University of Florida College of Veterinary Medicine

I. Course information
   Course Title: VEM 5473, Large Animal Anesthesiology
   Phase: III
   Semester: Fall
   Course credit: 1
   Course grading: Letter

II. General information
   Course director: Luisito Pablo
   Office location & office hours: VC-108; by appointment
   Office phone number – 352-294-4340
   Email: pablochi@ufl.edu
   Course Faculty: Luisito Pablo, Fernando Garcia, Tiffany Granone, Andre Shih, and Jennifer Bornkamp

III. Course description
   Course goals;
   Educational goals of the course: Provide students the principles and knowledge necessary for the practice of safe anesthesia in large animals; Guide the students in solidifying their knowledge and understanding of large animal anesthesiology by relating what they experienced in the anesthesiology clerkship.
   Course objectives: Provide students the essential information for a safe practice of large animal anesthesia; guide the students in applying physiology and pharmacology in large animal anesthetic practice; point out the principles behind the techniques they experienced in the anesthesiology clerkship

   Course Outline & schedule:

   Course Outline

   1. General anesthesia in cattle
   2. Equine field anesthetic techniques
   3. General anesthesia in horses (OR setting)
   4. Anesthesia of the small ruminants and camels
   5. Management of respiratory problems during anesthesia in large animals
   6. Local anesthetic techniques in large animals
   7. Pain management for large animal patients
   8. Management of anesthetic problems and complications in equine anesthesia
   9. Large Animal Case Management (2 IPs)
   10. Monitoring the anesthetized large animal patients
   11. Anesthesia of the pig
   12. Field anesthesia laboratory

   Schedule

<table>
<thead>
<tr>
<th>TOPICS</th>
<th>INSTRUCTORS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to the course (10 mins.)</td>
<td>PABLO</td>
</tr>
<tr>
<td>General anesthesia in cattle</td>
<td>PABLO</td>
</tr>
<tr>
<td>Equine anesthesia - field techniques</td>
<td>PABLO</td>
</tr>
<tr>
<td>General anesthesia in horses</td>
<td>PABLO</td>
</tr>
<tr>
<td>Anesthesia of the small ruminants and camels</td>
<td>PABLO</td>
</tr>
<tr>
<td>Management of respiratory problems during anesthesia in large animals</td>
<td>PABLO</td>
</tr>
<tr>
<td>Local anesthetic techniques in large animals: part of preemptive analgesia</td>
<td>PABLO</td>
</tr>
<tr>
<td>Pain management for large animal patients</td>
<td>GRANONE</td>
</tr>
<tr>
<td>Problems and complications in equine anesthesia</td>
<td>SHIH</td>
</tr>
<tr>
<td>Field anesthesia lab (Ponies) Tentative (not funded as of the preparation of the schedule) (Area between Barn A &amp; Foal Unit)</td>
<td>PABLO</td>
</tr>
<tr>
<td>Equine anesthesia and surgery lab 1 (VAB)</td>
<td>PABLO</td>
</tr>
<tr>
<td>Case management Part I: Pregnancy and acute abdominal crisis</td>
<td>SHIH</td>
</tr>
</tbody>
</table>
IV. Course Materials

Include Learner Objectives and Key words for each IU

1. Lecture: General Anesthesia in Cattle (1 IP)

Keywords: Regurgitation, Bloat, Salivation, Atropine, Sedative, tranquilizers, Analgesics, Field Anesthesia, Thiopental, Guaifenesin, Ketamine, Xylazine, Maintenance, Recovery, Cattle

Objectives:
1. To discuss the preoperative considerations and anesthetic hazards specific to cattle
2. To discuss preanesthetic medication in cattle
3. To enumerate and discuss the different anesthetic induction and maintenance methods available for cattle
4. To address the monitoring of anesthetized cattle.
5. To discuss the important points when recovering cattle from general anesthesia

2. Lecture: Equine Anesthesia - Field Techniques (1 IP)

Keywords: Field Anesthesia, IV Anesthesia, Single Bolus, Repeated Boluses, Constant Infusion, IM, Oral, Standing Technique, Field Castration, Recumbency Times,

Objectives:
1. To discuss the preoperative considerations and preparation specific to field anesthesia in horses
2. To present the different anesthetic combinations used in field anesthesia.
3. To discuss the use of total IV anesthesia as an alternative to inhalant agent
4. To discuss the use of constant rate infusion for standing sedation

3. Lecture: General Anesthesia in Horses (1 IP)

Keywords: Acepromazine, Xylazine, Detomidine, Medetomidine, Romifidine, Diazepam, Chloral hydrate, Acepromazine-xylazine, Neuroleptanalgesic combinations, Parasympatholytic agents, Guaifenesin, Thiopental, Ketamine, Xylazine, Telazol, Inhalation agents, Monitoring, Recovery

Objectives:
1. To discuss the preoperative considerations and preparation specific to horses that will have surgery or procedure inside the hospital or operating room
2. To present the important aspects of pre-anesthetic medication in horses.
3. To enumerate and discuss the different anesthetic induction and maintenance methods available for horses.
4. To address the monitoring of anesthetized horses.
5. To discuss the important points when recovering horses from general anesthesia

4. Lecture: Anesthesia of the Small Ruminants and Camelids (1 IP)

Keywords: Balanced Anesthesia, Analgesia, Pain, Reversal Agents, General Anesthesia, Species Specific, Sheep, Goat, Camelids, Preoperative Fasting, Induction, Maintenance, Intubation, Recovery, Field Anesthesia,

Objectives:
1. To discuss the preoperative considerations and anesthetic hazards specific to small ruminants (goats, sheep, camelids and calves)
2. To discuss preanesthetic medication in small ruminants
3. To enumerate and discuss the different anesthetic induction and maintenance methods available for small ruminants
4. To address the monitoring of anesthetized small ruminants
5. To discuss the important points when recovering small ruminants from general anesthesia

5. Lecture: Management of Respiratory Problems during Anesthesia in Large Animals (1 IP)

Keywords: Hypoventilation, Hypoxemia, Ventilation-perfusion mismatch, Intrapulmonary Shunting, Management, Dead Space Ventilation

Objectives:
1. To explain the respiratory abnormalities, mainly hypoxemia and hypoventilation, that occur in horses and cattle during general anesthesia
2. To discuss the management of these respiratory abnormalities during anesthesia

6. Lecture: Local Anesthetic Techniques in Large Animals: Part of Preemptive Analgesia (1 IP)

Keywords: Infraorbital nerve block, Auriculopalpebral nerve block, Supraorbital (Frontal) Nerve Block, Lacrimal Nerve Block, Infraotochlear Nerve Block, Zygomatic Nerve Block, Mental Nerve Block, Mandibular Alveolar Nerve Block, Palmar digital nerve block, Abaxial sesamoid block, Low palmar nerve and palmar metacarpal nerve blocks, High palmar and palmar metacarpal nerve block, Lateral Palmar Nerve Block, Median nerve block, Medial cutaneous antebrachial nerve block, Ulnar nerve block, Tibial Nerve Block, Deep and Superficial Peroneal Nerve Block, Caudal Epidural Analgesia, Infraorbital Nerve Block, Anesthesia of the Interdigital Region (cow)

Objectives:
1. To explain the importance of preemptive analgesia in large animals
2. To present practical techniques in providing preemptive analgesia in large animals.
3. To present the local anesthetic techniques in large animals that can be used during general anesthesia

7. Lecture: Pain Management for Large Animal Patients (1 IP)

Keywords: Analgesia, large animals, Pain, Negative Effects of Pain, Primary and Secondary Hyperalgesia, Preemptive Analgesia, Acute Pain, Chronic Pain, Visceral Pain, Somatic Pain, Pain Assessment, Physiologic Changes, Analgesics, opioids, NSAIDs, local anesthetic, alpha-2 agonists, NMDA antagonists, fentanyl patches, alternative therapies, Septic Arthritis, Epidural, Drug Rules

Objectives:
1. To discuss the unique issues in providing analgesia in large animals
2. To emphasize the negative effects of pain in large animals
3. To discuss pain assessment in large animals
4. To present the different drugs that can be used in providing analgesia in large animals

8. Lecture: Problems and Complications in Equine Anesthesia (1 IP)

Keywords: handling problems, intracarotid injection, perivascular injection, drug reactions, airway obstruction, deep and light anesthesia, hypotension, blood loss, hyperkalemia, hypocalcemia, neuropathy, myopathy, cardiac arrest, problems during recovery, priapism, spinal cord infarct

Objectives:
1. To provide an overview of the potential complications that can be encountered during large animal anesthesia
2. To describe the steps on how to avoid these complications where possible
3. To provide clinically based solutions to these complications

9-10 Lectures: Case Management: Pregnancy, Acute Abdominal Crisis, Head and Neck Procedures and Orthopedic Procedures (2 IPs)

Keywords: Pregnancy, C section, dystocias, colic, drugs, head and neck procedures, airway management, limited access, reflex bradycardia, intraocular pressure, neuromuscular blockade, specific head and neck procedures, orthopedic procedures, recovering patients with orthopedic problems
Objectives:
1. To discuss the pathophysiological effects of anesthesia on the different organ systems specific to large animals
2. To discuss the anesthetic considerations when dealing with different diseases in large animals
3. To guide the students in choosing the appropriate anesthetic protocol when dealing with specific disease and surgical conditions

11. Lecture: Monitoring the Anesthetized Horse (1 IP)

Keywords: Circulation, Oxygenation, Ventilation, Pulse, Respiration, Reflexes, Mucous membranes and Capillary Refill Time, Electrocardiogram, Blood Pressure (direct and indirect), Blood Gases and Acid Base Status, Pulse Oximetry, End-Tidal Gases, Monitoring Neuromuscular Blockade, and Cardiac Output.

Objectives:
1. To discuss in more details the different monitoring tools that can be used in large animals including the principles of each monitoring tool
2. To discuss the significance of the findings from the different monitoring tools used in large animals

12. Lecture: Anesthesia of the Pig (1 IP)

Keywords: anatomic consideration, restraint, preanesthetic medications, atropine, azaperone, acepromazine, alpha-2 agonists, induction, ketamine, Telazol®, thiobarbiturates, pentobarbital, intubation, maintenance, halothane, isoflurane, sevoﬂurane, epidural, analgesia, monitoring, euthanasia, production issues, and withdrawal times

Objectives:
1. To discuss the general preoperative considerations and preparation specific to pigs
2. To present the important aspects of preanesthetic medication in pigs
3. To describe and discuss the different anesthetic induction and maintenance methods available for pigs
4. To address the monitoring of pigs

13. Laboratory: Field Anesthesia

Objective:
To provide the students the experience of performing field anesthesia in horses.

Required texts: none

Recommended/ Reference texts:
SCAVMA notes

Additional Resources/ equipment: Live ponies, injectable anesthetic drugs, syringes, and needles are needed for the field anesthesia laboratory.

V. Evaluation/ Grading/ Testing:

Accommodations for Students with Disabilities - Students requesting accommodations must first register with the Dean of Students Office, Disability Resource Center at 352-392-8565. Students may also apply on-line for accommodations. For more information, see the Disability Resource Center website at: http://www.dso.ufl.edu/drc/

The Disability Resource Center will provide a letter to the student who must then meet with the course instructor to discuss the required accommodations. Once notification is complete, the instructor can work with the Disability Resource Center to provide the requested accommodations. To ensure that necessary accommodations are provided
in a timely manner, it would expedite this process if any student who might need an accommodation would notify the course coordinator during registration.

VI. Administrative Policies: see Student Handbook @ http://education.vetmed.ufl.edu/dvm-curriculum/student-handbook/

Honesty Policy - All students registered at the University of Florida have agreed to comply with the following statement: “I understand that the University of Florida expects its students to be honest in all their academic work. I agree to adhere to this commitment to academic honesty and understand that my failure to comply with this commitment may result in disciplinary action up to and including expulsion from the University.” In addition, on all work submitted for credit the following pledge is either required or implied: “On my honor I have neither given nor received unauthorized aid in doing this assignment.” To review the student honor code please visit: http://www.dso.ufl.edu/judicial/honorcodes/honorcode.php

Plagiarism includes any attempt to take credit for another person’s work. This includes quoting directly from a paper, book, or website, without crediting the source. Sources should be noted, a link to the website added, or quotation marks placed around the material and attributed, even during online discussions. However, the instructor expects more than simply cutting and pasting in this graduate-level course. Students are expected to review, evaluate and comment on material they research, rather than simply copying relevant material. Work will be graded accordingly.

Student Evaluation of Instruction - Evaluations are performed electronically at the end of the course. To evaluate the instructor, visit the UF Evaluation site at: https://evaluations.ufl.edu/evals/

VII. Other information:
The final grade will come from the final examination. The final examination will be made up of multiple choice questions. Sample test questions

Multiple choice questions for the final exam:

A 2000-lb bull is anesthetized using isoflurane. The animal is placed in right lateral recumbency for circumcision. It is salivating profusely and continuously during anesthesia. How will you manage the salivation?

A. Administer atropine to stop the salivation.
B. Administer glycopyrrolate because it is a better antispasmodic.
C. Stop the surgical procedure and recover the animal from general anesthesia.
D. Place the animal in sternal recumbency.
E. Lower the head and allow the saliva to flow out freely.

You are planning on doing a castration on a 450-kg stallion using xylazine and ketamine. Five minutes after giving 5 ml of 10% xylazine IV to this horse, the head is still above the level of the withers and the sedation appears to be mild. What would you do next?

A. Tell the owner of the horse that this horse should not be anesthetized because of his resistance to drugs.
B. Give additional xylazine IV and wait for better sedation before giving ketamine.
C. Administer ketamine at 2.0 mg/kg IV.
D. Administer ketamine at a higher dose to compensate for the inadequate response from xylazine.
E. Reverse the xylazine using yohimbine. Wait for the horse to be completely responsive and try again using detomidine.

Extra credit assignments- none

Hints on studying – Attendance and listening to lectures will help the students understand the more difficult concepts in large animal anesthesia. Participation in the field anesthesia laboratory is mandatory.