41st Annual Frank W. Jordan Seminar

March 3, 2024

KANSAS STATE UNIVERSITY | College of Veterinary Medicine

41ST Frank W. Jordan

2024

Sunday, 3 March 2024 ***8.00 AM - 4:15 PM***

8:00 AM - 8:30 AM	Registration - Bi Atrium	
8:30 AM - 8:35 AM	Welcome	
8:35 AM - 9:25 AM	New Tools for Pain Control in Livestock	Eduarda Bortoluzzi, MV, MS, PhD
9:35 AM - 10:00 AM	Break	
10:00 AM - 10:50 AM	Updates in Equine Pain Management	Rachel Hector, DVM, MS, DACVAA
11:00 AM - 11:50 PM	Updates in Equine Pain Management	Rachel Hector, DVM, MS, DACVAA
12:00 PM - 1:00 PM	Lunch ***(Provided for those who ordered at registration)***	
1:00 PM -1:50 PM	Finding the Pain Expert Inside You	Michael Petty, DVM
2:00 PM - 2:25 PM	Break	
2:25 PM - 3:15 PM	Finding the Pain Expert Inside of You	Michael Petty, DVM
3:25 - 4:15 PM	Pain Management & Sedation of Small Mammals	Gretel Tovar, MVZ, DABVP (Avian)

Conference Contact Information:

Kansas State University College of Veterinary Medicine
Office of Continuing Education and Events
213 Trotter, 1710 Denison
Manhattan, KS 66506
78.532.4528
vmce@vet.k-state.edu

New Tools for Pain Control in Livestock

Eduarda Bortoluzzi
MV, MS, PhD

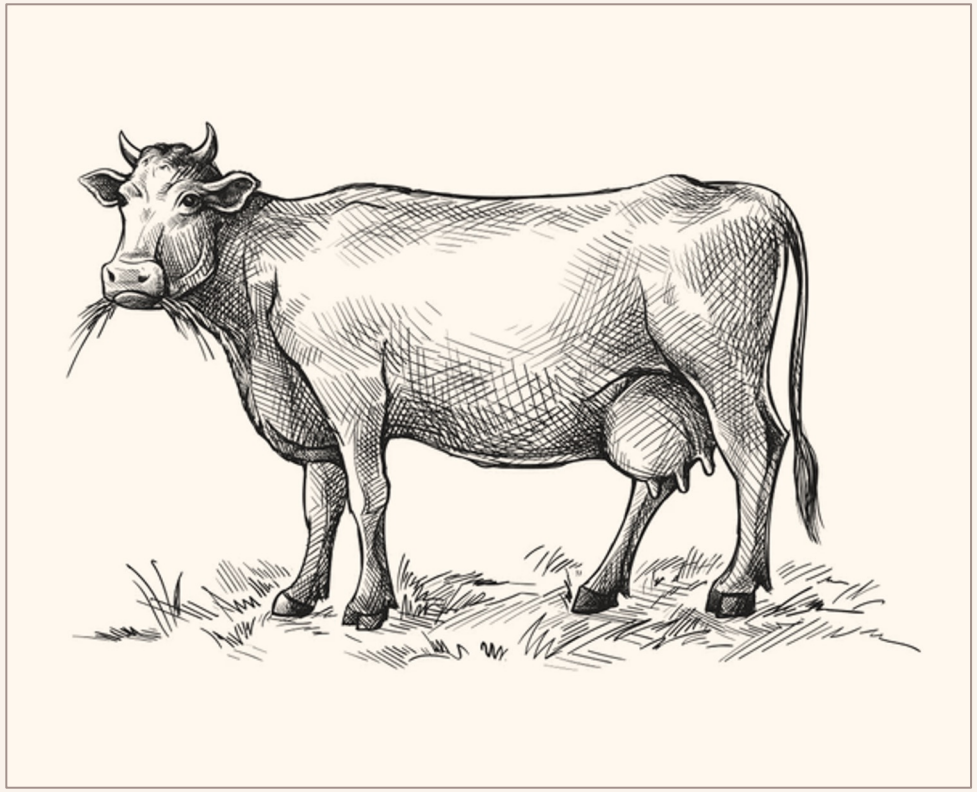
41st Annual Frank W. Jordan Seminar

New Tools for Pain Control in Livestock

Eduarda Bortoluzzi, M.V., M.S., Ph.D.

Pain

‘an unpleasant **sensory and emotional** experience associated with actual or potential tissue damage, or described in terms of such damage’



International Association for the Study of Pain
(1979, p.250)

Efferent Responses

‘Animal pain is an aversive **sensory and emotional** experience representing awareness by the animal of damage or threat to the integrity of its tissues; it changes the animal’s physiology and behaviour to reduce or avoid the damage, to reduce the likelihood of recurrence and to promote recovery’

Molony

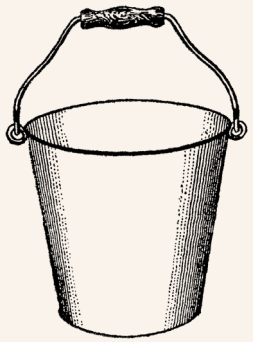
(1997, p.293)

‘Pain itself is a major animal welfare concern’

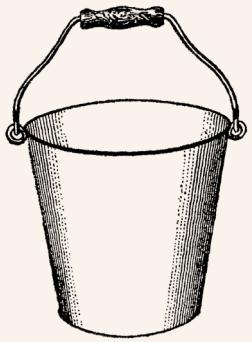
- Incapacitating effect

↓

Impair welfare and compromise survival



Food



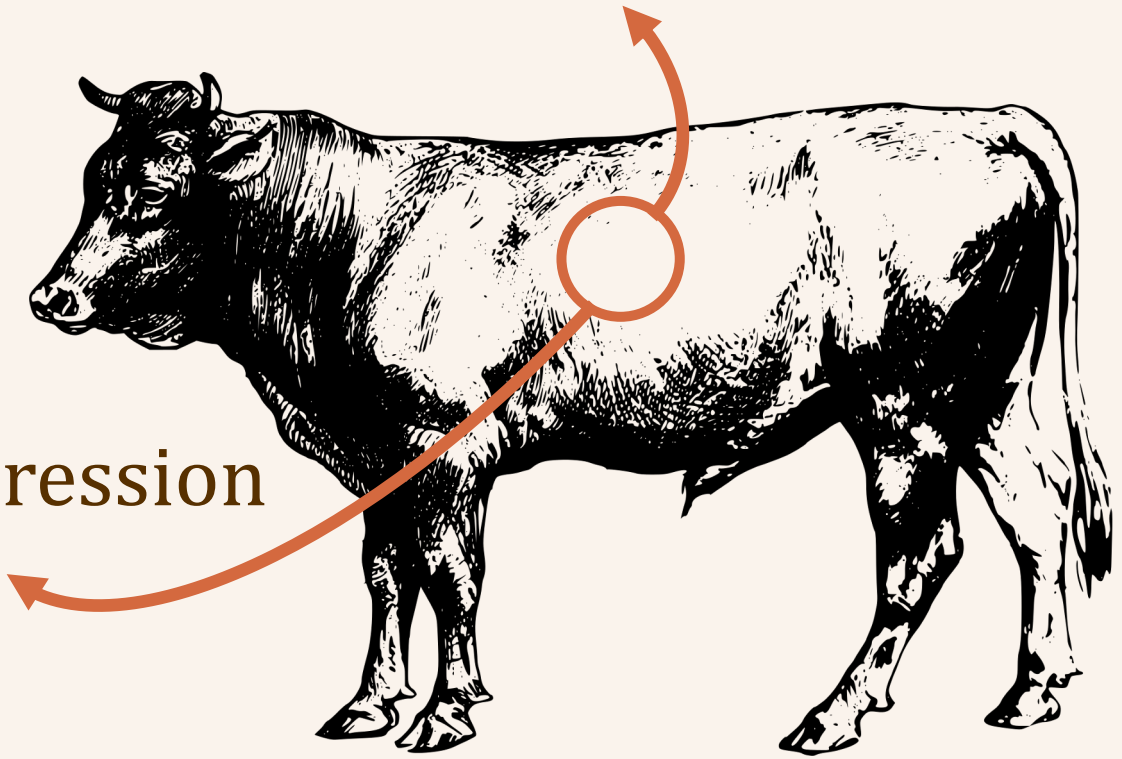
Water

Shelter

Physical Health

Metabolic changes

impair wound healing



immunosuppression

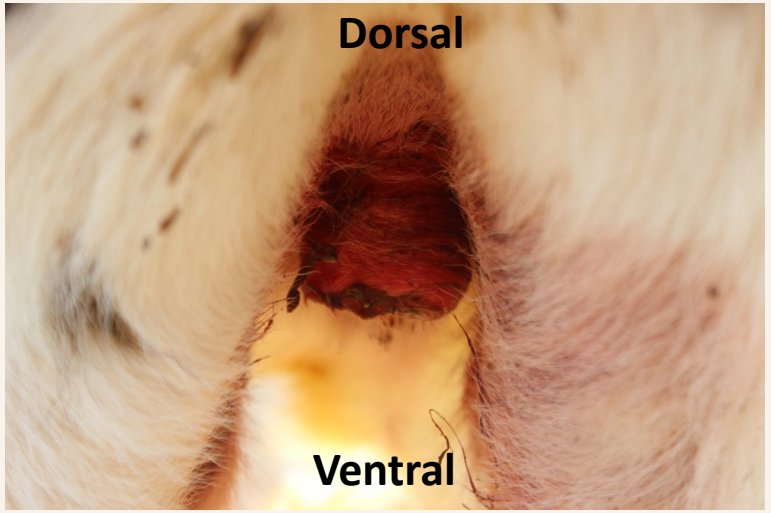
Occurrence of pain in livestock

Management Procedures

Castration

Reduce aggression, prevent mating, improve carcass quality

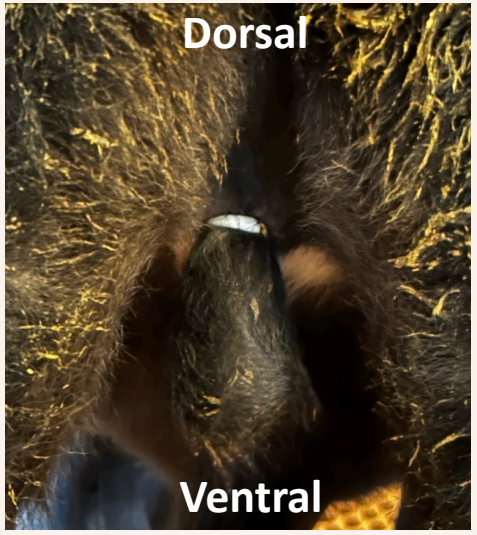
- Surgical
- Burdizzo
- Rubber ring/latex band
- Immunocastration



Dehorning Disbudding

Reduce danger of injury to worker and other animals

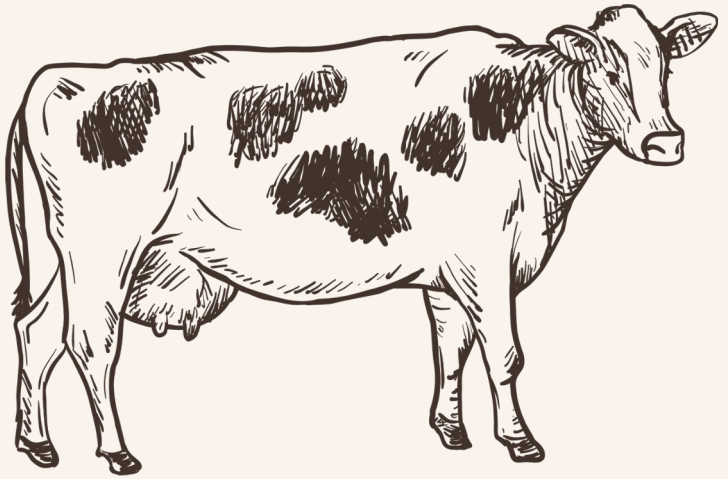
- Caustic paste
- Hot iron



All those procedures cause pain!

Nevertheless, they are often performed without anesthetics or analgesics

‘Procedures that cause pain and distress to animals are likely the most contentious of all animal welfare issues’



Intentionally causing pain to another human is considered repulsive in most societies, and ***causing pain to animals*** *normally generates a similar response.*

Rushen et al.
The Welfare of Cattle
(2008)

‘Pain management in animals remains suboptimal’

- Difficulties associate with pain recognition
- Difficulties associate with pain assessment
- Narrow range of treatment strategies (extra label use)
- Impractical or economically prohibitive

Novel approaches
Kansas State University

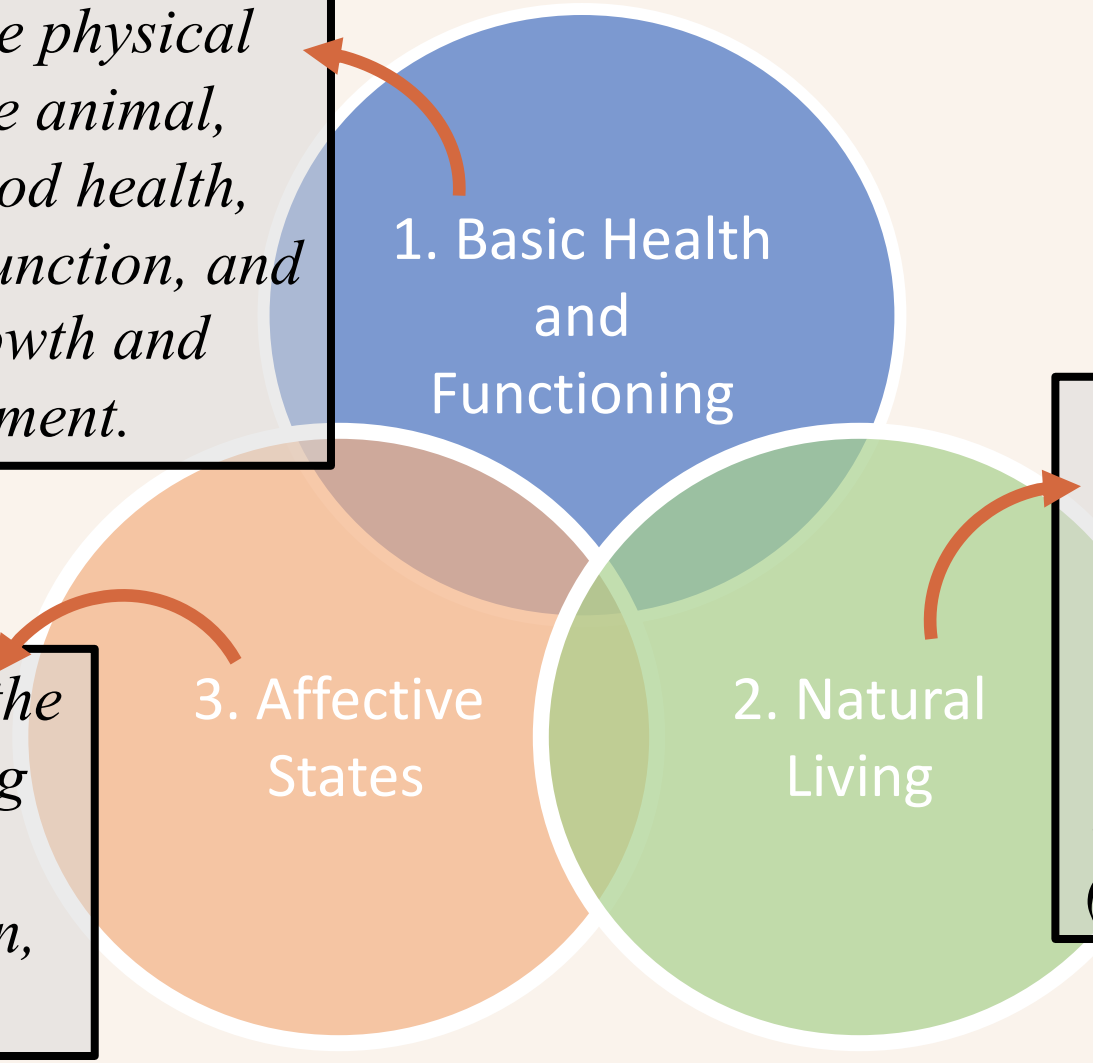
Lidocaine loaded bands
Lidoband™

Maternal Bovine Appeasing Substance (MBAs)
FerAppease

Castration Clamp
ClipFitter

Animal Welfare

Addresses the physical fitness of the animal, including good health, normal body function, and normal growth and development.



"Natural living includes both allowing animals to live in a manner to which they are adapted and to develop in a manner that is normal for the species" (Fraser and Weary, 2004).

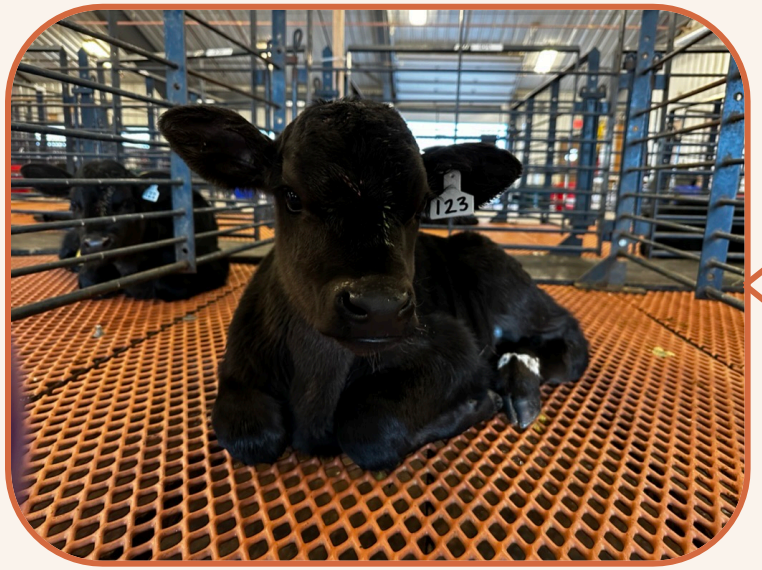
Focus upon whether the animals are suffering from unpleasant feelings, such as pain, fear, or hunger.

Fraser et al.

(1997)

Lidocaine loaded bands

Lidoband™



Lidoband
(n = 13)

Standard
(n = 13)

Follow for 7 weeks

Lidocaine loaded bands

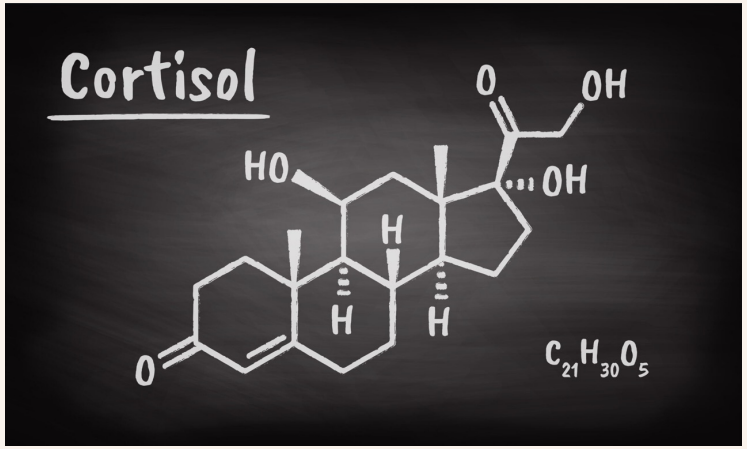
Lidoband™

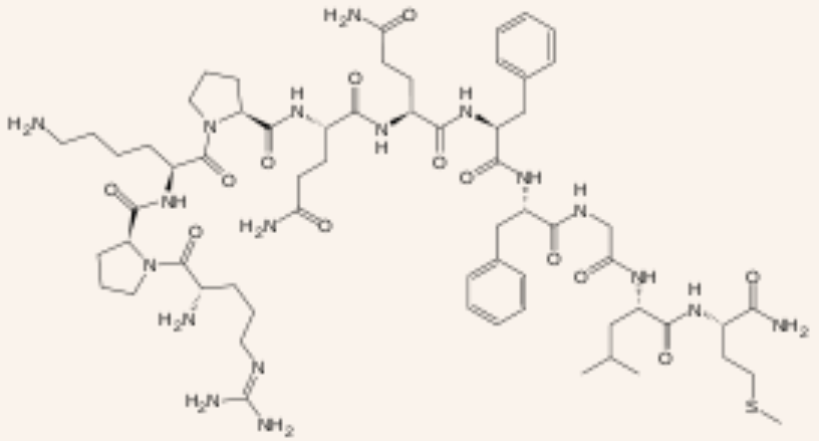
Calf behavior
- stand/lie (accelerometers)
- tail flicking
- foot stamping
- wound licking
- human approach

Lidocaine loaded bands

Lidoband™

Physiological measures
- cortisol
- substance P





Lidocaine loaded bands

Lidoband™

Animal performance
- body weight
- average daily gain
- feed:gain

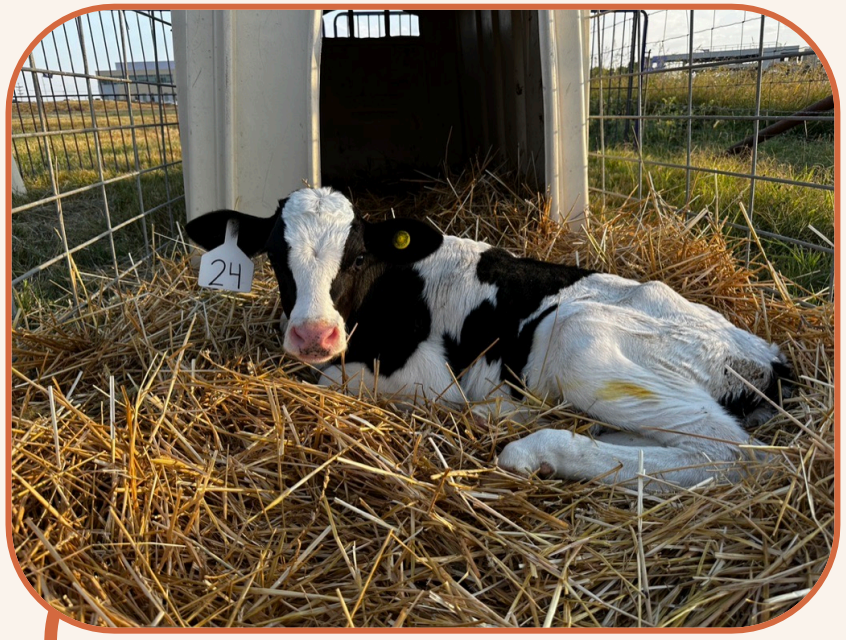
Lidocaine loaded bands

Lidoband™

Health
- morbidity
- wound healing

Maternal Bovine Appeasing Substance

FerAppease



Disbudding
Castration

Group	Lidocaine local block	Oral Meloxican	MBAs FerAppease	n
LID	X			9
MEL	X	X		10
MBAS	X		X	10
COMBO	X	X	X	9
SHAM	No procedures or treatments			6
CONT	Disbud and surgical castration; No treatments			5

Maternal Bovine Appeasing Substance

FerAppease

Calf behavior

- stand/lie (accelerometers)
- tail flicking
- foot stamping
- wound licking
- head scratching
- head shaking

Maternal Bovine Appeasing Substance

FerAppease

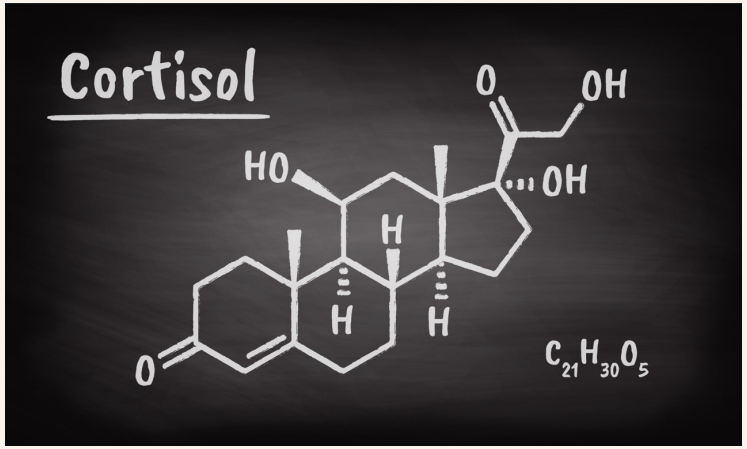
Gait analysis

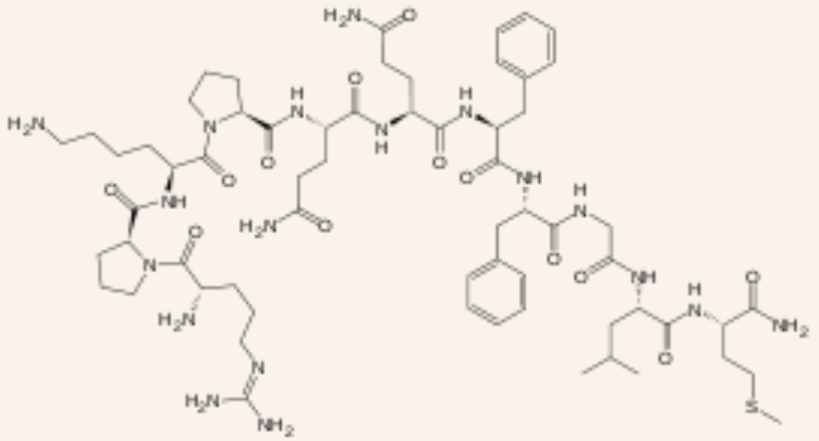
Infrared thermography

Maternal Bovine Appeasing Substance

FerAppease

Physiological measures
- cortisol
- substance P





Maternal Bovine Appeasing Substance

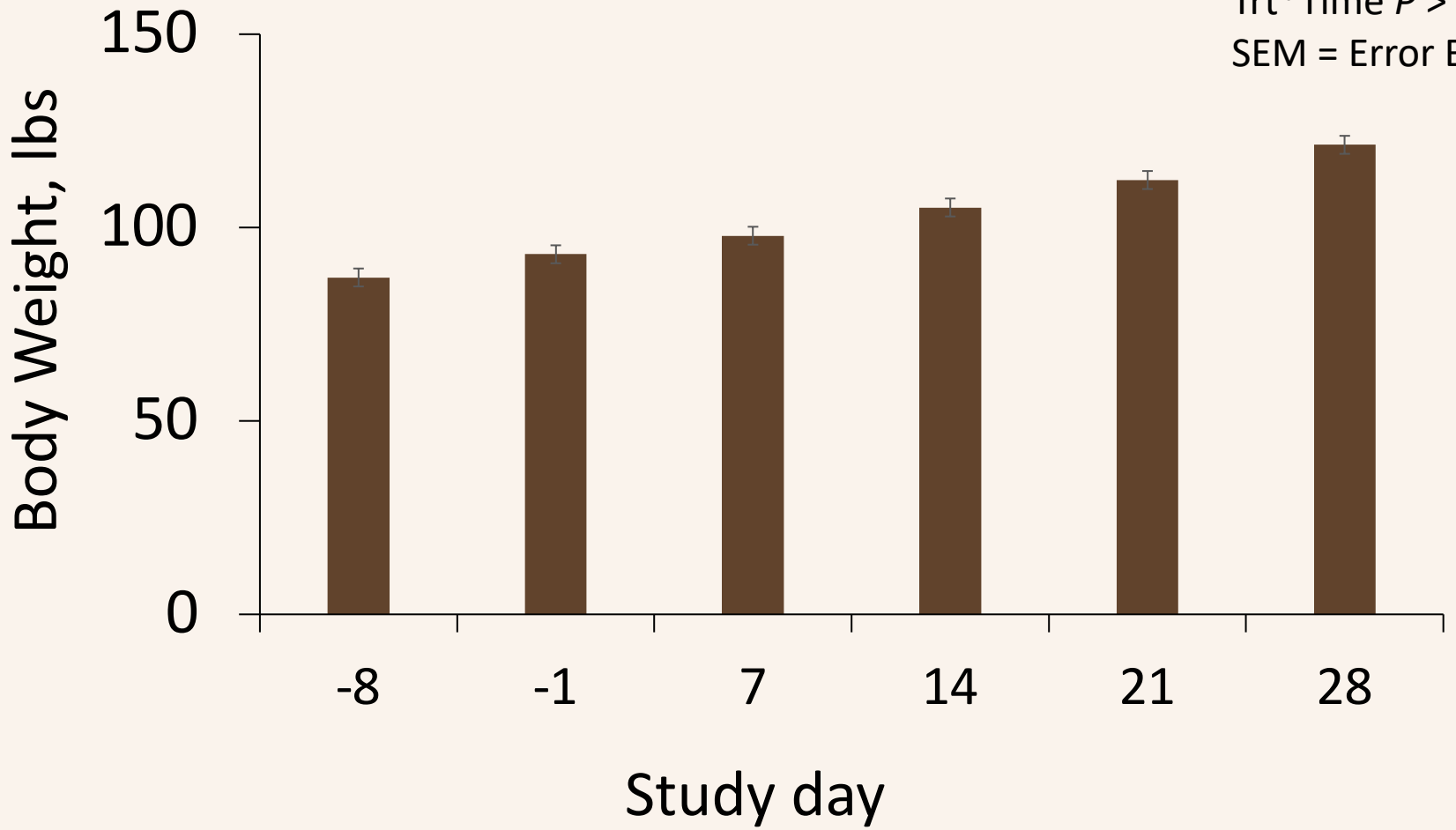
FerAppease

Animal performance
- body weight
- average daily gain
- feed:gain

Maternal Bovine Appeasing Substance

FerAppease

Treatment $P > 0.05$
Time $P < 0.05$
Trt*Time $P > 0.05$
SEM = Error Bars

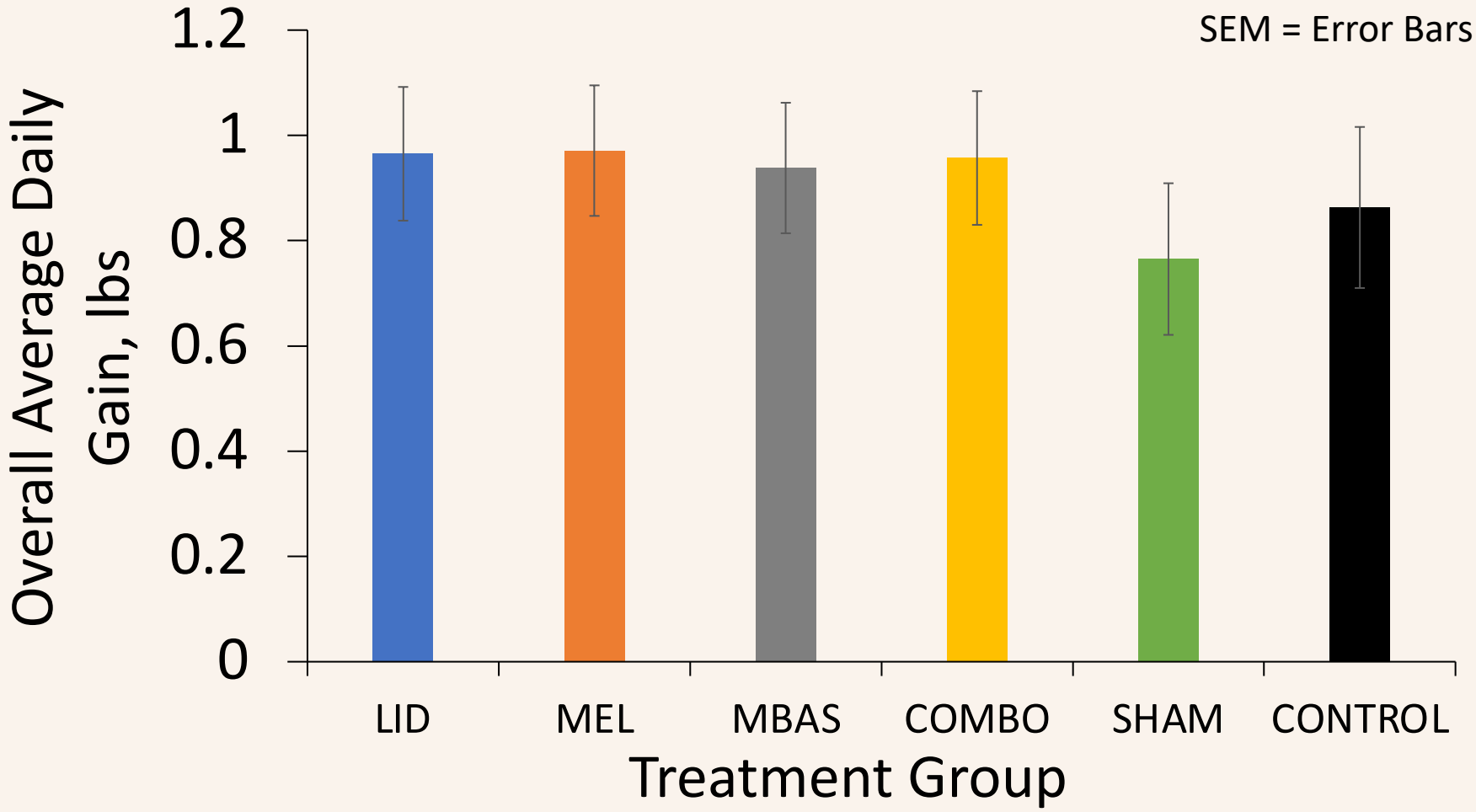


Maternal Bovine Appeasing Substance

FerAppease

P > 0.05

SEM = Error Bars

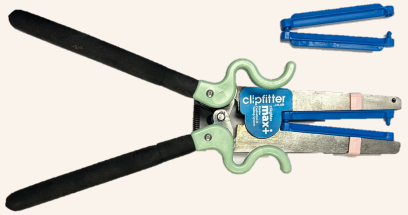


Maternal Bovine Appeasing Substance

FerAppease

Health
- morbidity
- mortality

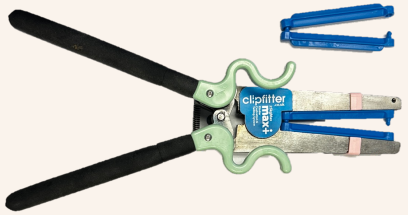
Castration Clamps
ClipFitter



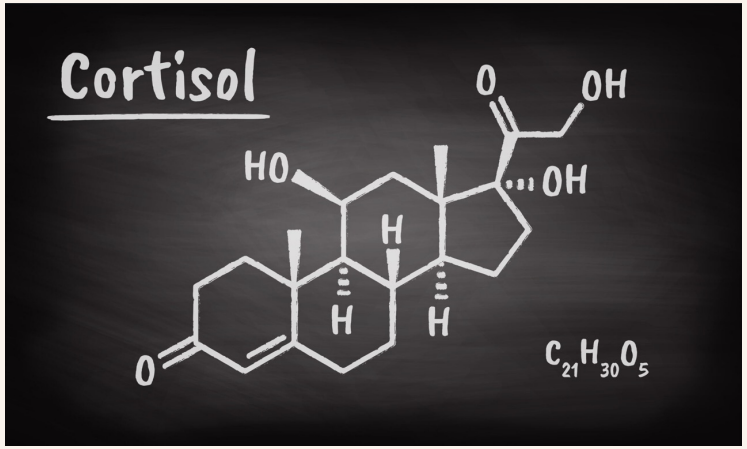
Group	Treatment	n
Clip	ClipFitter	4
Band	Standard Band	4
Sham	No castration procedure	4

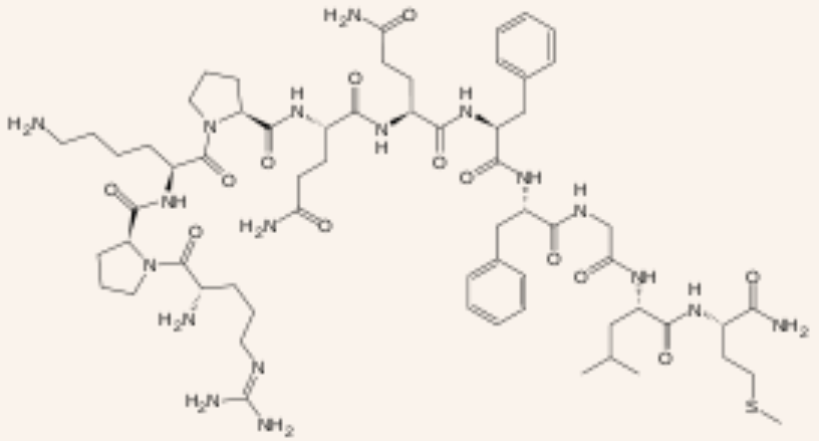
Castration Clamps

ClipFitter



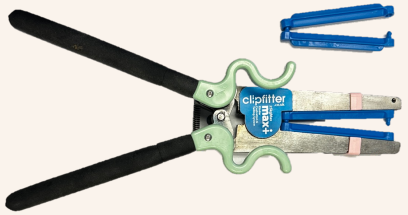
Physiological measures
- cortisol
- substance P





Castration Clamps

ClipFitter



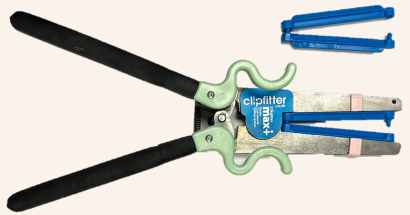
Stand/lie behaviors (accelerometers)

Infrared thermography

- Castration and disbudding are painful management practices that are often done without analgesics or anesthetics

- K-State animal welfare group continues to engage in research to improve overall animal welfare

- Results from studies done with innovative approaches might provide tools for veterinarians and producers to mitigate pain



Questions?

Thank you!

bortoluzzi@vet.k-state.edu

Thank you!

Graduate students
- Madeline Mancke
- Jacob Schumacher

Sponsors
- Solvet
- FERA Diagnostics and Biologicals
- EADIE & Co Ltd

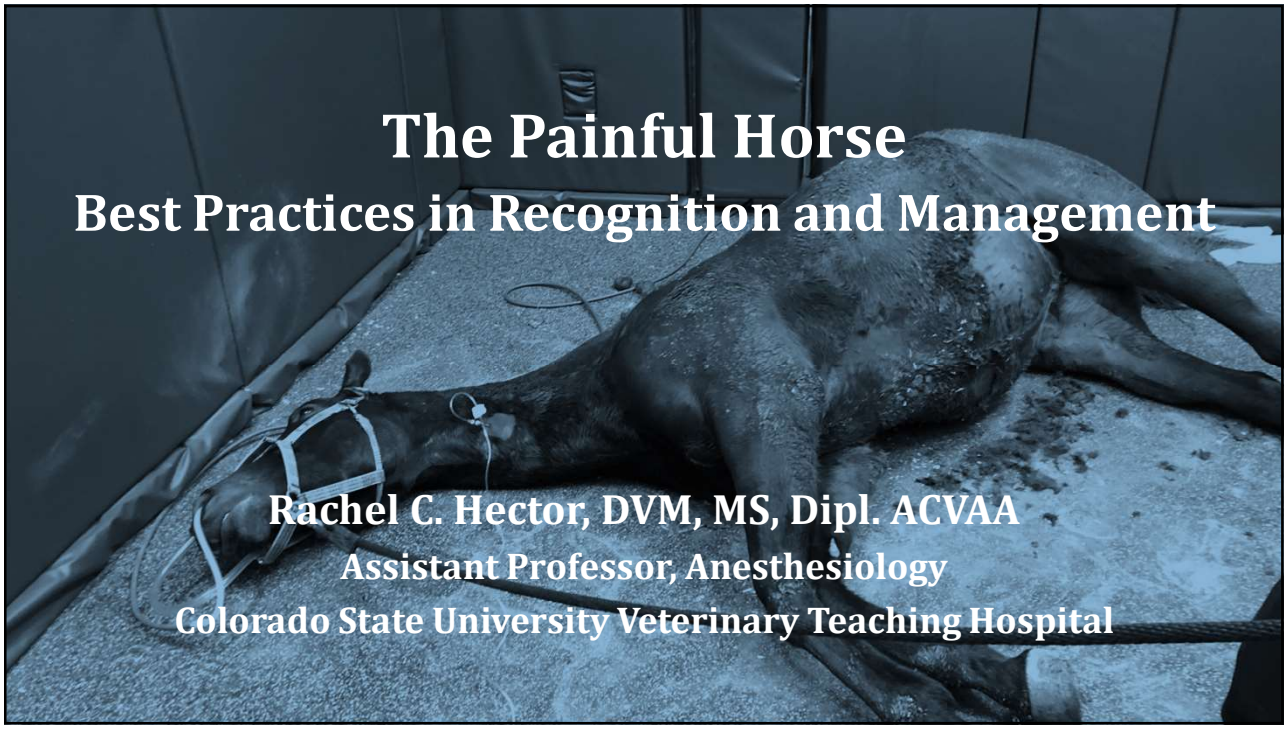
Co-PIs
- Dr. Hans Coetzee
- Dr. Brad White

BCI Faculty

BCI graduate students and undegraduates

Updates in Equine Pain Management

Rachel Hector
DVM, MS, DACVAA



The Painful Horse
Best Practices in Recognition and Management

Rachel C. Hector, DVM, MS, Dipl. ACVAA
Assistant Professor, Anesthesiology
Colorado State University Veterinary Teaching Hospital

1

Horses are consistently considered **non-painful** by owners, riders, and veterinarians – even when experiencing obviously uncomfortable conditions.

2

3

4

animals

MDPI

Commentary

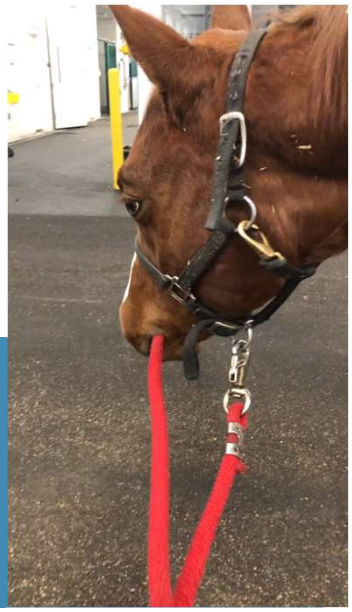
Equine Discomfort Ethogram

Catherine Torcivia [1,*] and Sue McDonnell [2]

[1] Department of Clinical Studies, University of Pennsylvania School of Veterinary Medicine, 382 W Street Road, Kennett Square, PA 19382, USA
[2] Havemeyer Equine Behavior Lab and Clinic, University of Pennsylvania School of Veterinary Medicine, 382 W Street Road, Kennett Square, PA 19382, USA; suemcd@vet.upenn.edu
* Correspondence: torcivia@upenn.edu

Simple Summary: Pain and discomfort behavior in horses tends to be especially subtle, and not readily or widely appreciated even by equine professionals, including many long-time horse keepers, trainers, and even by veterinarians, veterinary technicians, and care staff. Based on decades of evaluating the behavior of normal and physically uncomfortable horses in a referral hospital, as well as research context, we describe and illustrate a catalog of behaviors (ethogram) associated with equine physical discomfort. Our objective is to promote an unambiguous universal understanding of equine discomfort behaviors associated with various body systems and anatomic sources.

5



Fidgeting: biting, mouthing, and/or rubbing against objects (e.g., stall walls, feed/water containers). These responses **often reflect frustration with the inability to find a comfortable posture or relief from prolonged discomfort**.

6

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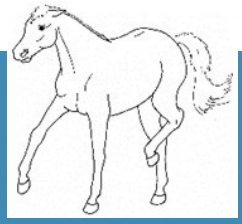
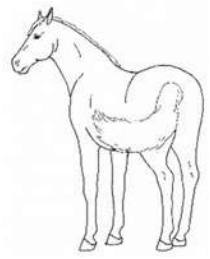
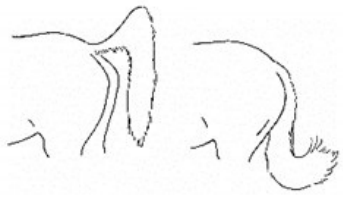


Increased irritability/aggression (biting, kicking, barging) toward people or other animals. Similar to hyperresponsiveness, a horse under increased stress from discomfort may display changes in demeanor that manifest as increased aggression. These horses may be generally sour or **unexpectedly lash out at people or other animals**.

8





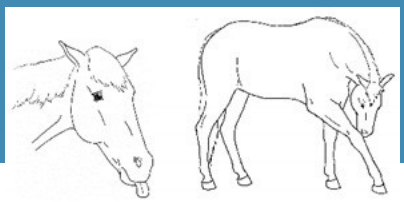
Moving tail suddenly from side to side, similar to that seen in response to cutaneous irritation, e.g., insects.

Sudden lifting and **smacking of the tail** against the perineum.

9

Sympathetic surge resolution signs

Cluster of autonomic responses following an acute sympathetic surge, including salivation (leading to chewing movements, swallowing, tongue extensions) and/or autogrooming (typically rubbing face against forelimb).



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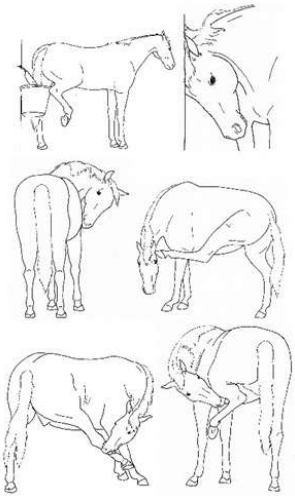

Nibbling, nuzzling, and/or biting at an area of the body, or rubbing one part of the body to another or against an object, similar to that seen in response to cutaneous irritation, e.g., insects.

11

OPEN ACCESS Freely available online

PLOS ONE

Development of the Horse Grimace Scale (HGS) as a Pain Assessment Tool in Horses Undergoing Routine Castration

Emanuela Dalla Costa[1]*, Michela Minero[1], Dirk Lebelt[2], Diana Stucke[2], Elisabetta Canali[1], Matthew C. Leach[3]

1 Università degli Studi di Milano, Dipartimento di Scienze Veterinarie e Sanità Pubblica, Milan, Italy, **2** Pferdeklinik Havelland / Havelland Equine Hospital, Beetzsee-Brielow, Germany, **3** Newcastle University, School of Agriculture, Food & Rural Development, Newcastle upon Tyne, United Kingdom

Abstract

Background: The assessment of pain is critical for the welfare of horses, in particular when pain is induced by common management procedures such as castration. Existing pain assessment methods have several limitations, which reduce the applicability in everyday life. Assessment of facial expression changes, as a novel means of pain scoring, may offer numerous advantages and overcome some of these limitations. The objective of this study was to develop and validate a standardised pain scale based on facial expressions in horses (Horse Grimace Scale [HGS]).

Methodology/Principal Findings: Forty stallions were assigned to one of two treatments and all animals underwent routine surgical castration under general anaesthesia. Group A (n = 19) received a single injection of Flunixin immediately before anaesthesia. Group B (n = 21) received Flunixin immediately before anaesthesia and then again, as an oral administration, six hours after the surgery. In addition, six horses were used as anaesthesia controls (C). These animals underwent non-invasive, indolent procedures, received the same treatment as group A, but did not undergo surgical procedures that could be accompanied with surgical pain. Changes in behaviour, composite pain scale (CPS) scores and horse grimace scale (HGS) scores were assessed before and 8-hours post-procedure. Only horses undergoing castration (Groups A and B) showed significantly greater HGS and CPS scores at 8-hours post compared to pre operatively. Further, maintenance behaviours such as explorative behaviour and alertness were also reduced. No difference was observed between the two analgesic treatment groups.

Conclusions: The Horse Grimace Scale potentially offers an effective and reliable method of assessing pain following routine castration in horses. However, auxiliary studies are required to evaluate different painful conditions and analgesic schedules.

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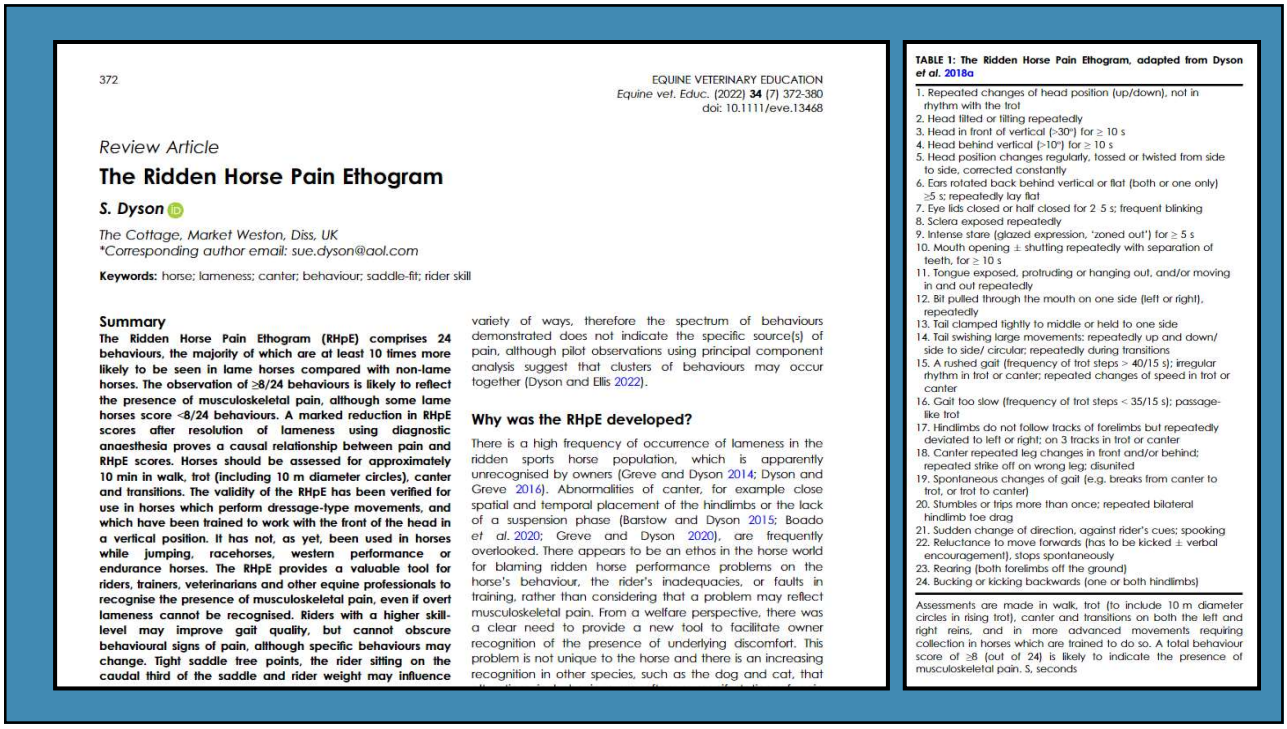


372

EQUINE VETERINARY EDUCATION
Equine vet. Educ. (2022) **34** (7) 372-380
doi: 10.1111/eve.13468

Review Article

The Ridden Horse Pain Ethogram

S. Dyson

The Cottage, Market Weston, Diss, UK
**Corresponding author email: sue.dyson@aol.com*

Keywords: horse; lameness; canter; behaviour; saddle-fit; rider skill

Summary

The Ridden Horse Pain Ethogram (RHpE) comprises 24 behaviours, the majority of which are at least 10 times more likely to be seen in lame horses compared with non-lame horses. The observation of ≥8/24 behaviours is likely to reflect the presence of musculoskeletal pain, although some lame horses score <8/24 behaviours. A marked reduction in RHpE scores after resolution of lameness using diagnostic anaesthesia proves a causal relationship between pain and RHpE scores. Horses should be assessed for approximately 10 min in walk, trot (including 10 m diameter circles), canter and transitions. The validity of the RHpE has been verified for use in horses which perform dressage-type movements, and which have been trained to work with the front of the head in a vertical position. It has not, as yet, been used in horses while jumping, racehorses, western performance or endurance horses. The RHpE provides a valuable tool for riders, trainers, veterinarians and other equine professionals to recognise the presence of musculoskeletal pain, even if overt lameness cannot be recognised. Riders with a higher skill-level may improve gait quality, but cannot obscure behavioural signs of pain, although specific behaviours may change. Tight saddle tree points, the rider sitting on the caudal third of the saddle and rider weight may influence

variety of ways, therefore the spectrum of behaviours demonstrated does not indicate the specific source(s) of pain, although pilot observations using principal component analysis suggest that clusters of behaviours may occur together (Dyson and Ellis 2022).

Why was the RHpE developed?

There is a high frequency of occurrence of lameness in the ridden sports horse population, which is apparently unrecognised by owners (Greve and Dyson 2014; Dyson and Greve 2016). Abnormalities of canter, for example close spatial and temporal placement of the hindlimbs or the lack of a suspension phase (Barstow and Dyson 2015; Boado *et al.* 2020; Greve and Dyson 2020), are frequently overlooked. There appears to be an ethos in the horse world for blaming ridden horse performance problems on the horse's behaviour, the rider's inadequacies, or faults in training, rather than considering that a problem may reflect musculoskeletal pain. From a welfare perspective, there was a clear need to provide a new tool to facilitate owner recognition of the presence of underlying discomfort. This problem is not unique to the horse and there is an increasing recognition in other species, such as the dog and cat, that

TABLE 1: The Ridden Horse Pain Ethogram, adapted from Dyson *et al.* 2018a

1. Repeated changes of head position (up/down), not in rhythm with the trot
2. Head tilted or tilting repeatedly
3. Head in front of vertical (>30°) for ≥ 10 s
4. Head behind vertical (>10°) for ≥ 10 s
5. Head position changes regularly, tossed or twisted from side to side, corrected constantly
6. Ears rotated back behind vertical or flat (both or one only) ≥5 s; repeatedly lay flat
7. Eye lids closed or half closed for ≥ 5 s; frequent blinking
8. Sclera exposed repeatedly
9. Intense stare (glazed expression, 'zoned out') for ≥ 5 s
10. Mouth opening ± shutting repeatedly with separation of teeth, for ≥ 10 s
11. Tongue exposed, protruding or hanging out, and/or moving in and out repeatedly
12. Bit pulled through the mouth on one side (left or right), repeatedly
13. Tail clamped tightly to middle or held to one side
14. Tail swishing large movements: repeatedly up and down/ side to side/ circular; repeatedly during transitions
15. A rushed gait (frequency of trot steps > 40/15 s); irregular rhythm in trot or canter; repeated changes of speed in trot or canter
16. Gait too slow (frequency of trot steps < 35/15 s); passage-like trot
17. Hindlimbs do not follow tracks of forelimbs but repeatedly deviated to left or right; on 3 tracks in trot or canter
18. Canter repeated leg changes in front and/or behind; repeated strike off on wrong leg; disunited
19. Spontaneous changes of gait (e.g. breaks from canter to trot, or trot to canter)
20. Stumbles or trips more than once; repeated bilateral hindlimb toe drag
21. Sudden change of direction, against rider's cues; spooking
22. Reluctance to move forwards (has to be kicked ± verbal encouragement), stops spontaneously
23. Rearing (both forelimbs off the ground)
24. Bucking or kicking backwards (one or both hindlimbs)

Assessments are made in walk, trot (to include 10 m diameter circles in rising trot), canter and transitions on both the left and right reins, and in more advanced movements requiring collection in horses which are trained to do so. A total behaviour score of ≥8 (out of 24) is likely to indicate the presence of musculoskeletal pain. S, seconds

14

animals

MDPI

Article

In-Person Caretaker Visits Disrupt Ongoing Discomfort Behavior in Hospitalized Equine Orthopedic Surgical Patients

Catherine Torcivia [1,*] and Sue McDonnell [2]

1 Department of Clinical Studies, University of Pennsylvania School of Veterinary Medicine, New Bolton Center, 382 W Street Road, Kennett Square, PA 19348, USA

2 Havemeyer Equine Behavior Lab and Clinic, Department of Clinical Studies, University of Pennsylvania School of Veterinary Medicine, New Bolton Center, 382 W Street Road, Kennett Square, PA 19348, USA; suemcd@upenn.edu

* Correspondence: torcivia@upenn.edu

15

"He's fine, he just…"

16

17

5 yr old mustang gelding

Ventral body wall abscess opened and drained under general anesthesia 2 days prior

Current meds:
Phenylbutazone 1 g PO q12 hr
Acetaminophen 30 mg/kg PO q12 hr

Additional treatment:
Epidural morphine/detomidine

18

Options for Acute Pain Control

19

α2 Agonists

Xylazine, dexmedetomidine (short acting)

Detomidine, romifidine (long acting)

- **Excellent visceral analgesics and sedatives**
- **Cardiovascular effects are <u>dose independent</u>**
  - Decreased cardiac output
  - Vasoconstriction
  - Bradycardia
- **Intensity/duration of analgesia improved when combined with opioids**

20

α2 Agonists

Dose determines profundity and duration of effect



For long referral distances, give both IV and IM

21

Opioids

Mu-agonist (pure mu):
- Hydromorphone
- Morphine
- Methadone
- Fentanyl
- Buprenorphine

Kappa-agonist (mu antagonist):
- Butorphanol
- Nalbuphine

Do not be afraid of smart opioid use in horses!

22

Why are we so afraid?

The Fear

Opioids (especially pure mu-agonists) decrease GI motility and therefore horses given opioids will colic…and die.

The Flip Side

- Pain also causes ileus (which can be quite severe).
- Opioids decrease motility especially when used repeatedly, over many days, and at supra-clinical doses.
- α2 agonists decrease GI motility profoundly and for extended time periods (but we use them all the time).

23

Why are we so afraid?

The Fear

Opioids (especially pure mu-agonists) will cause horses to become excited and behave dangerously.

The Flip Side

- Truly painful horses *rarely* display excitatory behavior with opioids.
- Excitatory behavior is uncommon at clinical doses.
- α2 agonists and acepromazine used in combination with opioids decrease the likelihood of excitement.

24

Why are we so afraid?

The Fear

I am uncomfortable giving drugs that I have never given (such as mu opioids).

The Flip Side

Mu agonist opioids offer the most profound analgesia for our patients.

25

What does smart opioid use look like?

- Use in the acute setting rather than long term, high dose/multiple dose
- Use as a part of multi-modal approach
- Use locally rather than systemically where possible

26

27

Butorphanol decoded

Problem	Solution
Kappa agonist opioids have only mild analgesic properties.	Switch to a mu-agonist opioid.
Butorphanol is generally under-dosed.	Effective doses of butorphanol are 0.1-0.2 mg/kg (50-100 mg per horse).
Butorphanol has a short duration of effect.	It can be given as a CRI (0.03-0.1 mg/kg/hr) in hospital or by non-IV routes.
Bioavailability is poor when butorphanol is given IM.	Bioavailability is substantially increased when given subcutaneously.

28

Hydromorphone

- Analgesic for up to 12 hours at 0.04 mg/kg IV dose (20 mg/horse)
  - Range 0.01-0.05 mg/kg
- Excellent option to combine with α2 agonist (e.g., detomidine) for long referral transport

No increased incidence of colic with use in multiple studies!

29

Morphine

- Can be given IV or IM at 0.1-0.3 mg/kg (50-150 mg/horse)
- Shorter acting compared to hydromorphone when given systemically

30

Morphine is excellent given locally

<u>Intra-articular</u> 0.05-0.1 mg/kg = approx. 24 hours analgesia

<u>Epidural</u> 0.1-0.3 mg/kg = approx. 12-24 hours analgesia

31

Fentanyl

- Matrix patches have reliable absorption
- Place 2-3 patches (100 mcg/hr) under the tail base and wrap with Elastikon
- Onset in ~12 hours and duration ~72 hours

32

Buprenorphine

- Longer duration of effect
  - Behavior concerns!
- Adults 0.003 – 0.005 mg/kg IV
- Foals at least 0.01 mg/kg IV
- Likely cost prohibitive

33

Methadone

- Intravenous 0.1-0.2 mg/kg similar duration to morphine
- Epidural 0.1 mg/kg provides at least 6 hours analgesia (likely longer)
- Likely cost prohibitive

34

Ketamine

Well absorbed by almost any route!

For hospitalized patients:

- **Ketamine CRI 0.2-1 mg/kg/hr**
- **Ketamine IM/SC 0.4 mg/kg q4-6 hr**

For long referral transport:

- **Consider 0.25-1 mg/kg IM dose (125-500 mg/horse)**
- **Recumbency is possible!**

35

Lidocaine

- **Easy/cheap addition in hospital**
- **Effective for multiple types of pain**
- **Reduces dose requirement of other drugs**
- **IV bolus 1 mg/kg over 15 mins, then IV CRI 0.025-0.05 mg/kg/min**
- **Recumbency, seizures possible with overdose/inadvertent bolus**

36

37

Duration of commonly used local anesthetics

- Lidocaine 1-2 hours
- Mepivacaine (carbocaine) 2-4 hours
- Bupivacaine 6-8 hours
- Ropivacaine 6-8 hours

Potentiated local anesthetics offer additional hours:

- Add dexmedetomidine 5 mcg/ml

What about liposomal bupivacaine (Nocita®)?:

- As a nerve block, provides ~24 hours duration
- Can be diluted up to 1:4 with saline or bupivacaine to decrease cost
- Possible adverse local reactions?

Local blocks are hugely helpful in acute pain management plan especially <u>when they offer duration</u>

38

8 year old warmblood gelding LF P1 fracture repair

LF low 4 point block:

5 ml 0.75% bupivacaine, 5 mcg/ml dexmedetomidine
5 ml liposomal bupivacaine (Nocita®)

39

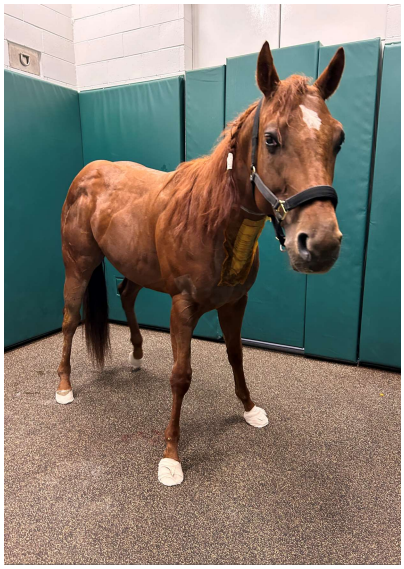
Options for Acute and Subacute Pain Control

40

Acetaminophen

- 30 mg/kg PO q12hr
- Studies demonstrate safety and efficacy for short term use (up to 2-3 weeks)
- If possible: alternate with NSAID so drugs are dosed q6hr in acute phase:

  Bute 12 pm
  Acetaminophen 6 pm
  Bute 12 am
  Acetaminophen 6 am



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Gabapentin

- Poor oral bioavailability in horses means doses need to be high
  - 10-20 mg/kg (or more) PO q8-24 hr
- Side effect profile limited = always worth a try
- Good idea when a procedure has exposed nerves directly (e.g., dental, neurectomy)

42

Pregabalin

- Minimal equine data but seems quite effective clinically
- 4 mg/kg PO q12-24hr
  - 150 mg capsules
- Schedule 5 controlled substance
- Higher cost

43

Methocarbamol

- Muscle pain as well as tension from other causes of acute pain should be addressed
- 50-100 mg/kg PO q12-24h
- Moderate oral bioavailability but if cost effective little downside

44

Diclofenac Topical

- Diclofenac is an NSAID in cream formulation
- Underutilized but very easy to add to the plan
- Make sure to clip application site well
- Study: Voltaren gel vs Surpass – not as effective

45

Acepromazine

NOT an analgesic drug…

…BUT pain can lead to anxiety and anticipation, fueling pain cycle

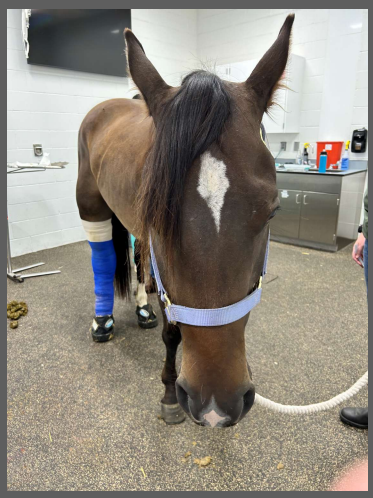
If hemodynamically stable, consider acepromazine for patients in care for painful conditions (e.g., major laceration repairs)

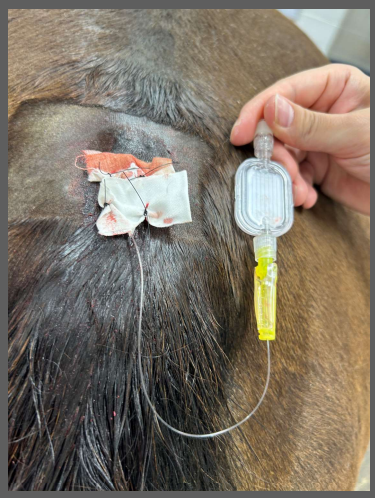
46

47

Epidural catheters can be used to manage painful conditions of multiple structures:

- Hindlimbs
- Retroperitoneal space
- Caudal GI tract
- Reproductive tract
- Body wall
- Pelvis
- Tail, perineum



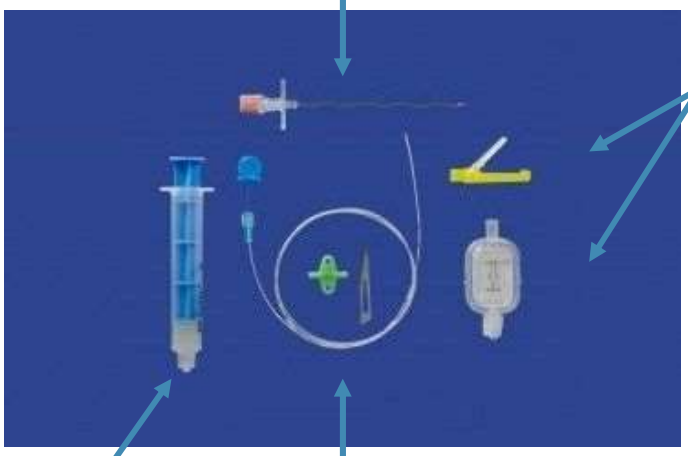


48

MILA Equine Epidural Catheter Kit →

What else you will need:

Sedation
Clippers
Sterile prep
Sterile gloves
6 ml lidocaine
Suture
Stepstool
4x4 Gauze
Ioban



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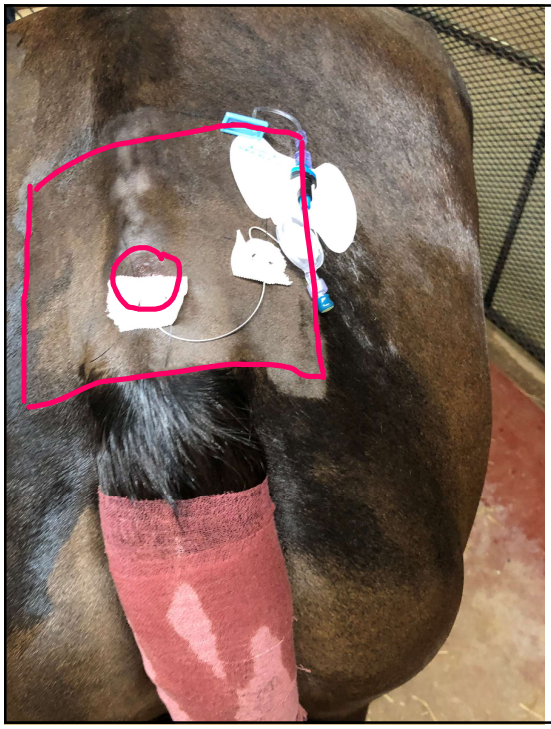


- Most horses prefer to be sedated for this procedure.
- Clip a wide square over the spinous processes of the sacrococcygeal and first intercoccygeal vertebrae.
- On midline over the palpable intervertebral space, inject lidocaine just under the skin with a 25-gauge needle, then direct the needle downward to infiltrate beneath the skin.
- Prepare a space to set down your catheter kit and a few syringes of sterile saline.
- Have a friend perform a sterile prep of the site (it's also helpful if they glove up to help you when they are done).
- Put on your sterile gloves and place the drape over the prepped site.

50

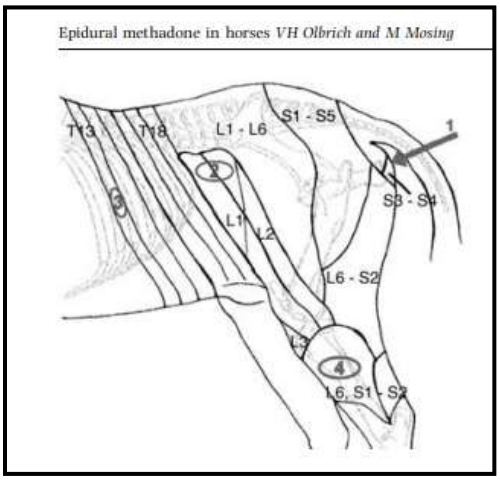
- **Insert the tuohy needle at an approximately 45-degree angle to the skin, on midline in the intervertebral space.**
- **Insert to just under the skin.**
- **Have a friend drop some saline into the hub of the tuohy needle so it bubbles up at the top of the hub.**

51

- **Insert the tuohy needle slowly but surely toward the epidural space; when it pierces the ligamentum flavum, negative pressure in the epidural space will suck the saline from the hub of the needle (hanging drop).**

52

- **Hold the needle in place.**
- **Pass the catheter through the needle to the desired location**



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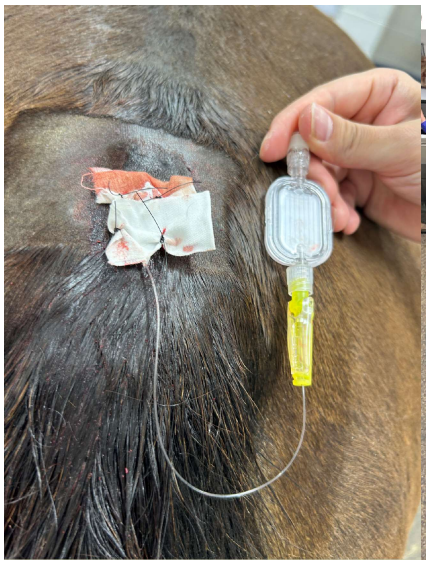
- **Holding the catheter, carefully remove the needle.**
- **Holding the catheter, carefully remove the stylet.**
- **Cut the catheter to the desired length outside the skin.**

54

- **Apply the clamp end and filter with an injection cap.**
- **Flush the catheter with a 0.5-1 ml of sterile saline (should be easy though catheter is small).**
- **Suture the catheter in place at the insertion (and at a second point if desired).**
- **Cover in gauze and Ioban.**



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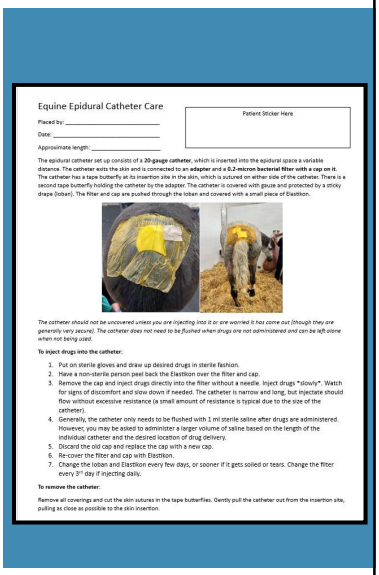
56

Wear sterile gloves and change the injection cap at each injection.

Epidural catheters that get pulled out accidentally can be replaced with fresh ones easily.

Epidural catheters can be left in for days to weeks!



Equine Epidural Catheter Care

Placed by: _____

Date: _____

Approximate length: _____

Patient Sticker Here

The epidural catheter set up consists of a **20-gauge catheter**, which is inserted into the epidural space a variable distance. The catheter exits the skin and is connected to **an adapter and a 0.2-micron bacterial filter with a cap on it**. The catheter has a tape butterfly at its insertion site in the skin, which is sutured on either side of the catheter. There is a second tape butterfly holding the catheter by the adapter. The catheter is covered with gauze and protected by a sticky drape (loban). The filter and cap are pushed through the loban and covered with a small piece of Elastikon.

The catheter should not be uncovered unless you are injecting into it or are worried it has come out (though they are generally very secure). The catheter does not need to be flushed when drugs are not administered and can be left alone when not being used.

To inject drugs into the catheter:

1. Put on sterile gloves and draw up desired drugs in sterile fashion.
2. Have a non-sterile person peel back the Elastikon over the filter and cap.
3. Remove the cap and inject drugs directly into the filter without a needle. Inject drugs *slowly*. Watch for signs of discomfort and slow down if needed. The catheter is narrow and long, but injectate should flow without excessive resistance (a small amount of resistance is typical due to the size of the catheter).
4. Generally, the catheter only needs to be flushed with 1 ml sterile saline after drugs are administered. However, you may be asked to administer a larger volume of saline based on the length of the individual catheter and the desired location of drug delivery.
5. Discard the old cap and replace the cap with a new cap.
6. Re-cover the filter and cap with Elastikon.
7. Change the loban and Elastikon every few days, or sooner if it gets soiled or tears. Change the filter every 3rd day if injecting daily.

To remove the catheter:

Remove all coverings and cut the skin sutures in the tape butterflies. Gently pull the catheter out from the insertion site, pulling as close as possible to the skin insertion.

57

Epidural catheter drugs

- For catheters fed cranially more than 5-7 cm:
  - First dose:

  detomidine 5 mg + morphine 50 mg
  - Next doses:

  morphine 25-50 mg q12-24 hours

  *based on pain assessment
- For catheters fed only up to 5-7 cm:
  - Local anesthetics can be added in low volumes

58

Equine Pain Case Examples

59

Prosody

13 year old
QH/Appaloosa mare

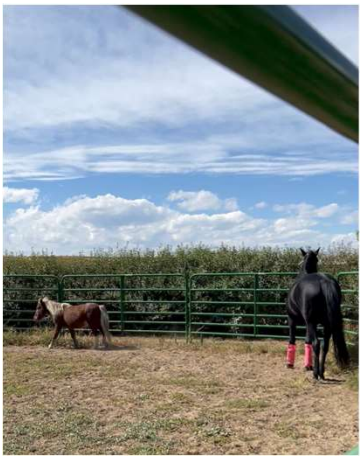
Chronic bilateral forelimb lameness, grade 2/5 but worsening

Pain behaviors:

- Short/stabbing stride to 4/5 lameness
- Pointing of the lamest leg
- Rubbing her face on her leg
- Laying down more frequently

Initial medications:

- 57 mg firocoxib PO q24hr
- 30 mg/kg acetaminophen PO q12-24 hours as needed



60

Updated treatment plan:

Pharmacologic:

Switch to phenylbutazone 2 g PO q 12 hr (reducing when possible)

Continue acetaminophen 30 mg/kg PO q12 hr

Add gabapentin 10 mg/kg PO q 12hr

Non-pharmacologic:

Ice feet

TENS (transcutaneous electrical nerve stimulation)

61

Continuing plan:

- Taper phenylbutazone dose (1 g PO q12 to q24 as possible)
- Reduce frequency of gabapentin, acetaminophen (discontinue when possible)
- Decrease/discontinue ice/TENS

Continuous pain reassessment!

62

Meca

17 year old QH gelding

Septic tenosynovitis RF, severe DDFT/SDFT damage

Pain behaviors:

•Toe touching, non weightbearing RF
•Pointing forward RF

Initial treatments:

•General anesthesia and flushing of RF digital sheath and tendon debridement
•Pre-operative hydromorphone 0.04 mg/kg IV
•Intra-operative low 4 point nerve block with 8 ml 0.75% bupivacaine, 5 mcg/ml dexmedetomdine
•Post-operative phenylbutazone 1 g PO q12 hr, acetaminophen 30 mg/kg PO q12hr

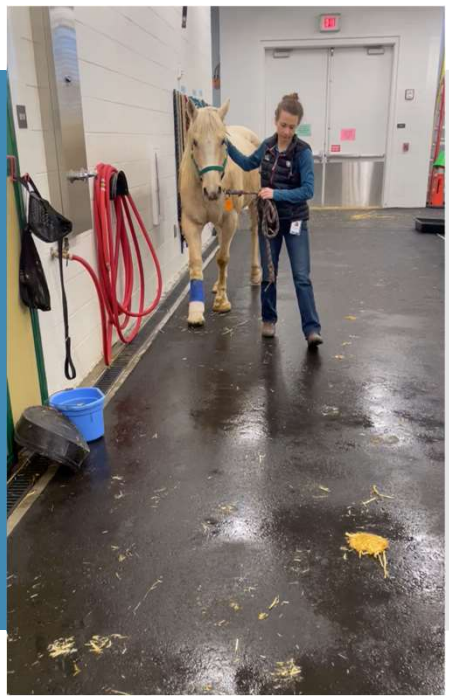
Initial result:

•Weight bearing ~12 hours post-operatively
•Returned to non weightbearing
•Owner unable to hospitalize any longer due to finances

63

Updated plan:

- Add pregabalin 4 mg/kg PO q12hr
  - Cost = ~$7/day
- Add TENS (encourage owner to purchase unit from Walgreens)



64

Cash

20 year old QH gelding

Rectal impaction and peri-rectal abscess

Pain behaviors:

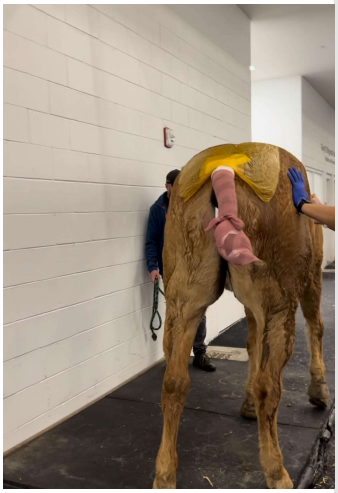
- Dull appearance, mild colic signs (up/down, decreased appetite)
- Muscle fasciculations
- Odd posture in hindlimbs ("waddle")

Initial treatments:

- IV flunixin 1.1 mg/kg, xylazine 150 mg for evaluation of abscess
- Epidural catheter placement to 7 cm depth:
  - Lidocaine 1 ml (10 mg) to provide sensory blockade to lance and drain abscess

Post procedure analgesia:

- Continue flunixin IV to oral
- Detomidine 5 mg, morphine 50 mg via epidural catheter
- 50 mg morphine via epidural catheter q12hr 2 days



65

Voodoo

6 year old QH gelding

Severe sacroiliac joint pain

Pain behaviors:

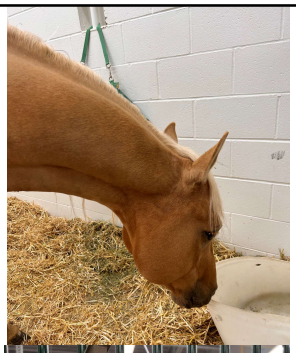
- See earlier videos!
- Defensive behaviors when touching sides/back
- Able to be ridden as a reining horse

Initial treatments:

- Injection of SI joints with PRP
- IV detomidine and hydromorphone for sedation for procedure
- IV phenylbutazone

Hospitalization for infusion therapy:

- 15 hour IV CRI hydromorphone, detomidine, ketamine, lidocaine, acepromazine, magnesium sulfate (to be repeated twice, 3 weeks apart)
- Start fluoxetine 0.5 mg/kg PO q24 hr



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67

68

Camryn
4 year old QH mare

Septic pedal osteitis of RH, grade 4/5 lameness

Pain behaviors:
•None other than lameness

Initial treatments:

•Phenylbutazone 1 g PO q12 hr
•Acetaminophen 30 mg/kg PO q12 hr
•Gabapentin 40 mg/kg PO q12hr
•TENS 3x daily

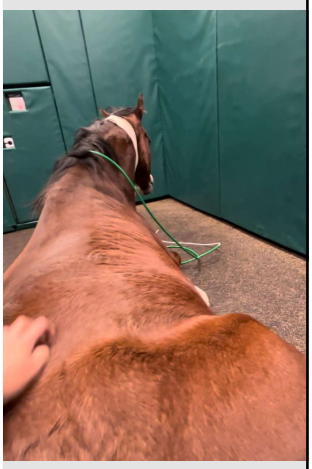
First additional interventions:

•RH low 4 point block Nocita, bupivacaine, dexmedetomidine
•Epidural catheter placement, 5 mg detomidine and 50 mg morphine q12hr

69

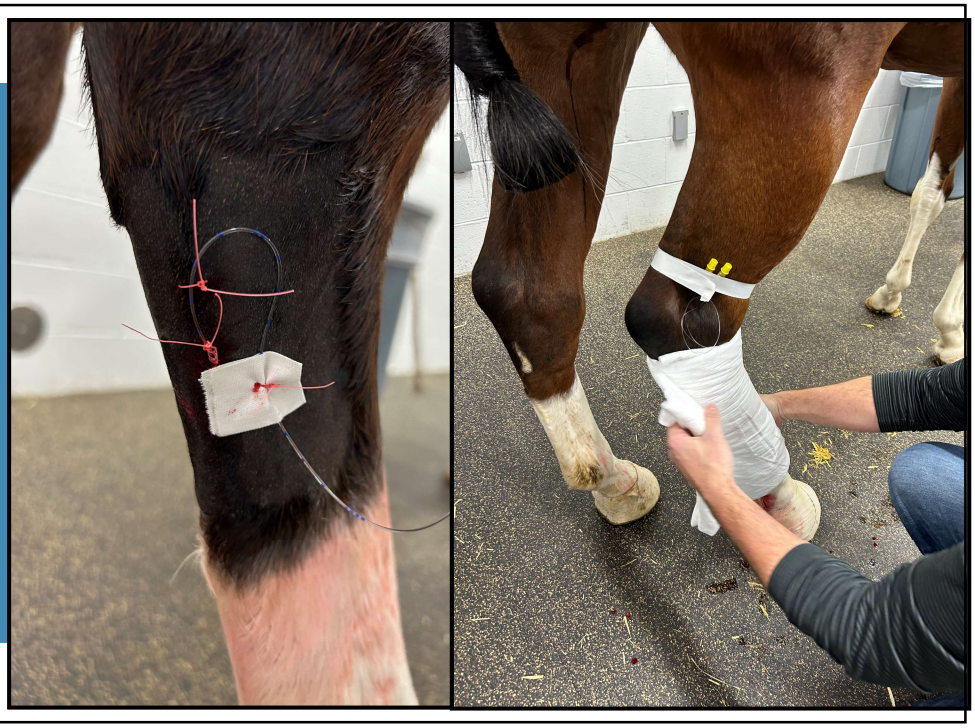
Over the course of the week:

- Surgery x2 for P3 debridement (imaging: MRI)
- Worsening response to epidural drugs
- Minimal response to IV hydromorphone
- Starting to resent repeated nerve blocks
- Minimal response to continuous IV infusion:
  - Hydromorphone 0.003 mg/kg/hr
  - Lidocaine 0.03 mg/kg/min
  - Ketamine 0.6 mg/kg/hr
  - Detomidine 0.002 mg/kg/hr
  - Acepromazine 0.002 mg/kg/hr
  - Magnesium sulfate 10 mg/kg/hr



70

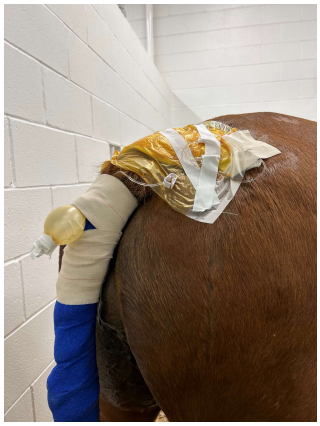
Continuous perineural blockade via catheterization



71

Continuous perineural blockade via catheterization

72



Elastomeric pumps provide continuous drug delivery

73

Thank you!

rachel.hector@colostate.edu

74

Finding the Pain Expert Inside of You

Michael Petty
DVM

Frank Jordan Seminar
Michael Petty Proceedings
Finding the Pain Expert Inside of You

1. The Team Approach
    a. My Team
        i. Caregiver/owner
            1. We need the caregiver to bring the animal in and to give us a history of what is going on
        ii. Receptionist
            1. The receptionist needs to listen for clues when the owner makes an appointment, such as "I need to make that vaccine appointment after 3 pm when my husband gets home because my dog can no longer jump in the car by herself"
            2. Observation of the animal prior to entering the clinic (if possible) to observe gait before the animal is "on guard" after walking through the front door
        iii. Technician/nurse
            1. Must be given the time to take a proper history, take clues from the history and receptionist, and administer pain questionnaires when appropriate
            2. www.zoetispetcare.com has great interactive but non-validated visual aids for the client
        iv. The patient
            1. Use Fear Free and Cat Friendly techniques to do a proper examination, gait analysis, etc.
        v. The Veterinarian
            1. Listen to everyone else.
            2. Do a thorough pain exam
                a. Don't forget to check for neurologic issues that can mimic pain, for example diabetic neuropathy, FCE, etc
            3. Take the time
                a. You may need to reschedule
                b. Radiographs
    b. These are listed in order of importance: Each member of the team cannot do a proper job without the cooperation of the person ahead of them in the list.
2. A typical cat case
    a. Owner calls, and receptionist makes appointment for cat not using the litter box
    b. Nurse does the intake. Gets history of inappropriate urination: owner has two cats and three litter boxes, all with high sides. Nurse knows at this point that it could be an access issue and tries to rule out pain: Zoetis graphics are used but owner does not check any of the boxes

    c. My findings: Guarded response when L/S joint is palpated and there is mild crepitus in both knees. At this point I discuss OA with the owner as a possible issue but they are skeptical
        i. They are thinking behavioral
        ii. Do not "gaslight" the owners, take their concerns seriously…they might be right
        iii. I asked for a video of the cat jumping and using stairs
    d. Video comes in and sure enough, there is hesitancy to jump and a gait abnormality when using stairs.
        i. Its not that the owner is ignorant of their cat's issues, they are just not trained.
        ii. Radiographs confirm spondylosis at L/S, and OA in knees
    e. Outcome measures
        i. Sometimes the owner wants something fantastic to happen "I want my OA dog to play flyball" and you need to assess each case and decide if it is a possibility
        ii. In this case, the owner wanted the cat to use the litter box: Easy enough.
            1. Did trial of Onsior for a week, cat was using the box. Switched to Solensia, continued use of litter box.
3. What other treatments can be considered?
    a. NSAIDS off label
    b. Adequan Canine off label
    c. Amantadine
    d. Gabapentin
    e. Physical Modalities: Acupuncture, Laser, Rehab, Weight loss
4. A typical dog case
    a. Owner calls receptionist and as is typical with some cases, the owner sees the limp.
    b. Tech/nurse still needs to consider, did it start with one incident, was it gradual, has it happened before, etc? In this case the dog started limping one day ago, may have jumped off of couch
    c. Animal/Veterinarian exam revealed the dog limping on the left front leg and palpation revealed thickening of the elbow with crepitus and decreases range-of-motion. In other words, this is an acute exacerbation of a chronic issue the owner was not aware of.
        i. This is called acute on chronic pain
        ii. Often has neuropathic inflammation as a component
    d. Radiographs confirmed the findings
    e. Needed acute and long-term therapy
        i. We don't want the dog to go back to the old "normal" that was actually painful
5. Considerations for short term and long term therapy
    a. NSAID
    b. Librela

c. PBMT
d. Massage
e. Acupuncture
f. Weight loss
g. Platelet Rich plasma injections, stem cell therapy and Synovetin OA as injectable therapies

Photobiomodulation/Laser Therapy

1. Reasons to consider PBMT for OA in dogs and cats
    a. Good evidence it works
    b. Non-invasive
    c. Some patients cannot take pharmaceuticals
    d. Some patients cannot be sedated for more complex procedures
        i. PRP
        ii. Stem Cells
        iii. Synovetin OA
    e. Cats: Solensia is the only legal option in the US, and if it doesn't work….
2. Intervertebral disc disease
    a. Can be used alongside classic therapies like NSAIDs and physical therapies like rehab and acupuncture
    b. In my clinic, dogs with cervical disc issues see improvement with one treatment.
    c. In paretic or paralyzed dogs, there is no reason not to try non-surgical options prior to going to surgery
3. Fibrocartilagenous embolism (FCE)
    a. Often confused with IVDD, really a "stroke" of the spine
    b. Initially painful day 1, then just paretic afterwards
    c. Worse prognosis than IVDD, no surgical option
    d. Increased blood flow, especially in very early stages, secondary to using PBMT is beneficial
4. Degenerative Myelopathy
    a. Not really a pain condition but is worth reminding everyone that there are now studies showing it can delay the progression of the disease.
5. Otitis externa
    a. The pain of this condition is often over looked…send home meds, can the owner even get them in? Maybe reason for poor compliance.
    b. I send home an NSAID and laser the ear to reduce pain and inflammation, and to promote repair and healing of damaged tissue.
6. Anal Sacculitis
7. Respiratory issues are not necessarily painful, but they are often very distressing
    a. Chronic pulmonary fibrosis/Westie Lung Disease
        i. PBMT works better than conventional pharmaceutical interventions.
    b. Tracheal Collapse

        i. Does nothing to “fix” the condition, but can reduce the severity and episodes of cough
        ii. Often seen improvement in minutes. But it needs to be done often
    c. Laryngeal Paralysis
        i. Reduces inflammation, promotes tissue repair, reduces swelling and improves muscle function

Acupuncture

1. Medical acupuncture is the act of placing a needle into the body at specific points
    a. Compared to Chinese acupuncture, it takes a more evidence-based approach
    b. It integrates biomedical principles with Chinese medicine traditions
2. Acupuncture has been evolving over the past 3000 years
    a. Being taught more and more in medical and veterinary schools
3. Reasons to use acupuncture for pain
    a. Better control of diseases not adequately helped by Western medicine/pharmaceuticals
    b. Helps control both acute/surgical and chronic pain issues
4. What are acupuncture points:
    a. Where nerve bundles penetrate fascia
    b. Often in close proximity to major blood vessels that are surrounded by small nerve bundles
    c. Where nerves enter/exit muscles
    d. Nerve trunks
    e. Cranial foramina and sutures
    f. Periarticular structures
5. Physiology in a nutshell
    a. Relieves pain and restores physiologic homeostasis (can’t acupuncture in the ‘wrong’ direction
    b. Biomechanical coupling from surface tension of tissue and by electrical affinity between the needle and the tissue
    c. Frictional forces that disrupt the extracellular matrix when the inserted needle is twisted
        i. Release of many local chemicals when that happens
    d. Analgesia by spinal segmental approach
        i. Needles inserted by dorsal root ganglion can have both a downstream and upstream effect on skin, muscles, bones, and viscera
6. How does acupuncture feel to the patient?
    a. Like nothing
    b. A pin prick
    c. Dull ache
    d. Sensation of impulse traveling
7. Safety of acupuncture
    a. Disposable sterile needles
    b. Side effects are rare: sympathetic and parasympathetic stimulation

    c. Unknown bleeding disorder
8. Does it always work?
    a. No: in humans about 8% of people are poor responders
    b. No data in dogs/cats, but anecdotally about the same
    c. Drugs get approved with only a 50% success rate!
9. Pain conditions treated
    a. Dental
    b. OA
    c. IVDD and FCE
    d. Lameness from soft tissue injuries

Massage

1. Benefits
    a. Improved range-of-motion
    b. Relaxation
    c. Reduction in pain
    d. Reduction in swelling
    e. Neurologic stimulations
    f. Three types
        i. Petrissage
        ii. Effleurage
        iii. Tapotment
2. Canine Medical Massage by Narda Robinson, available at AAHA bookstore and Amazon.

Pain Management & Sedation of Small Mammals

Gretel Tovar
MVZ, DABVP (Avian)

Pain management and sedation of small mammals

Gretel Tovar, MVZ, DABVP (Avian Practice)

Pain identification

Exotic companion mammals can suffer from various painful conditions, such as gastrointestinal syndrome, dental disease, urolithiasis, fractures, neoplasia, foreign bodies, surgery, and self-mutilation.

When dealing with these species, it is essential to remember that prey animals hide their pain to avoid being eaten, so they may be sicker or in more pain than they appear. Knowing how to handle them, their sensitivity to medications, and their response to hospitalization is also crucial. Additionally, administering medications to these animals may be challenging due to their small size.

Understanding the nature of pain is crucial for effective treatment. According to the International Association for the Study of Pain, pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage.

Studies have shown that pain control medications are not frequently used in exotic animals, possibly due to limited pain assessment abilities or lack of familiarity with these animals.

Pain is a stressor that can cause an increase in the secretion of corticosteroids, epinephrine, and norepinephrine, leading to an increase in heart rate, blood pressure, and body temperature, which can last for hours after the initial insult.

When evaluating an animal's pain, relying on physical parameters such as heart rate, blood pressure, and body temperature can be unreliable as they can be influenced by stress or challenging to measure. However, other indicators can help. For instance, if the pain is localized to a specific area, we can assess the animal's reaction to touch or observe changes in their behavior, such as reduced grooming or nesting. Certain animals may also stop eating or lose weight when experiencing pain, but this is often a secondary effect and not an accurate indicator of pain itself.

Gracing scales are available on the National Center for Replacement and Reduction of Animals in Research (NCRRAR) website and can be used to measure pain in rats, mice, rabbits, and ferrets. The grading and signs of pain vary depending on the species, but some signs are common. For example, most exotic companion mammals tend to tighten the closure of their eyelids when in pain. The nose bridge budges in some species, like rats and ferrets, creating a Roman nose. To learn more about the grimacing scales, please refer to NCRRAR's website.

It is crucial to recognize the signs of pain to reduce suffering and prevent the side effects of overmedication. If we can predict when a painful event will occur, we can manage pain quickly

and effectively. Treating pain can minimize the chances of sensitization when done early. However, if pain is not anticipated, we can use anthropomorphism or try a treatment trial to alleviate it. Pain assessment should be performed during the early postoperative period when the patient's temperature has stabilized, the effects of analgesics have worn off, or the pain has subsided.

Remember that pain is a stressor, and we should minimize other types of stress, including environmental factors, movement, and how we handle our patients.

Analgesia

Analgesia refers to the loss of sensation of pain. In exotic companion animals, multimodal analgesia, which involves combining multiple analgesic drug classes or techniques to target various points along the pain pathway, should be used. In this context, I will briefly mention a few groups of medications, their uses, and their side effects.

Non-steroidal anti-inflammatories, also known as NSAIDs, are medications used to treat pain, fever, and other inflammatory processes. In exotic companion animals, such as ferrets, the most commonly used NSAID is meloxicam. This medication is generally well-tolerated, but ferrets tend to be an exception. They often experience gastrointestinal side effects like melena. Therefore, I only recommend using meloxicam for no more than four days in ferrets and at the low end of the recommended dose.

Opioids are a type of medication used to treat moderate to severe pain. They bind to specific receptors (mu, delta, kappa) in the central and peripheral nervous systems. Hydromorphone is a semi-synthetic mu-opioid that is commonly used for moderate and severe pain. However, it can have adverse effects, such as CNS and respiratory depression, decreased food intake, bradycardia, and fecal output. In ferrets, it can also cause vomiting.

Buprenorphine is a potent mu agonist and a kappa and delta receptor antagonist. It has a slow onset of action but lasts longer than other opioids. It is usually used for mild to moderate pain but can have significant side effects, including gastrointestinal stasis, weight loss, pica, urine retention, and respiratory depression.

Butorphanol is a mixed agonist/antagonist with low activity at my and strong activity at kappa receptors. It is used for sedation and mild pain control.

Tramadol has mu-opioid receptor activity and inhibits the reuptake of norepinephrine and serotonin. While it is effective for treating pain in some animals, it is not recommended for chinchillas due to the risk of serotonin syndrome at higher doses. At lower doses, it may be ineffective.

Gabapentin is a medication that is similar to GABA. It is commonly used for chronic pain and seizures. Combined with other pain medications, it can enhance the effectiveness of analgesia. However, at high doses, it can cause flaccidity.

Local anesthetics such as Lidocaine and bupivacaine can also be used to relieve pain through methods like splash blocks, local infiltrations, nerve blocks, epidurals, and more.

Analgesic dosing

The doses used here are for reference only. Please evaluate each patient and base decisions on the individual.

Species	**Meloxicam**	**Gabapentin**
Ferrets	0.1-0.2 mg/kg q 24 h	3-5 mg/kg q 8-24 h
Rabbits	1 mg/kg PO q 24 h	10-15 mg/kg PO q8-12h 25 mg/kg 2 hours prior stressor
Guinea pigs	0.5-0.75 mg/kg q 12 h	10-15 mg/kg PO q8-12h
Chinchillas	0.5-0.75 mg/kg q 12 h	10-15 mg/kg PO q8-12h
Rats, mice, hamsters	1 mg/kg PO q 12 h	10-50 mg/kg q 8-24 h
Hedgehogs	0.2 mg/kg q 24 h	3 mg/kg q 8-24 h
Sugar gliders	0.2 mg/kg q 24 h	3 mg/kg q 8-24 h

Species	**Hydromorphone**	**Buprenorphine**	**Tramadol**
Ferrets	0.1 mg/kg q 1-2 h	0.04 mg/kg q 4-6 h	4-5 mg/kg PO q 8-12 h
Rabbits	0.2-0.3 mg/kg q 4 h	0.05-0.1 mg/kg q 4-6 h	15 mg/kg PO q 8-12 h
Guinea pigs	0.3 mg/kg q 4 h	0.2 mg/kg q 4-6 h	15 mg/kg q 8-12 h
Chinchillas	2 mg/kg q 4 h	0.2 mg/kg q 4 h	Not recommended
Rats, mice, hamsters	0.2 mg/kg q 4 h	0.2 mg/kg q 4-6 h	15-30 mg/kg PO q 8-12 h
Hedgehogs	0.1 mg/kg q 4 h	0.03-0.05 mg/kg q 48 h	4-5 mg/kg PO q 8-12 h
Sugar gliders	0.05 mg/kg q 4 h	0.03-0.05 mg/kg q 6 h	2-5 mg/kg PO q 8-12 h

Sedation

Sedation may be necessary when collecting blood, taking quality radiographs, or performing an ultrasound. These protocols can also serve as pre-anesthesia. It is important to note that each patient is unique and requires individual assessment to ensure the safety of these protocols. I advise against using dexmedetomidine and ketamine in patients with cardiac conditions. Additionally, it's essential to keep your patients warm throughout the sedation and recovery period. Exotic mammals lose heat quickly, which can lead to complications during sedation or prolong the recovery period.

Ferrets are sensitive to opioids, which can cause sedation and respiratory depression. However, withholding opioids is not recommended. A combination of butorphanol (0.1 - 0.3 mg/kg IM) and midazolam (0.2-0.5 mg/kg IM) can be used for non-painful procedures. For painful procedures, hydromorphone (0.1 mg/kg IM) is recommended instead of butorphanol. Dexmedetomidine (0.03 mg/kg IM) can be added if necessary. Flumazenil (0.02 – 0.05 mg/kg IM) and atipamezole (0.1-0.3 mg/kg IM) can be used as reversals.

Rabbits. If you need to take radiographs of a rabbit, a combination of butorphanol (1-2 mg/kg IM) and midazolam (1 mg/kg IM) may be sufficient for sedation. However, if the rabbit is otherwise healthy, it is recommended to add either dexmedetomidine (0.02-0.05 mg/kg IM) or ketamine (1-3 mg/kg IM) to enhance the quality of sedation. If a more potent opioid is required for pain relief due to GI stasis, hydromorphone (0.3mg/kg IM) is preferred. However, buprenorphine (0.01-0.1 mg/kg IM) can also be used, but it may also cause GI stasis. Flumazenil (0.02-0.05 mg/kg IM) and atipamezole (0.2-0.5 mg/kg IM) can be used as reversals.

Guinea pigs can be sedated effectively with a combination of midazolam (0.3 mg/kg IM) and dexmedetomidine (0.3 mg/kg IM). Hydromorphone (0.3 mg/kg IM) can be added if a painful procedure is required. Alternatively, ketamine (1-3 mg/kg IM) can be used instead of dexmedetomidine. Flumazenil (0.02 – 0.05 mg/kg IM) and atipamezole (0.3 mg/kg IM) can be used as reversals.

Chinchillas are not responsive to opioids. A mix of midazolam (0.3 mg/kg IM) and dexmedetomidine (0.3 mg/kg) can be used to sedate them. Hydromorphone (2 mg/kg) can be added if a painful procedure needs to be performed. Ketamine (1-3 mg/kg IM) can also be used instead of dexmedetomidine. The sedation effects can be reversed by administering flumazenil (0.02 – 0.05 mg/kg IM) or atipamezole (0.3 mg/kg IM). It is important to note that the hydromorphone dose is high. Chinchillas can often develop heart disease. Therefore, caution should be exercised while sedating them.

Little rodents. Sedation can be achieved for little rodents like rats, mice, and hamsters using butorphanol (1-2 mg/kg IM) and midazolam (1-2 mg/kg IM). If a painful procedure is expected, it is recommended to switch butorphanol for hydromorphone (0.2 mg/kg IM) or morphine (1-2 mg/kg IM). Dexmedetomidine (0.1 -0.2 mg/kg IM) can be used if required. Flumazenil (0.02 – 0.05 mg/kg IM) and atipamezole (1-2 mg/kg IM) are the recommended reversals.

Hedgehogs can be tricky to sedate. For this, midazolam (1 mg/kg IM), alfaxalone (3 mg/kg IM), and butorphanol (0.5 mg/kg IM) can provide approximately 30 minutes of sedation, which should be sufficient for radiographs and blood collection. It is essential to ensure that you are administering the medication in the muscle (orbicularis muscle) rather than under the mantle, as absorption will be different and may not result in proper sedation. Flumazenil (0.02 – 0.05 mg/kg IM) can be used as reversal.

In conclusion, recognizing and treating pain in exotic companion mammals is crucial for their well-being. Because most of these animals are prey species, they may hide their pain, making it challenging to diagnose and treat. However, by understanding the nature of pain, recognizing the signs of pain, and using appropriate analgesic medications, we can minimize their suffering and improve their quality of life. We can ensure these animals receive the care they need and deserve by taking appropriate measures.

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