Definition

- Behavioral deterioration while in a kennel setting
- Behavioral manifestations consistent with:
  - Fear or anxiety
  - Abnormal repetitive behaviors
  - Increased arousal and frustration
- Hallmark:
  - Pet did not display these behaviors prior to kennel housing
  - Behaviors worsened since being housed in shelter/kennel setting

Motivation

- Goal of displayed behaviors: Reduce Stress
- But what is stress?

What is Stress?

- Definitions:
  - Physiologic and behavioral responses to re-establish homeostasis when interrupted
  - Sum of all nonspecific effects or factors acting on body to increase energy consumption significantly above resting levels

What is Stress?

- Response via hypothalamic-pituitary-adrenal (HPA) axis
- Immediate release of sympathetic nervous system hormones
  - Epinephrine and norepinephrine
  - Glucocorticoid release moments later
What is Stress?

- **Adaptive vs. Maladaptive**
  - **Adaptive**
    - Stress response helps to adjust to situation
    - Usually short term presence
    - Improve survival
  - **Maladaptive**
    - Animal unable to return to homeostasis
    - Chronic or repeated presence of stressor
    - System remains activated trying to reach it

- **Three Phases:**
  - **Alarm Reaction**
    - Recognition of stressor
  - **Resistance Phase**
    - Respond to stressor
  - **Exhaustion Phase**
    - Stressor reaches chronic/maladaptive point
    - Body shows effects from sustained high levels of stress hormones
    - Significant physical changes can occur

Back to Stress in the Shelter

- **Signs of “stress”**
  - Fear and anxiety
    - Response to perceived or actual threatening stimulus
    - Hiding, trembling, cowering, or excessively drooling
  - Learned helplessness/depression
    - Withdrawn, curled up in back of kennel
    - Lack of interest in social interaction
  - Frustration
    - Motivated to perform a behavior without an appropriate outlet
  - Goal of these behaviors motivated by stress:
    - Reduce anxiety, fear and frustration created by the inadequate environment or housing system

Why Not Stress?

- Stress used incorrectly
  - Over-simplified catch-all term
  - Any aversive physical or psychological condition
  - “Stress” = “Unpleasant Emotion”
  - Not interchangeable!

Stress in the Shelter

- High arousal, lack of impulse control
- Jumping, mouthing
- Acute conflict behaviors
  - Stereotypic or abnormal repetitive behaviors
  - Cage biting
- Aggression
  - Fence running, charging the kennel door
- Very difficult to ignore some of these unwanted behaviors

Dr. Frank McMillan 2018
Epidemiology/ Risk

- Pre-existing environmental/situational fears
- Highly social dogs
  - To people or dogs
- High energy levels
- Highly trainable breeds
  - Working breeds
    - Rottweilers, Dobermans, German Shepherds
    - Other herding breeds - Aussie, Border collie
  - Hounds
  - Terriers
    - Including Pit bull terriers

Diagnosis

- Kennel stress considered when:
  - Hiding, trembling, cowering, or excessively drooling
  - Abnormal repetitive behaviors
    - Patterned pacing, circling, tail chasing, shadow chasing, stereotyped pouncing, other repeated behaviors
  - Increased barking, jumping and lunging at passersby; difficulty focusing during play & training
  - In current housing system

Social Frustration

Repetitive Jumping

Repetitive Spinning
Frustration

Shadow Chasing

High Arousal, Anxiety

Excessive Drooling

Differential Diagnoses

- Pre-existing behavior disorders
  - Generalized anxiety
  - Compulsive disorder
  - Other Fears/ Phobias
  - Fear aggression
  - Territorial aggression (?)
  - Separation anxiety (?)
  - Medical causes for abnormal repetitive behaviors

Fear/ Anxiety

Diagnosis

- Physical examination:
  - Traditional exam
  - Body language
  - Behavior observation
  - Negative emotional state inferred
  - Only after observing all signals and interpreted together within context of situation and environment
- Hallmark:
  - Behaviors not displayed prior to being housed in shelter, or have worsened since being housed in shelter/ kennel setting
Physical Exam Findings

- Increased TPR*
  - Due to high arousal
- Weight loss
  - Despite appropriate nutrition and good appetite
- Diarrhea
  - No other physical cause
- Physical injury secondary to repetitive behaviors
  - Lameness, paw pad excoriations, broken teeth or nails

Body language

- Fear and anxiety
  - Ears back, eyes wide, furrowed brow, trembling, cowering, excessive drooling, barking, or howling
- High arousal
  - Pupil dilation, tense, hackles up, penile panting, barking

Behavior Observations

- Fear and anxiety
  - Escape, hiding
- Abnormal repetitive behaviors
  - Circling, tail chasing, shadow/reflection chasing, weaving, or other patterned movements (pacing)
- Frustrated and aroused dogs
  - Jump and mouth frequently, difficulty focusing during play and training

Fear and anxiety

- Escape, hiding
- Abnormal repetitive behaviors
  - Circling, tail chasing, shadow/reflection chasing, weaving, or other patterned movements (pacing)
- Frustrated and aroused dogs
  - Jump and mouth frequently, difficulty focusing during play and training

How does it develop?

- Some degree of fear or frustration inevitable upon experiencing shelter/kennel setting
  - Novel unfamiliar environment
  - Loud sounds
  - Intense smells
  - Exposure to unfamiliar people and animals
  - Lack of control of schedule and interactions

Upon entering shelter

- Catecholamines increase immediately
- Cortisol within minutes
- Pet attempts to return to normal set point
  - Homeostasis
- Fear
  - Escape or hide from trigger
- Social frustration
  - Attain interaction with another person/dog
- Physical frustration
  - Perform normal active behaviors

Acclimation

- Some within a few days
- Others take longer (2 weeks)
- Another subset continually deteriorate
  - Body continues to release neurotransmitters, expend energy
    - Unable to return to normal
  - Leads to exhaustion of body's normal coping strategies
    - Remain in chronically negative emotional state
    - Leads to reduced quality of life and poor welfare
Etiology/ Pathophysiology

- Frustration
  - Active, intelligent dogs
    - Learning by operant conditioning
    - Trial and error
    - Occurring all of the time, whether we want it to or not
  - Law of Effect

Law of Effect

- Behavior resulting in pleasant consequence strengthened/ Increases in frequency
- Behavior resulting in no consequence is weakened
- Behavior resulting in unpleasant consequence weakened/ decreases in frequency
- Interpretation of consequence based on dog’s perception, not ours!

Treatment

- Address motivation for the behaviors displayed
  - Environmental management
  - Behavior modification
  - Behavior medication
- Must also appropriately address underlying negative emotional state
  - Inappropriate to use aversive tools or methods to address unwanted behavior in sheltered pets

Treatment

- Immediate
  - Strategic housing
  - Increased time outside of kennel
  - Consistent daily routine
  - Increased enrichment
  - Cage side behavior modification

Treatment

- Immediate-acting anxiety reducing medication
  - Address immediate welfare emergency
  - Prevent continued deterioration
  - Trazodone 2-5 mg/kg PO q 12 hrs
  - Gabapentin 10-30 mg/kg PO q 12 hrs
  - Clonidine 0.01-0.05 mg/kg PO q 6-8 hrs PRN

Treatment

- Chronic
  - Fast track to adoption or transfer if appropriate/ available
  - Put on a schedule
    - Increased enrichment/ activity
    - Positive reinforcement training
  - Group housing or foster if appropriate
Treatment

- Longer-term anxiety reducing medication
  - Anticipated long length of stay
  - Suspect pre-existing behavior disorder
  - Manage welfare
- Fluoxetine 1-2 mg/kg PO q 24 hrs

Monitoring and Follow Up

- Record behavior observations
  - Daily caregivers
  - Daily population rounds
- Review for response to treatment and adjust plan weekly/bi-weekly

Prognosis and Outcome

- One of only behavior problems that can be completely reversible
  - How to do this?
- Change environment!
- Fair to Guarded
  - Depends on duration and severity before treatment implemented
  - Treat earlier when less severe
  - Prevent continued deterioration and poor welfare
  - Does organization have resources available to implement behavior treatment plan?
  - Other options

Recognition and Prevention

- Screen every pet frequently for signs of kennel stress
  - Treatment implemented as soon as identified
  - Delayed recognition and treatment results in rapidly worsening condition
- Leads to:
  - Welfare emergency
  - Poor physical and emotional health
  - Less appealing to adopters
  - Longer length of stay
  - Can result in pet no longer being suitable for live positive outcome in community

Prevention

- Prevention
  - Housing
  - Enrichment
  - Social interaction
  - Exercise
  - Manage length of stay

- Human Dog Interactions
  - Positive reinforcement training
  - Play
  - Leash walks
  - Quiet time/Office Foster
- Other Enrichment
  - Beds in kennels
  - Hiding spots in kennels
  - Toys
  - Foraging toys
  - Scent
  - Music/Quiet hours
Conclusions

- Kennel stress is an indicator of a negative emotional state and poor welfare
- All cases should be treated and early intervention can help reduce length of stay
- Prevention by creation of more behavior-friendly housing and enrichment system can help prevent or reduce severity, progression of many cases

Conclusions

- Documentation of behavior concerns using objective behavior descriptions important for comparing repeated evaluation pre- and post-intervention
- At minimum:
  - Provide daily walks and quiet time during entire shelter stay
  - Manage noise levels
  - Offer enrichment from time of intake to adoption

Thank You for Your Time!

- Sara L. Bennett, DVM, MS, DACVB
  - Clinical Assistant Professor of Veterinary Behavior
  - Department of Clinical Sciences
  - North Carolina State University, College of Veterinary Medicine
  - Raleigh, North Carolina, USA
  - Email: sara_bennett@ncsu.edu
  - Phone: 919-513-6130

  - Patient inquiries? To Behavioral Medicine Service:
    - http://www.ncsubehavior.com/
    - E-mail: ncstatevetbehavior@ncsu.edu
    - Phone: 919-513-6999

Gilbert

- Name:

Gilbert

- Description:

- Image:
Areas to Address

- Environment
  - Housing
    - Size
    - Indoor/outdoor
    - Noise
  - Enrichment
    - Beds
    - Toys
- Social interaction
  - Conspecific interaction
  - Human interaction
- Exercise

Housing size, indoor/outdoor

- Dogs spent more time moving and less time in repetitive behaviors in larger pens
- Outdoor access
  - Associated with a decrease in stereotypy
  - Sometimes an increase in activity or pace
- By very nature, outdoor and/or group housing increases physical complexity of kennel environment


Beds

- Moving bed to front of cage made dog more likely to be at the front even though its activity was not altered
  - May indirectly increase welfare by facilitating adoption
  - Visitors reported dogs at the front of cages to be more attractive than ones at the back
- Raised platforms were used by young dogs 55% of the time
  - After two months, these dogs were rated as more confident, friendly, and playful than previously

(Wells & Hepper 1992, 2000; Wells 1996; Hubrecht 1993)

Conspecific Social Interaction

- Keeping dogs in groups
- Opportunity to satisfy biological need for physical exercise and social contact with conspecifics
  - Increased risk of behavioral abnormalities when housed singly
  - Particularly evident if isolated from a young age
    - More likely to circle repetitively, vocalize, and self groom
    - Almost complete absence of stereotypic behaviors reported in group-housed dogs

(Sondergerger & Tuan; Thompson et al 1956; Fuller & Clark 1966; Scott 1980; Hubrecht et al 1992; Hubrecht 1993; Mertens & Unshelm 1996; Beerda et al 1999)
Conspecific Social Interaction

- Group-housed shelter dogs were
  - More active, less aggressive, quicker to re-home
  - Showed fewer behavior problems in the new home
  - Visual and auditory perception of conspecific without opportunity to physically interact can be very frustrating

(Hertens and Unshelm 1996; McAfee et al 2002; Mills & Davenport 2002)

Human Social Interaction

- Presence of people can be both stimulating and calming
- Periods of human activity were correlated with increased dog activity and barking
  - Dogs more likely to stand near the front of the cage and bark during busy visiting periods


Human Social Interaction

- Human contact may decrease stress-related behavior and physiology
  - Mechanism for helping kenneled dogs cope with stress
  - Petting can reduce heart rate, after an initial rise upon greeting

(McMillan 1999; Hennessey et al 1998; Lynch & Gantt 1968; Kostarczyk 1992)

Human Social Interaction

- Visual access to people without physical access
  - Can be over-stimulating, facilitate barking and be source of frustration
- Visual access to people may be detrimental to the welfare of the dogs
  - Particularly for fearful dogs in shelters during maintenance or visiting times
  - Not been fully explored