

Preventive Medicine Review for BCSE

- **Regulations**

United States Department of Agriculture (USDA) has a section called Animal and Plant health inspection service (**APHIS**) that enforces the animal welfare act, that sets the minimal standard of care of laboratory animals, pet trades, animal transportation and exhibition and licensure of animal dealers. It is also responsible for prohibiting animal fighting.

Institutional Animal Care and Use Committee (IACUC): self-regulating entity that must be established by institutions that use laboratory animals. They oversee the care and use of laboratory animals.

Food animal residue Avoidance Databack (FARAD): have guidelines on withdrawal times in food-producing animals.

Pasteurization: 140 Celsius or 284 F for 4 seconds (UHT pasteurization).

- **Behavior**

Feline aggression: use selective serotonin reuptake inhibitors (SSRIs – fluoxetine and paroxetine) or tricyclic antidepressants (amitriptyline, clomipramine) combined with desensitization and counter conditioning exercises are the most effective way to manage feline aggression. Benzodiazepines such as diazepam, can help some timid cats that are victims of aggression. Treatment for up to a year or more is often necessary. Play aggressive kittens should be given suspended toys.

Re-directed aggression: when an interruption of an aggressive event between 2 animals results in re-direction of the aggression to the one who intervened or to a third uninvolved animal.

Petting-induced aggression should be dealt by gradually increasing petting time and associated with food rewards.

Vocalizing, chasing, attacking and biting a new cat in the house is considered an act of **overt, active** and **offensive aggression** on the part of the resident cat.

Facial pheromones are thought to act at level of the hypothalamus to decrease anxiety and effectively decrease urine spraying in felines. Examples include Feliway and Felifriend. However, some cats may not respond well to pheromones or may become even worse.

Punishment-based negative reinforcement may **increase** fear and anxiety in cats and male aggression among cats worse.

Kittens who are weaned early, hand raised or bottle fed exclusively by people may never learn to modulate their play aggression responses to others cats. They are not adequately socialized and may not know when to stop being aggressive.

Flehmen reflex is common in males. In females it is an indicative of testosterone-producing granuloma cell tumor that leads to stallion-like behavior along with aggression and mounting.

Always do a **gradual introduction of a new pet** to prevent aggression episodes.

To promote breeding, the queen should go to the tom's territory. Minimize interruption of the 2 cats. Allow meeting with the queen so they can breed multiple times, but separate them regularly to allow the male to rest and prevent fighting.

Llamas will lay in sternal recumbency when in heat.

Berserk llama syndrome occurs when an orphaned crias, usually male, imprint with human handlers and then treat them as another llama. Llamas are very aggressive among themselves and head butt and bite to establish dominant. If they imprint on humans they will do that to their handlers.

South American camelids defecate and urinate on a **communal dung pile** and they do not graze near or

downstream from the dung piles.(It is a normal behavior)

- **Preventive Medicine**

Organisms transmitted by milk include: mycobacterium bovis (TB), listeria monocytogenes, Brucella abortus and coxiella burnetti (Q fever).

Animal diarrheas with public health/zoonotic significance: cryptosporidiosis (protozoa in drinking water), salmonellae and E. Coli

Sentinel animals are typically susceptible to a particular disease and are used in laboratories and in the wild to monitor the environment and determine if that disease is on the rise.

Carcass from BSE should not be disposed by **rendering** because the prions are still infective and rendered material may be used as animal feed.

- **Epidemiology**

TP =		Diseased	Non-Diseased	Total
	Test Positive	A (TP)	B (FP)	A+B
	Teste Negative	C (FN)	D(TN)	C+D
	Total	A+C	B+D	A+B+C+D

True Positive

FP = Fake Positive

FN = False Negative

TN = True Negative

Sensitivity: $A/(A+C)$. High sensitivity means you can trust a **Negative** test (few false negative). You want a sensitive test for 1. Diseases that are rare (eg: BSE), 2. Diseases where early diagnosis improved prognosis (eg. HIV in people) and 3. the disease is highly lethal and with severe consequences for missing (eg. Rabies, Brucellosis, BSE).

Specificity: $D/(B+D)$. High specificity means you can trust a Positive test (few false positives). High specificity is important in diseases with high prevalence (kannel cough) and where early diagnosis or treatment does not improve prognosis.

Sensitivity and specificity are inherent to the test and are not affected by the population.

Prevalence: $(A+C)/(A+B+C+D)$

Positive predictive value (PPV): $A/(A+B)$

Negative predictive value (NPV): $D/(C+D)$

x Practice Exercise (BCSE)

You screen 1000 cows with a new blood test for bovine spongiform encephalopathy (BSE). You also send brain tissue to the lab for confirmation (The gold standard). 200 cows were confirmed to have BSE based on the gold standard test.

- Of the 200 cows with BSE, 190 teste positive on your new test.
- Of the 800 cows without BSE, 4 tested positive.

Calculate the sensitivity, specificity, prevalence, positive predictive value and negative predicted value.

	Diseased	Non-Diseased	Total
Test Positive	190	4	194
Teste Negative	10	796	806
Total	200	800	1.000

Sensitivity:

$190/200 = 0.95$

Specificity: $796/800 = 0.995$

Prev: $200/1000 = 0.2$

PPV: $190/194 = 0.98$

NPV: $796/806 = 0.9875$

Therefore, the test will detect 95% of cows with BSE and will miss 5% of cows with BSE. However, the test will correctly rule

out BSE in 99.5% of healthy cows but will diagnose 0.5% of healthy cows with BSE.

With 98% PPV and 99% NPV, this test is probably a pretty good screening test for the herd. So, 98% of the cattle that test positive truly had the disease and 99% of the cattle that tested negative were truly disease free.

- **Veterinary Inspection at Slaughter**

Rectal temperature for slaughter: 106 (41C) for pigs and 105 (40.5C) for cattle, sheep, goats, horses and mules.

In the US it is illegal to consume: lungs (TB), brain (rabies, BSE), laryngeal muscles (rabies) and thyroid gland (thyroid hormone).

Temperature for pasteurization is set by *Coxiella burnetti*, which is extremely heat resistant and causes Q fever.