain assessment remains questionable. In preliminary studies, the authors have attempted to measure blood pressure in conscious ferrets by offering liquid food (Convalescence support, Royal Canin). However, as nearly all ferrets started trembling while eating, collecting measurements were not possible.

Another parameter that has been suggested to be helpful as an indicator of pain in animals is body weight as weight loss may indicate reduced food intake which can result from pain. Similarly, checking the quality and quantity of feces could be helpful to assess digestive function, which could be altered due to pain. However, for all parameters, it should be noted that changes may also result from other pathology and that these are not necessarily caused by pain.<sup>15</sup> In addition, it is important to realize that ferrets display obvious sexual dimorphism (males being twice the size of females) and may undergo seasonal body weight changes, which can include a weight gain of 30% to 40% in autumn and winter.<sup>16</sup>

In human medicine, the value of physiologic parameters has been extensively studied as these may provide helpful clues to identify pain in people that are unable to

**Table 1**  
**Physiologic indicators of discomfort**

Parameter	Reference Value
Respiratory rate <sup>17,18</sup>	33–36/min
Heart rate <sup>16,17</sup>	200–250 bpm
Blood pressure (diastole/systole) <sup>14,16</sup>	51–87/95–155 mm Hg
Temperature <sup>17,18</sup>	37.8–40 °C 98.6–104 °F
Body weight <sup>18</sup>	Female (jill): 600–950 g Male (hob): 1–2 kg
Cortisol <sup>18,19</sup>	6.6 (0.0–101.5) nmol/L



**Fig. 1.** The pulse frequency will increase under influence of pain, but is also influenced by agitation. When the ferret is rested on the lower arm the femoral pulse can easily be counted, minimally influenced by stress.

verbally communicate or self-report their pain, for example, those with severe or profound intellectual disability. Such studies have included more or less invasive technologies, such as electrocardiography (ECG) or photoplethysmography for the measurement of heart rate variability, pulse oximetry to measure changes in respiratory pattern, electromyography (EMG) to measure muscle tension, pupillometry to measure changes in pupillary diameter, skin conductance tests to measure changes in electrodermal activity related to sweating, and electroencephalography (EEG) or neuroimaging techniques (eg, [functional] magnetic resonance imaging, (f)MRI; positron emission tomography, PET) to record brain activity.<sup>20–22</sup> Of these, respiratory pattern analysis, muscle tension, and pupillometry have been shown to reliably indicate the presence of acute pain, whereas (f)MRI can assess changes in the brain as a result of both acute and long-term, chronic pain.<sup>22</sup> Of these, only PET and fMRI have been evaluated for assessing pain in animal models.<sup>23,24</sup> While these studies have shown similar changes in the brain as in humans following chronic pain and pharmacologic intervention, these techniques remain impractical from a clinical perspective because of their invasiveness, limited availability, and associated expenses. Electroencephalography has been more commonly used to study pain in animals. While these studies have mostly involved laboratory (eg, rabbits,<sup>25</sup> rats,<sup>26,27</sup> mice,<sup>28</sup>) and production animals (eg, sheep,<sup>29,30</sup> deer,<sup>31</sup> cattle,<sup>32,33</sup> pigs,<sup>34</sup> poultry<sup>35</sup>), some studies have evaluated its usefulness to assess pain in companion animals (eg, dogs,<sup>36</sup> horses,<sup>37,38</sup>). In ferrets, EEGs have also been performed.<sup>39–41</sup> However, their application is mostly limited to studies on sleep and brain dysfunction, rather than the study of pain. In addition, EEG has its practical limitations as locating pain centers in the brain and separating pain responses from other emotional states such as fear and anxiety may be difficult. Moreover, EEG interpretation may be hindered by movement artifacts.<sup>42</sup>

### **Biochemical Parameters**

Aside from the activation of the sympathetic system, nociception will also lead to the activation of the hypothalamic–pituitary–adrenal axis. Corticotrophin-releasing hormone (CRH) produced by the hypothalamus will stimulate the release of adrenocorticotrophic hormone (ACTH) by the anterior pituitary gland which leads to the production and release of glucocorticosteroids from the adrenal cortex. Of these, cortisol is the

main glucocorticoid hormone in mammals, and its release will lead to a plethora of changes, including increased gluconeogenesis (which can eventually lead to weight loss), and suppression of the immune system (which can increase susceptibility to infections).<sup>9,43</sup> In animal models and patients with conditions associated with chronic pain (eg, fibromyalgia, irritable bowel syndrome, rheumatoid arthritis), marked HPA axis abnormalities have been noted, indicating a relationship between chronic pain and stress.<sup>44–46</sup> In many of these patients, abnormal cortisol levels can be observed.<sup>47–49</sup> As such, assessing the activity of the HPA system can be considered to assess pain or distress and has mostly involved the measurement of cortisol in plasma, saliva, urine, or feces of animals undergoing painful procedures such as abdominal surgery,<sup>50</sup> electroimmobilization,<sup>51</sup> and castration.<sup>52</sup> Sladky and colleagues (2000) evaluated fecal cortisol concentrations in laboratory ferrets ( $n = 12$ ) undergoing ovariectomy and bilateral anal sacculotomy following epidural anesthesia with morphine (0.1 mg/kg) or saline (0.1 mL/ferret).<sup>53</sup> While fecal cortisol concentrations were higher in all animals during the first 24h after surgery, increases were statistically significant only in the ferrets receiving the saline epidural, suggesting that morphine helps to attenuate the physiologic responses to surgically induced pain, and indicating that fecal cortisol can be used to assess pain in ferrets.<sup>53</sup> However, it is important to realize that—similar to physiologic parameters—values may be affected by other events which might not necessarily be associated with pain, such as stress induced by handling and restraint.<sup>54,55</sup> In addition, plasma concentrations, in particular, can periodically fluctuate and depend on circadian rhythms,<sup>56–58</sup> rendering serial measurements before and after treatment a necessity to properly evaluate the changes.<sup>9</sup>

Other biochemical parameters that have been measured in other animal species in relation to pain include plasma (nor)epinephrine, ACTH, glucose, and lactate.<sup>59–62</sup> Plasma epinephrine has been shown to increase rapidly but briefly after painful procedures such as tail docking and castration in lambs, castration in pigs, dehorning in calves, and ovariectomy in dogs.<sup>63–65</sup> Plasma norepinephrine changes were found to show a similar pattern, though increases generally occurred later and lasted longer compared with epinephrine.<sup>63</sup> As such, these hormones may be useful to consider as a parameter to evaluate acute pain, but as these hormone measurements are not routinely conducted in practice, evaluation of pain by the measurement of these hormones is not routinely conducted. Prunier and colleagues (2005) evaluated the effects of painful procedures (eg, castration, tail docking) on cortisol, ACTH, glucose, and lactate in piglets, and found lactate to increase following castration, most likely as a result of (adrenalin-induced) catabolism of muscular glycogen.<sup>59</sup> Alternatively, increased lactate levels may have resulted from the increased muscular activity and anaerobic glycogenolysis associated with defensive movements made on experiencing acute pain.<sup>62</sup> In addition to lactate, glucose and free fatty acids are expected to increase following the release of catecholamines and/or cortisol. In horses and rabbits, glucose values have been found to significantly rise in animals suffering from highly painful, life-threatening diseases such as colic, gastrointestinal ileus, or liver lobe torsion.<sup>66,67</sup> However, in horses with chemically induced synovitis, no significant differences were found in glucose values following treatment with epidural analgesia and/or phenylbutazone, compared with a placebo.<sup>68</sup> Hence, the value of glucose as a sensitive and specific marker for pain remains questionable. Similarly, attempts were made to connect pain related to castration in male pigs with fluctuations in plasma concentrations of various other substances, including tumor necrosis factor- $\alpha$ , interleukin-1  $\beta$ , C-reactive protein, serum amyloid A and haptoglobin, have been unsuccessful.<sup>69</sup>

### ***Behavioral Parameters***

Already in 1985, Morton and Griffiths suggested that changes in behavior patterns could be useful to assess whether an animal is in pain, thereby emphasizing that behavior analysis should constitute a substantial part of pain assessment.<sup>12</sup> Behavior data also avoid the induction of stress or pain that can result from the collection of biochemical or physiologic parameters. However, a solid understanding of the normal behavior of a given species is essential to be able to correctly identify and interpret painful behavior. This is particularly true for the prey species that hide and disguise pain and display a “conservation-withdrawal” reflex rather than a “fight-or-flight” response that is commonly exhibited by the domesticated and predatory species.<sup>2</sup> Despite ferrets being predatory and domesticated species, pain can be seemingly difficult to recognize in this species. Some factors that might explain why ferrets might display less pain behaviors are the innate solitary lifestyle of its ancestor, limiting the need for obvious pain display, and their overall higher tolerance for pain.

Behavioral changes that are commonly observed in animals with pain include:

- Reduced (general) activity, including diminished play behavior and exploration of novel items or new environments.
- Restlessness.
- Changes in temperament, for example, sudden onset of aggression in animals that are otherwise friendly, or apathy/lethargy in animals that are otherwise fierce.
- Isolation and withdrawal behavior, for example, hiding in the back of the cage.
- Altered posture and/or gait, for example, lameness, increased muscle tension/rigidity, or loss of the normal hunched posture of ferrets.
- Lack of or reduced grooming behavior, resulting in a ruffled, unkempt appearance of the hair coat, or excessive biting licking.
- Piloerection, twitching/shivering (despite normal body temperature).
- Hypersensitivity to touch, sound, and/or temperature change.
- Diminished food and water intake.
- Bruxism (teeth grinding).
- Vocalizations differing in pitch and pattern from normal vocalizations.<sup>1,2,12,55,70,71,72</sup>

Many of the aforementioned parameters are nonspecific and may be affected by many other conditions or disorders. Moreover, behaviors may not uniformly manifest across species and can be subtle. For example, a study evaluating behavioral responses to tooth pulp inflammation in ferrets demonstrated ipsilateral tongue protrusions (ie, tongue protrusions aimed toward the affected side) to be the single most significant behavior change indicative of pain, whereas other behaviors, including face-wash strokes, headshakes, fore limb flairs, paw-licks, ear grasps and chin rubs, seemed less specific.<sup>73</sup> These findings emphasize the importance of familiarizing oneself with the normal behavior of the species as well as the individual to obtain proper baseline measurements for comparison.<sup>12,70,74</sup> In addition, sufficient time and close monitoring of the behavior are required to enable the detection of subtle behavior changes. In practice, this task is therefore usually performed by the owner or veterinary technician, who can be instructed to evaluate the animal’s behavior and look for subtle changes therein. These behavior observations should normally take place without disturbing the animal at a time when it is awake and active. In ferrets, this poses an additional challenge as they may spend up to 70% of their time sleeping, with relatively short episodes of activity in between.<sup>40,75</sup>

Specific behaviors that have been reported as indicators of pain in ferrets include general malaise, anorexia/decreased appetite, lethargy, depression, inactivity/immobility, staying rolled up into a ball,<sup>76,77</sup> or reluctance to curl into this sleeping position (which is normal for a ferret).<sup>78,79</sup> Respirations may be more frequent and deeper, and the ferret may show a strained facial expression, squinting (**Fig. 2**), focal muscle fasciculations, or focal muscle bristling of the tail fur (**Fig. 3**).<sup>2,76,77</sup> Rather than walking with a normal, hunched posture, the ferret may have a stiff gait, and walk lame or with its head elevated and extended forward.<sup>76,78,79,80</sup> Additionally, ferrets may show aggression, biting, and/or teeth-bearing when disturbed.<sup>76</sup> Ferrets in pain may also stop grooming, hide themselves, grind their teeth, produce high-pitched vocalizations (eg, screeching, whining, crying), or grunt (particularly when handled).<sup>76,77</sup> However, the value of most of these parameters is primarily based on expert opinion with no studies performed to establish their clinical validity as indicators of pain.

When evaluating pain behavior in an animal it is also important to take into account that different forms of pain might induce different types of pain-related behaviors. For example, excessive biting or licking a particular body area or aversive responses to external palpation will often indicate localized pain in this area. Dental pain will commonly result in teeth grinding and reduced water and food intake, while ferrets with otitis media are more likely to show head shaking, ear scratching, dysphagia, and reluctance to open their mouth. Abdominal or visceral pain, which may result from for example, gastric ulceration, foreign body, trichobezoar, *Helicobacter* gastritis, or epizootic catarrhal enteritis (ED), is more likely to result in a stiff, stilted gait, or walking hunched with an arched back, immobility, reduced appetite or teeth grinding, especially when presented with food.<sup>80</sup>

Postoperative and traumatic pain usually manifests as a reluctance to move and an overall tensed facial expression with dull, half-open, noninquisitive eyes.<sup>79</sup> In addition, shivering or trembling despite normal body temperature may be seen, which disappears following the administration of an appropriate dose of analgesics. Sladky and colleagues (2000) reported specific behavioral changes in female ferrets that underwent ovariectomy and anal sacculotomy and received epidural morphine for postoperative analgesia.<sup>53</sup> Compared with the treatment group, control animals displayed restricted/labored breathing patterns, trembling, and attenuation of movement on rubbing the site of incision over the edge of the nest box when climbing it, suggesting these behaviors to indicate pain. The latter in particular, has been shown to be a robust pain indicator in dogs and cats as well.<sup>81–83</sup> Other behavioral parameters, such as licking the incision site, drowsiness, and depression did not differ between



**Fig. 2.** A 5.5-year-old female, hospitalized in the clinic for acute liver failure. Notice the squinting of the eyes indicating a form of discomfort in this ferret.





**Fig. 3.** This ferret is demonstrating the bristling of the hairs on the tail. This behavior can be seen either during excitement but can also be a sign of pain/discomfort (photo credit: B. van der Laan).

the control and treatment groups, suggesting these are less reliable as indicators for pain.


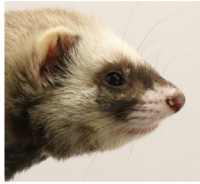


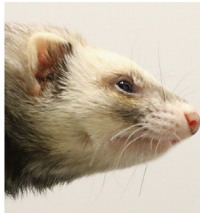




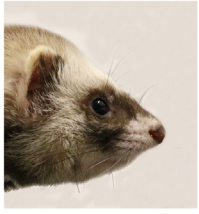

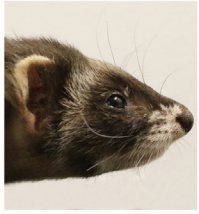

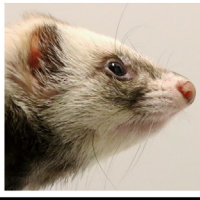

### ***Facial Expressions***

Pain can give rise to changes in facial expression as a result of activation of the sympathetic nervous system, which results in pupillary dilatation and muscle tension leading to ocular squinting, sunken eyes, and flattened ears.<sup>12,70</sup> Such facial changes may help to minimize sensory input,<sup>84</sup> but are also hypothesized to serve a function in soliciting for social support from conspecifics that can potentially help to diminish the experienced discomfort.<sup>85</sup>

Kinematic analysis of facial movements following a short-lasting, painful stimulus (IV catheter placement) using an infrared motion capture system and reflective markers on the eyelids, nostrils, facial crest, and midline, indicated consistent changes in facial expression on the delivery of the painful stimulus.<sup>86</sup> As changes are often subtle, these can be difficult to recognize for the inexperienced observer. Nevertheless, systematic evaluations of specific facial features have been shown effective to allow the recognition of these subtle changes. These features, which include changes in the eyes, cheek, nose, whiskers, and ears, are summarized in a so-called facial grimace scale (FGS). Facial grimace scales have initially been developed for mice,<sup>87</sup> and have since been adjusted and validated in many other species, including rats,<sup>88</sup> rabbits,<sup>89</sup> horses,<sup>90,91</sup> cats,<sup>92</sup> cattle,<sup>93</sup> sheep,<sup>94</sup> pigs,<sup>95</sup> and sheep.<sup>96</sup>

Reijgwart and colleagues, (2017) developed a grimace scale for ferrets.<sup>97</sup> Following a study of the facial musculature of ferrets and comparing lateral photographs of 19 ferret faces at six-time points before and after intraperitoneal telemetry probe implantation, they identified five Action Units (AUs) as potential indicators of pain in ferrets: orbital tightening, nose bulging, cheek bulging, ear changes and whisker retraction (**Fig. 4**). To evaluate whether these AUs could reliably assess pain related to the procedure, photographs taken before and after the procedure were scored 0 (AU not present), 1 (moderately present), or 2 (obviously present) by 11 (experienced and unexperienced) observers that were blinded to the treatment and timing of the photographs. Analysis indicated that AU-scores assigned to photographs taken 5 hours after surgery were significantly higher compared with time-matched baseline scores, suggesting that an FGS can be helpful to recognize pain in ferrets as well. In particular, orbital tightening had a high sensitivity, specificity,



	Not present (0)	Moderately present (1)	Obviously present (2)
<b>Orbital tightening</b> <ul style="list-style-type: none"><li>▪ The eyelids close (orbital area narrows)</li><li>▪ A wrinkle may be visible around the eye</li></ul>			
<b>Nose bulging</b> <ul style="list-style-type: none"><li>▪ The nose is pulled down</li><li>▪ The nose rounds off</li><li>▪ The nostrils point down</li><li>▪ The bridge of the nose bulges</li></ul>			
<b>Cheek bulging</b> <ul style="list-style-type: none"><li>▪ The cheek muscles bulge</li><li>▪ The contour of the cheeks become visible</li><li>▪ the cheek may be pulled up at the side of the ear</li></ul>			
<b>Ear changes</b> <ul style="list-style-type: none"><li>▪ The ears are pulled back against the body</li><li>▪ The ears may form a pointed shape</li><li>▪ The ears may fold over</li></ul>			
<b>Whisker retraction</b> <ul style="list-style-type: none"><li>▪ The whiskers are pulled back against the cheek</li><li>▪ The whisker follicles converge caudally</li><li>▪ The whiskers clump together</li></ul>			

**Fig. 4.** The ferret grimace scale. Photographs visualizing the normal appearance and changes (0 = not present, 1 = moderately present, 2 = obviously present) of the 5 Action Units that are used in the Ferret Grimace Scale. Reprinted with permission.<sup>93</sup>

and accuracy, while other facial features (nose and cheek bulging and ear flattening) had little to no extra value in making this distinction. In fact, whisker retraction was attributed to a negative weight, resulting in lower accuracy, indicating this should be left out of the FGS altogether in its current form. However, as no analgesia was provided, postanesthetic effects on facial expression could not completely be ruled out, warranting further studies to validate the use of this FGS in ferrets. Additionally, the value of frontal images (as used in other species), as opposed to photographs taken laterally, could be compared, although this method was attempted in a pilot study

but had a high failure rate as the ferrets' agility resulted in many poor quality images that were out of focus.

## SUMMARY

Many physiologic, biochemical, and behavioral parameters have been reported as indicators of pain in ferrets and other animals. The scientific evidence validating these parameters is limited and requires further studies into changes in these parameters following induction or alleviation of pain using analgesia. As many parameters are nonspecific, it is generally recommended to assess these parameters in combination, taking into account species-specific behaviors, and type of pain (eg, visceral pain, somatic pain, postoperative pain, inflammatory pain, or pain related to trauma) that may be involved, as their clinical presentation may differ. In addition, establishing a baseline for the individual ferret is important to be able to quickly and reliably detect behavioral or physiologic changes associated with pain. In the assessment of postoperative pain, pain score sheets and grimace scales can be particularly helpful as these allow for objective, standardized and effective evaluation of relevant parameters. In addition, home assessments of the ferret's behavior by the owner can be valuable in detecting signs of chronic pain, whereby the behavior with and without analgesia can be compared. In these situations, a return to normal attentive behavior, curling up under a towel to sleep, and adequate appetite are all suggestive that the analgesia provided to the ferret is adequate.

## DISCLOSURE

The authors have nothing to disclose.

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