

Adaptive Learning: Innovative Approaches to VTNE Preparation



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**“To achieve great things,
two things are needed;
a plan, and not quite enough time.”**

- Leonard Bernstein



Retrieval Practice Teaching for VTNE Success:

Helping Students Prep for a Test About "Everything"

- **Learn better by testing**
- **When in doubt, GUESS**
- **Walk before you run:**
 - Organizing the Home Stretch
- **Accountability:**
 - The den mother effect



Pop Quiz... yay?



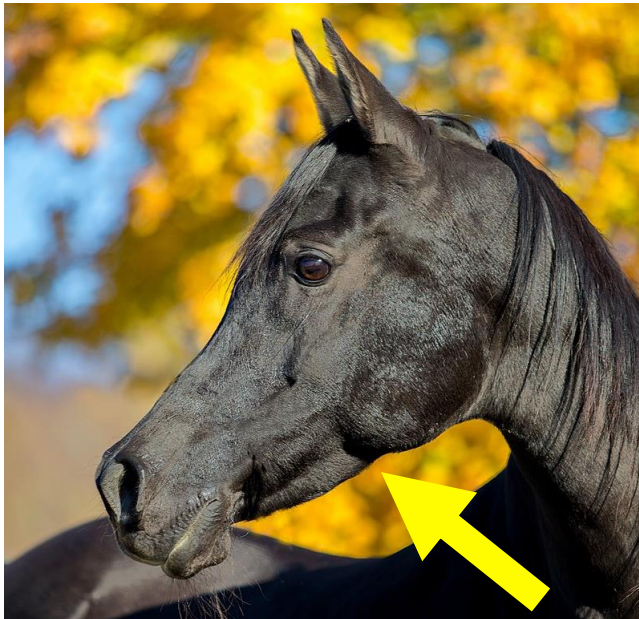
Which animal has the slowest resting heart rate?

- A. Dog
- B. Pig
- C. Cat
- D. Ferret
- E. Horse
- F. Sheep

Which animal has slowest resting HR?

Horse: 28-44 bpm

Horses are athletes



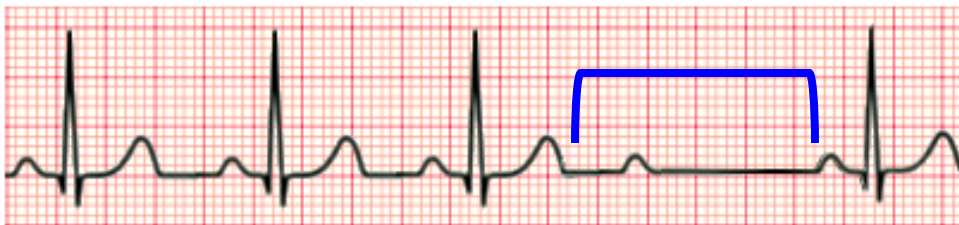
Palpate the facial artery as it courses over the mandible just in front of the masseter muscle.

Image courtesy of [OliverSeitz](#)

Unique horse physiology

Cardiovascular

- Large animals w/ **slow** resting HR (24-48 bpm)
- Prone to a normal arrhythmia called **second-degree AV block** (dropped beat)



Top - A horse wearing a Holter monitor - records a 24-hour and exercising ECG.
Bottom - 2nd degree AV block is common in horses. See the "dropped" beat (arrow).
Images courtesy of Nora Grenager, VMD, DACVIM (top) and [apatchett](#) (bottom)



Respiratory

- Horses **cannot breathe through their mouths**
- They are athletes with HUGE lungs

What is the best location for an IM injection in a cow?

(besides Vermont in June)



Image courtesy of Liz Brock, DVM, MS

Neck is best!

Caudal thigh will do in a pinch.



Demonstration of safe locations for intramuscular injections in the cow: neck (left image) and caudal thigh (right image)

Images courtesy of Liz Brock, DVM, MS

Medication administration, continued

Intramuscular (IM)

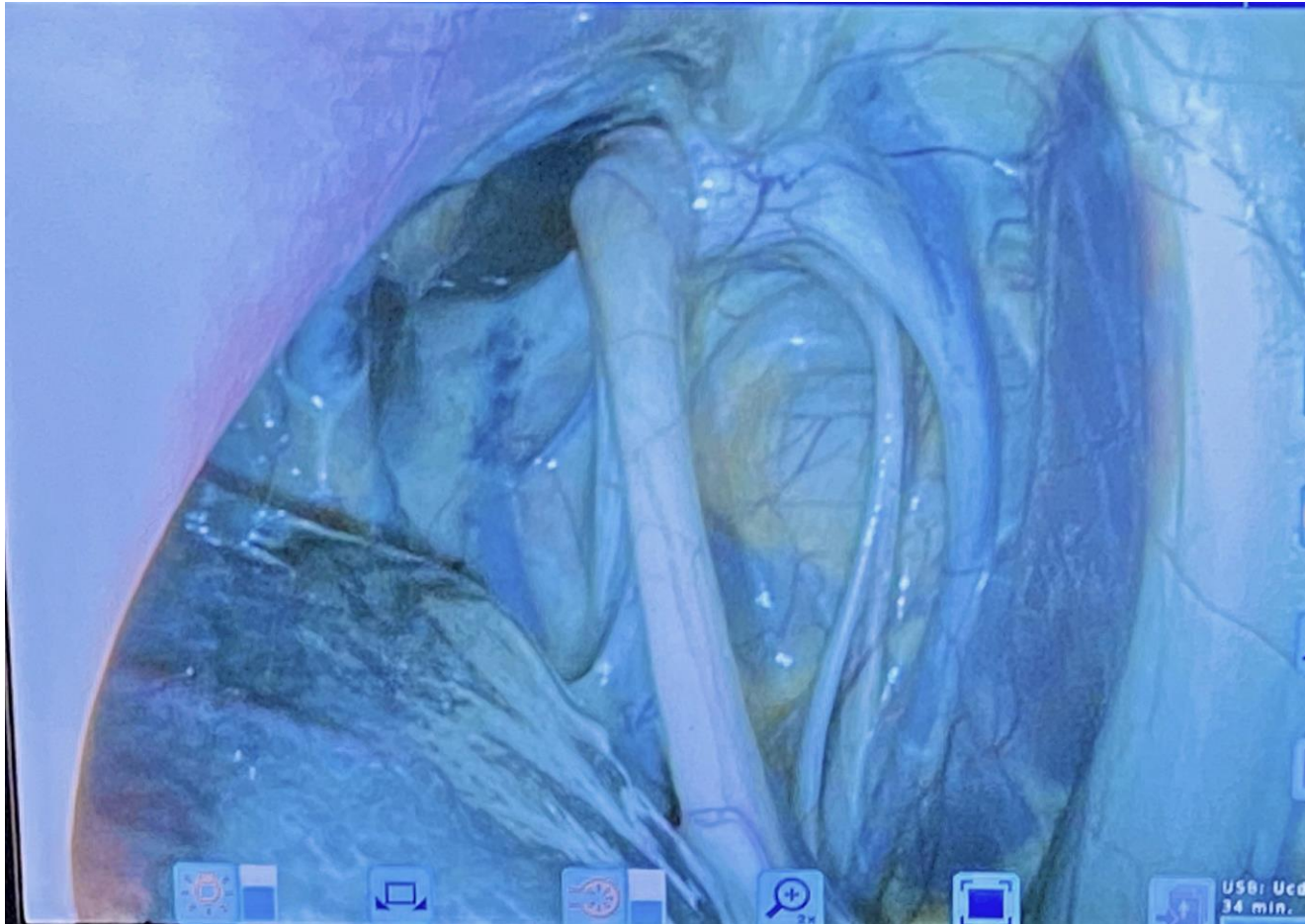
- What: Vaccines, antibiotics, vitamins
- Where:
 - Neck for best Beef Quality Assurance
 - Caudal thigh muscles, beware of sciatic nerve



Demonstration of safe locations for intramuscular injections in the cow: neck (left image) and caudal thigh (right image)

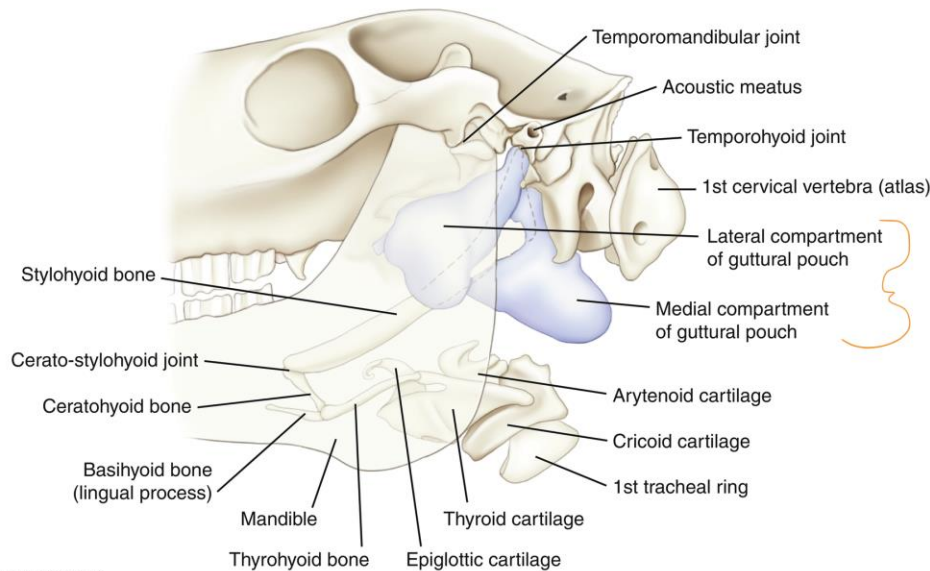
Image courtesy of Liz Brock, DVM, MS

What (the heck) is a guttural pouch?



What is a guttural pouch?

Part of the ear - an air-filled out-pouching of the Eustachian tube



Unique! Only horses/donkeys, some rhinos, tapir, and bats!

What is the heart rate of a cow?



TPR and the clinical exam, continued

Exam, continued

- **Left side:**
 - **Auscultate:**
 - HR, RR
 - P: **60-84 beats/min**
 - R: 18-28 breaths/min
 - Heart and lung sounds
 - **Rumen contractions**
 - 1-2/min
 - **Ping left paralumbar fossa (PLF)**
 - **Observe:** Look for jugular pulses, check **hydration** on skin of neck



Demonstration of auscultation of heart (top) and rumen (bottom)

Images courtesy of Liz Brock, DVM, MS

Learn Better, by Testing: Retrieval Practice

- Pulling information **OUT** of our heads (retrieval) beats cramming
- **LOW-stakes** practice testing=**DECREASED** anxiety
- **INCREASED** comfort making mistakes is good for learning

Two wrong ideas about learning

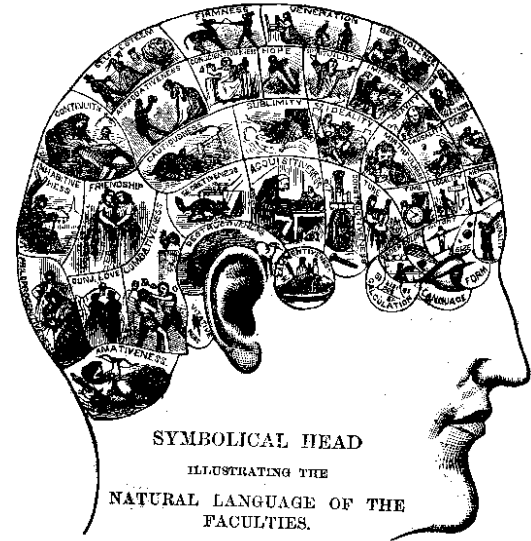
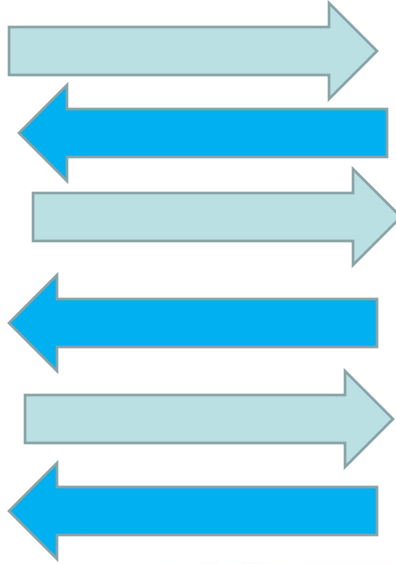


- **Cramming facts in = learning**
- **Mistakes are bad**

How We THINK We Learn



How We Really Learn: Working Memory



Selected references:

Good summaries

Retrieval practice resources online <https://www.retrievalpractice.org/>

“To Really Learn, Quit Studying and Take a Test”, New York Times, Jan 20, 2011, P. Belluck
<http://www.nytimes.com/2011/01/21/science/21memory.html>

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Books and Peer-reviewed papers

Retrieval-Based Learning: A Decade of Progress (2017), Karpicke, JD in
Learning and Memory: A Comprehensive Reference, 2nd ed., John H. Byrne, editor. Vol. 2, pp. 487-514.
<http://dx.doi.org/10.1016/B978-0-12-809324-5.21055-9>

Make it Stick: The Science of Successful Learning (2014). Brown, Roediger and McDaniel
<https://www.retrievalpractice.org/make-it-stick>

Karpicke, J. D., & Blunt, J. R. (2011). *Retrieval practice produces more learning than elaborative studying with concept mapping*. Science, 331, 772-775.
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Roediger, H. L., & Karpicke, J. D. (2006). *Test-enhanced learning: Taking memory tests improves long-term retention*. Psychological Science, 17, 249-255.
http://memory.psych.purdue.edu/downloads/2006_Roediger_Karpicke_PsychSci.pdf

Roediger, H. L. & Karpicke, J. D. (2006). *The power of testing memory: Basic research and implications for educational practice*. Perspectives on Psychological Science, 1, 181-210.
http://memory.psych.purdue.edu/downloads/2006_Roediger_Karpicke_Review.pdf

Carrier and Pashler: *The Influence of Retrieval on Retention, Memory and Cognition*, 1992, 20 (6) 633-642
http://laplab.ucsd.edu/articles/Carrier_Pashler_MemCog1992.pdf

Retrieval practice

- **A learning strategy,**
(not an assessment strategy)
- **“Desirable difficulty”**
 - Mental struggle during retrieval strengthens learning
 - Better than easy learning w/out struggle (cramming)
- **Like practicing the saxophone**
 - When students practice their knowledge
 - They remember information better, long-term



Retrieval Practice How Tos

- **When is best?**
 - **AFTER** a lesson = more robust learning
 - Also good to challenge students a week later
- **Should I give feedback? YES!**
 - Corrects retrieval mistakes
 - Better explanations= more powerful learning
- **Should I use multiple choice, short answer, essay, call and response or what?**
 - **All of the above**

Horses usually can **NOT** do which one of these things?

- A. Breathe through their nostrils
- B. Vomit
- C. Digest grains
- D. Sleep standing up
- E. Pass gas

Horses cannot [usually] do which of the following?

B. Vomit

The position of the stomach when it is full plus a tight sphincter between the oesophagus and stomach make vomiting nearly impossible

SO...

if you see a horse with feed coming out its nostrils, it's an emergency!

(either esophageal obstruction or a stomach that is about to rupture)

This is why we pass nasogastric tubes on any horse with colic.



Retrieval Practice How Tos

- **Should I do retrieval practice for grades? NO**
 - Low-stakes practice decreases student anxiety
 - Less pressure & more comfort with mistakes
=Increased learning
- **Do I need to change my curriculum? NO**
 - Just add quick retrieval opportunities to class
 - Help students get information OUT
- **Will frequent quizzes increase test anxiety? NO**

Strategic Guessing

Test performance improves with strategic elimination, using what you do know to narrow down options and manage anxiety.



Multiple choice tricks of the trade

- **The Good News**

Correct answer is **GUARANTEED** to be among the choices

- **The Bad News**

You **WILL** hit questions you don't know

Common mistake: Spending MOST of your time on questions about which you know the LEAST.

- **Key to success:**

Train yourself to MAKE CHOICES and then MOVE ON.

Guess for Success

- SKIM the answers (5 seconds),
then **READ** the question, and look away
- **ASK** “What is this about?”
-Dx? Rx? Px? Calculation? Trivial Pursuit/I’m Doomed?”
- **PREDICT / GUESS**
Is your answer the best of the choices ?
If “Yes” **SELECT** it and move on
- Unsure of the correct answer ?
ELIMINATE wrong ones, choose from what’s left,
and MOVE ON

A better way to do questions:
Read the answers FIRST

A. Mydriasis

B. Meiosis

C. Myiasis

D. Miosis

E. Mitosis

OK, so
something to
do with
vocabulary

A better way to do questions:
Look at image **SECOND (if there is one)**



Hmm,
something is
funny about
the cat's
eyes...

A better way to do questions:
Read the question LAST

You are presented with a cat that looks like this. What is this condition called?



OK, starts with
an “**M**” and it
means “**tiny
pupils**”

- A. Mydriasis
- B. Meiosis
- C. Myiasis
- D. Miosis CORRECT!**
- E. Mitosis

Miosis and Mydriasis



Miosis (constricted, small pupils)

- Pilocarpine
- Bright sunlight



Mydriasis (dilated, big pupils)

- Atropine or glycopyrrolate pre-meds
- May see after severe head trauma
- Dark room

A picture IS worth a thousand words:



Horner's syndrome:

Remember:

“My third sunken toe”

- Miosis
- Third lid protrudes
- Sunken eye
- Ptosis (drooped upper eyelid)

A better way to do questions:
Read the answers FIRST

A. Macrophage

B. Lymphocyte

C. Neutrophil

D. Thrombocyte

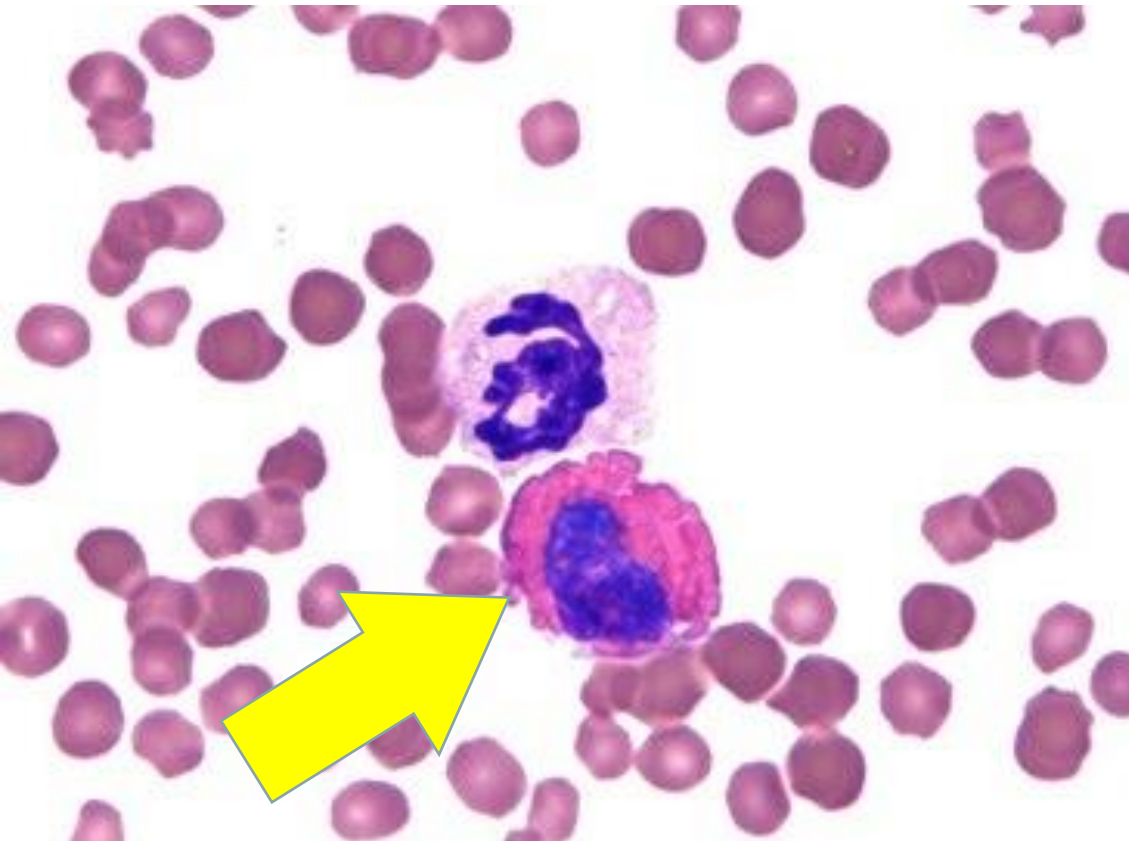
E. Eosinophil

What kind of question is this?

“Something about white blood cells”

A better way to do questions:

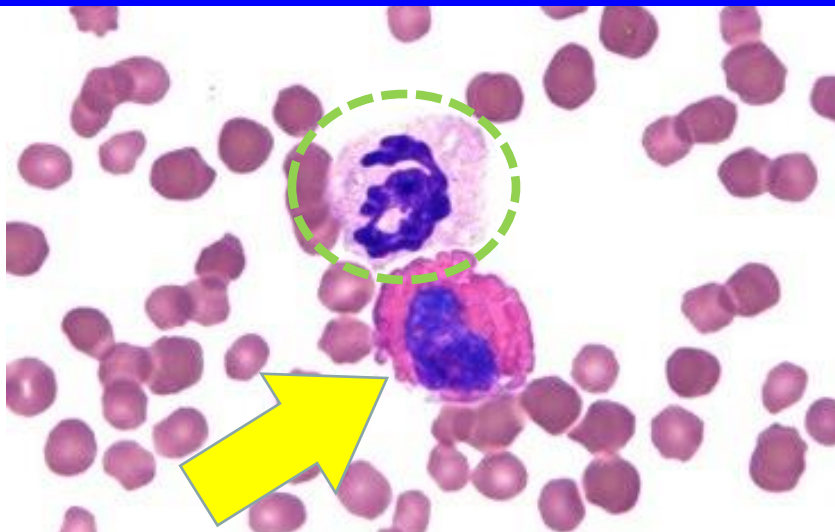
Look at image SECOND (if there is one)



What kind of
cell is this?

Read question last and **GUESS Strategically**

What kind of white blood cell is indicated by the yellow arrow? (equine)



- A. Macrophage
- B. Lymphocyte
- C. Neutrophil
- D. Thrombocyte

E. Eosinophil CORRECT!

Cross out the
ones you know
are wrong...
and guess!

GUESS Strategically, answers 1st

A. Roundworm

uddenly last night reveals the
of eggs are these?

B. Fluke

What kind of
question?

C. Whipworm

*“Something
about
parasites”*

D. Coccidia

E. Hookworm

GUESS Strategically, image 2nd



What kind of eggs are these?

GUESS Strategically, cross outs

A fecal sedimentation exam on a sheep that died suddenly last night reveals the following objects under the microscope. What type of eggs are these?

B. Fluke
CORRECT!



Cross out the ones you think are wrong... and guess!

Whipworm egg?

Hookworm egg?

Roundworm egg?

A. Roundworm

B. Fluke

C. Whipworm

D. Coccidia

E. Hookworm

What doesn't work

Organizing the Home Stretch for VTNE Success



- Free test prep service, no skin in the game
- No structured program (“Sink or swim”)
- Negative reinforcement / punishment-based

Walk before you run:

Organizing the Home Stretch for VTNE Success

- **Structure class by VTNE practice domains**
 - 1-2 weeks per topic
 - Assign completion targets in practice testing
 - Classes are high-altitude reviews
 - Timed quiz on topic each week
 - Grade on completion/participation, not test scores
- **Mock readiness exam at end of class**
- **GOAL:**
 - Each student leaves w/ clear idea of how to continue their VTNE prep

VTNE Practice Domains

1. Pharmacy & Pharmacology	20 Qs	(13%)
2. Surgical Nursing	20 Qs	(13%)
3. Dentistry	10 Qs	(7%)
4. Laboratory Procedures	14 Qs	(9%)
5. Animal Care and Nursing	30 Qs	(20%)
6. Diagnostic Imaging	9 Qs	(6%)
7. Anesthesia	20 Qs	(13%)
8. Emergency Medicine/Critical Care	10 Qs	(7%)
9. Pain Management/Analgesia	10 Qs	(7%)
10. Communication, Vet Prof Support Svcs	7 Qs	(5%)
150 Qs*		(100%)

***Remember:** On test day, you will actually do 170 questions total, but 20 “pilot” questions don’t count. You won’t know which ones are the pilot questions.

Communication and Veterinary Professional Support Services

A **Educate the client** about animal care, risks, and side effects to promote and maintain the health of animals and the safety of client/public (including but not limited to behavior, nutrition, dental health, anesthetic procedures, pain assessment/management, pre- and post-operative care, pharmacological/biological/chemical agents, preventative care, zoonosis)

B **Maintain professional communication** in all client and veterinary team interactions.

C **Collect patient information** (including but not limited to signalment, medical history, primary complaint).

D Provide **assistance with the euthanasia process** (including but not limited to consent, aftercare, grief management).

Walk before you run:

Organizing the Home Stretch for VTNE Success

- **Example: Lab Review**
 - 1-2 weeks
 - Correctly complete 80% of practice tests (in-class and at home)
 - High-altitude summary reviews on things like CBC, U/A, Basic Blood Chem, Parasites etc
 - Use retrieval practice Qs at end of each class
 - Timed quiz on topic each week
- **Mock readiness exam at end of class**

Accountability



Den Mother

or



Drill Sargent

Accountability

- **Most important ingredient for a successful prep program is you.**
 - Students need to know you are paying attention
 - Skin in the game matters
 - Continuity matters
 - Positive reinforcement helps a lot



Pop Quiz , YAY!



What internal organ will you hear if you put a stethoscope in the yellow oval?

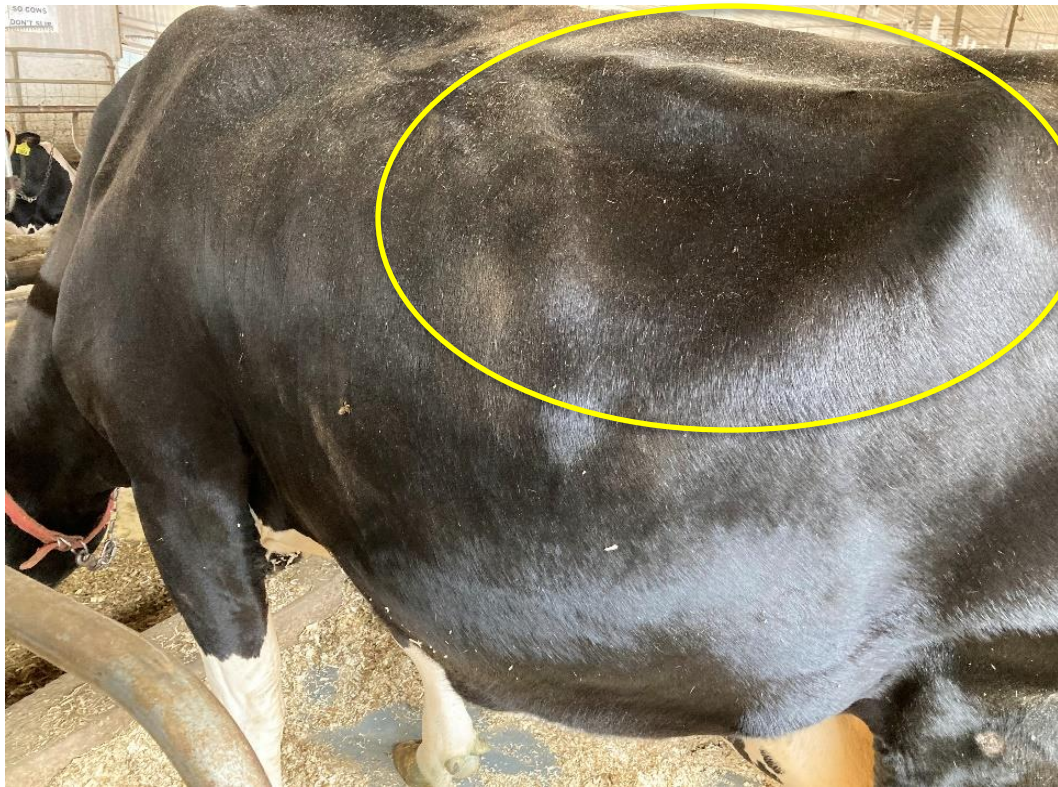


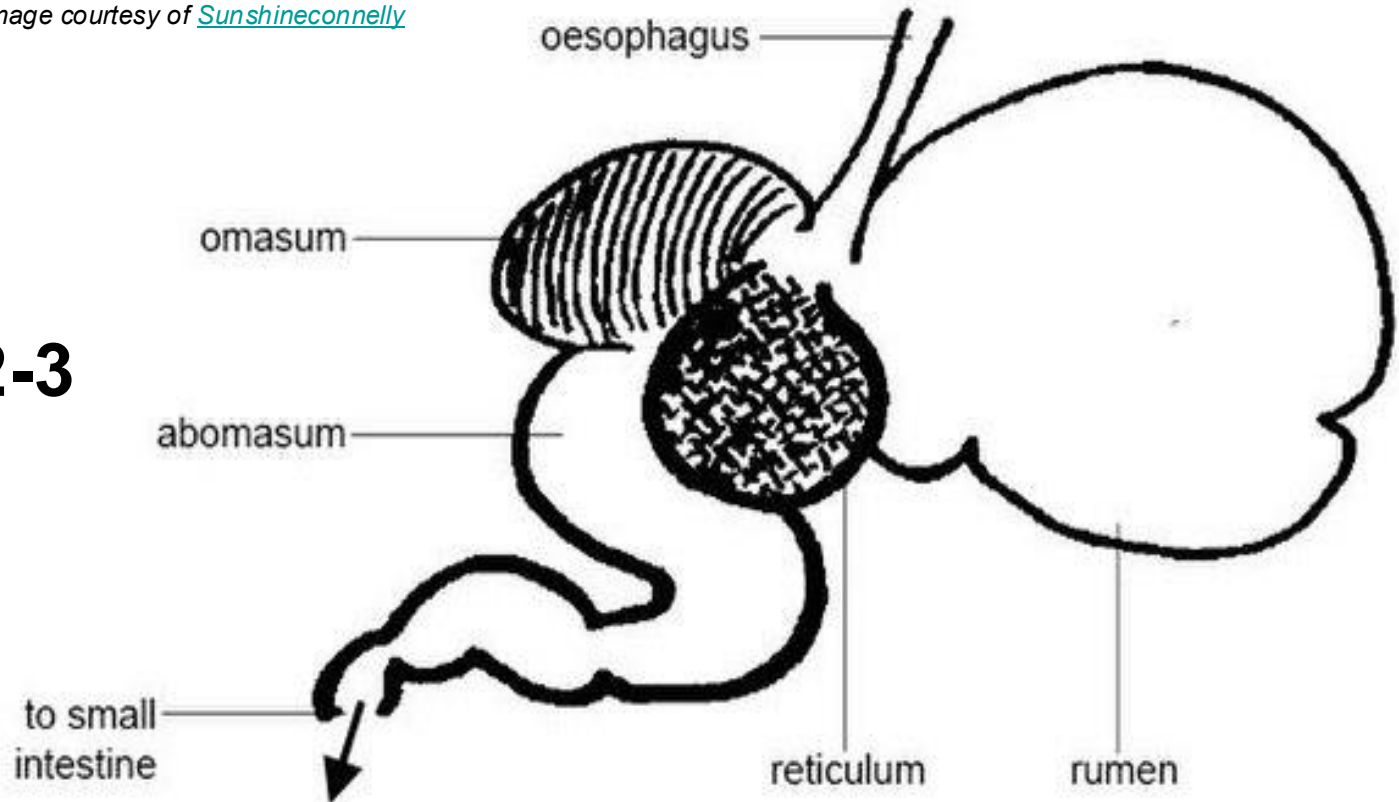
Image courtesy of Liz Brock, DVM, MS

The Rumen!

Anatomy of the bovine forestomach

Image courtesy of [Sunshineconnelly](#)

**A healthy
rumen
contracts 2-3
times per 2
minutes**



What do you do when you see this pattern on the ECG of a racehorse?



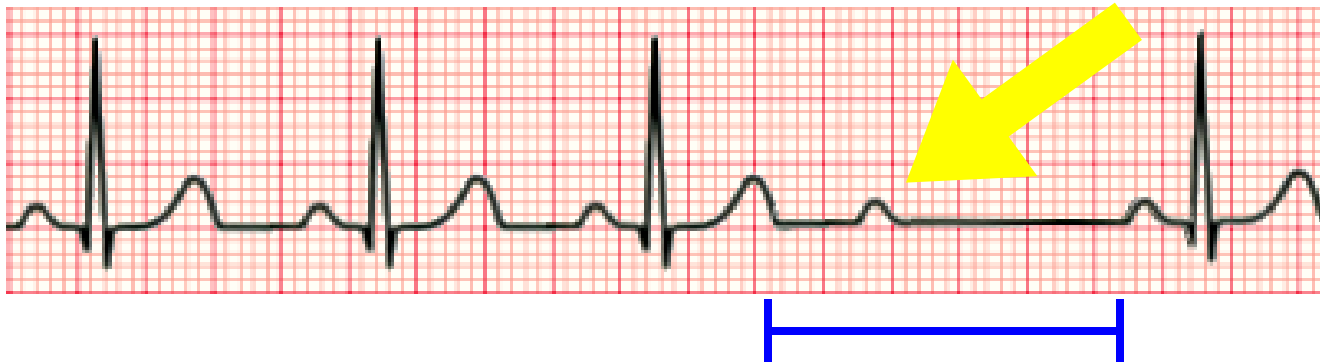
- A. Run around waving your arms
- B. Weep
- C. Check your electrode placement
- D. Help the vet administer oxygen
- E. Set up to place an I.V. STAT!
- F. Yawn

What do you do when you see this pattern on the ECG of a racehorse?

Yawn...

An occasional dropped beat in an athletic horse is ok

Horses are prone to a normal arrhythmia called
second-degree AV block



The South American tapir is most similar to which domestic veterinary species?



The horse!

(They both have guttural pouches)



What do you get from a pampered cow?



Image courtesy of Liz Brock, DVM, MS

Spoiled milk!



Image courtesy of Liz Brock, DVM, MS

Thank you and good luck!



**“I have never let my schooling
interfere with my education.”**

–Mark Twain

