AAALAC International is a private, nonprofit organization that promotes the humane treatment of animals in science through voluntary accreditation and assessment programs. More than 700 institutions around the world have earned AAALAC International accreditation, demonstrating their commitment to responsible animal care and use. They include universities, hospitals, government agencies, pharmaceutical and biotechnology companies, and other types of research organizations. The University of Tennessee Medical Center, Knoxville was originally AAALAC accredited in 1970. The University of Tennessee’s Colleges of Veterinary Medicine, Arts and Sciences, and Human Ecology became AAALAC accredited in the early 1980’s. The units were officially merged in June 2000 when the entire campus of The University of Tennessee, Knoxville became AAALAC accredited.

Our next AAALAC accreditation site visit is scheduled for this summer 2016. AAALAC evaluates all aspects of an animal care and use "program." An animal program (as defined by AAALAC) includes an organization's procedures and overall performance in the area of animal care and use in research, education, testing or breeding. The basic components that are evaluated include (but are not limited to) institutional policies, animal husbandry, veterinary care and the physical plant. We value our AAALAC International accreditation status as it demonstrates our commitment to responsible animal care and use.

During the site visit, AAALAC members with OLAC will tour all of the areas where animals are housed and have experimental procedures performed. This includes laboratories where animals are utilized. The site visitors will observe procedural areas, research and medical records, and ask questions. In the past, site visitors have opened drawers and cabinets. Please ensure that all animal use areas are clean and neat and that animal records are complete and current.

If you would like for OLAC to perform a mock site visit of your laboratory or animal use area, please call the main office at 974-5634 to schedule a visit. If you have any questions, please feel free to call or email olac@utk.edu.
A critical component of protecting animal welfare is the ability to recognize signs of pain and/or distress in our research and teaching animals. Recognition of pain and distress parameters is a necessity both for animal husbandry staff and research personnel.

As part of the daily care of our research and teaching animals, each animal is assessed for general health by the husbandry staff where the animal is housed. When an animal appears abnormal, either in behavior or appearance, the Office of Laboratory Animal Care (OLAC) is promptly contacted. It is important for any animal that appears unwell to be assessed in order that treatment can be implemented, and consequently undue pain and/or distress can be mitigated.

In every protocol, there are study endpoints that the principal investigator has established for the animals on the study.

These endpoints are based on signs of pain and distress and are developed to minimize and/or alleviate pain and distress in the animals involved in the study. There are regulations and policies, both institutional and federal, that mandate the minimization of pain and distress as much as possible to animals used for research and teaching. These endpoints are reviewed by the OLAC veterinarians and the Institutional Animal Care and Use (IACUC) office as part of the protocol approval process.

The University of Tennessee has an institutionally approved standard operating procedure (SOP) for the recognition of pain and distress for our more commonly used animals. This SOP provides an easy reference for investigators to use in establishing study endpoints. This document can also be referenced when, as part of the study, analgesics are needed to be administered the animals on a “as needed” (prn) basis. Technically if a drug is to be given “as needed”, parameters indicating when these drugs need to be given would need to be clearly defined in the protocol. Instead of the principal investigator (PI) having to list the many and various clinical signs of pain in the protocol, the PI can instead state that pain medication will be administered in congruence with the UT SOP for recognition of pain in laboratory animals.

The United States Department of Agriculture (USDA) has recently provided a chart to the inspectors in the USDA Animal Welfare Inspection Guide. This chart provides signs of pain specific to each USDA species listed in the chart. We have incorporated this chart into the UT SOP for Pain Recognition. The updated version now has signs of pain/distress that are specific to the species. In the previous SOP, the monitoring parameters were limited to general clinical signs or pain/distress, such as vocalization, which were briefly defined. The updated version now specifically lists typical signs of pain for each species. We believe that the updated version will be easier to use and can be applied more readily to the species used at University of Tennessee. Also our policy for evaluating pain and distress is now explicitly based on criteria USDA expects their Veterinary Medical Officers (VMOs) to utilize during the annual inspections. We believe that keeping this policy not only current but in line with USDA expectations help ensure that our animal care and use program continues to be one of the best.
UTK Pain and Distress SOP
Available on SharePoint Website under SOPs—General IACUC Policies and Procedures

1.0 Scope and Application

The animal welfare regulations define a painful procedure as “any procedure that would reasonably be expected to cause more than slight or momentary pain or distress in a human being to which that procedure was applied.” Distress is defined as an aversive state in which an animal fails to adjust to various stressors with which it is presented. All vertebrates should be considered capable of experiencing pain and distress. It is the ethical and legal obligation of all personnel involved with the care and use of animals in research to prevent, minimize, and/or alleviate pain or distress in animals that are involved in approved surgical or procedural protocols in accordance with current regulations and recommendations.

2.0 Summary of Method

- Animals should be monitored by trained individuals for pain and distress. Individuals should be aware of the species-specific signs of pain and distress as well as be knowledgeable of the potential outcomes of the procedure. The table below lists a number of behavior signs usually associated with pain. Changes in successive observations could indicate an improvement or deterioration of the animal’s condition.

- The extent and frequency of monitoring will depend on the levels of post-procedural pain or distress anticipated and the chosen intervention strategies. Animals should be monitored at least once daily or more often based on professional judgment and the research being conducted. The animal should be monitored for signs of pain or distress and if observed, the appropriate intervention strategies should be implemented.

- If unexpected pain or distress occurs, the attending veterinarian should be consulted to find the most appropriate method for the elimination of pain or distress. If the pain or distress is more than an isolated incident, the PI must submit an amendment delineating the unexpected problem and stating their proposed resolution.

- Documentation of monitoring is required in the animal’s medical record. This documentation must be available to all personnel responsible for monitoring the animal.

<table>
<thead>
<tr>
<th>Species</th>
<th>Species-Typical Signs of Pain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dogs</td>
<td>Quiet, reluctant or unwilling to move, abnormal posture, lameness, lack of alertness, whimpering, groaning, howling, shivering, loss of appetite, increased respiration, growl or exhibit apprehension when approached, looking at, licking at, rubbing, or chewing a wound or potentially painful area, response elicited when touching or manipulating an area (withdrawal, whine, snap, etc.)</td>
</tr>
<tr>
<td>Cats</td>
<td>Ungroomed/unkept appearance, greasy hair coat, quiet/withdrawn, apprehensive facial expression, loss of appetite, crying, hissing, hiding (often in litter box), crouching, or hunching, purring, tail flicking, response to handling (often aggressive but individuals may also purr in combination with other signs)</td>
</tr>
<tr>
<td>Rodents</td>
<td>Quiet, lethargy, decreased activity, decreased food and water consumption, anorexia, rough hair coat, reluctance to move, sunken eyes, decreased activity, piloerection, ungroomed appearance</td>
</tr>
<tr>
<td>Rabbits</td>
<td>Inactivity, appear apprehensive or anxious, hunched appearance, hide, squeal or cry, possible aggressive behavior with excessive scratching and licking, facial expression (tightening of eye, cheek flattening, nostril tightening, pulling back whiskers, tightening ears)</td>
</tr>
<tr>
<td>Cattle</td>
<td>Dull, depressed appearance, heads bowed, lack of alertness, loss of appetite, rapid/shallow breathing, rigid posture</td>
</tr>
<tr>
<td>Horses</td>
<td>Dullness, depression, reluctance to move, rigid stance, lowered head, dilated nostrils, clenched jaw, possible aggressive behavior, vocalization, rolling, looking or kicking at their abdomen, stretching</td>
</tr>
<tr>
<td>Pigs</td>
<td>Changes in overall demeanor, social behavior, gait and posture, unwilling to move, hiding, excessive squealing when handled</td>
</tr>
<tr>
<td>Sheep and Goats</td>
<td>Similar to cattle and vocalization, teeth grinding, increased lip curling, isolation from the flock</td>
</tr>
<tr>
<td>Camelids</td>
<td>Similar to cattle and vocalization, teeth grinding, looking or kicking at their abdomen</td>
</tr>
</tbody>
</table>
Spotlight on Models in Animal Research

Marc Caldwell, DVM

Investigating the influence of social behavior on the transmission dynamics of these pathogens.

In the current management systems of cattle production, calves are raised on farms in relatively protected environments with low pathogen loads. At the time of weaning, around 6 – 7 months of age, calves are abruptly introduced to series of stressors, such as maternal separation, transportation among crowded, occasionally poorly ventilated circumstances and commingling with unknown cohorts from other locations forcing changes in social hierarchy. Parents of young children may recognize similar patterns of social stress encountered on their child’s first day of school. And, in the midst of this potentially immune suppressing stress, we send these immunologically native individuals into cesspools of disease (auction markets for calves or the modern daycare facility for children) thus creating the perfect storm of host susceptibility and pathogen exposure.

My laboratory is interested in teasing out how stress imposes changes in the host innate immune defenses and alters the commensal microflora in ways that promote these infections. From recent work we and others have conducted, it appears that early in the sequence of these events there is a shift in the balance struck between the commensal organisms and the mucosal immune system. Under normal circumstances, the mucosal immune response is attenuated and controlled through dynamic communication with one or more keystone species within the system. We hypothesize that stress disrupts this necessary communication and permits an overzealous immune response and increases the opportunities for pathogenic organisms to enter and colonize the upper and lower respiratory tract. Cattle provide a convenient natural model to observe these events as they happen in real time.

We are also interested in the transmission dynamics of these pathogenic organisms between individuals. We recently obtained a real-time location system that permits continuous capture of activity level, location within a housing environment, and the social interactions between individuals. The system operates through the use of radio-frequency identification tags that send signals to several receivers throughout a housing area or pen. A software application then triangulates the position of the animal within the pen. At a resolution of less than 1 meter and a frequency of acquisition of every minute, we can observe where that animal spends their time and who they spend it with on a continuous 24 hour interval. This has allowed us to observe natural cattle behavior without human intrusion. We have used this technology to build social networking maps that indicate which animals develop stronger interactions within the group. These subgroups, or “cliques of cows” may have profound influences on the movement of pathogens in a larger group. This location system also permits us the ability to discern subtle changes in behavior when animals become ill. Like a Fitbit® for cows, the telemetric capture of normal and abnormal physiology provides data to interpolate changes in animal activity and behavior to signify illness or pain. One of the larger goals with this type of data is to apply it in the context of a disease outbreak. Potentially, this system would permit quick and accurate identification of sick animals, then through network mapping predict which other individuals have the closest contact and are at greatest risk further disease. In this experimental framework, several interventional strategies can be tested in an attempt to identify the best strategies for limiting outbreaks within a population.

Bovine respiratory disease is a complex of viral and bacterial pathogens that cause potentially fatal bronchopneumonia in adult cattle and calves. The circumstances that lead to bacterial bronchopneumonia in cattle are common to respiratory infections in multiple species, including humans. Typically, these infections arise from a combination of host stressors (environmental and management related) and primary viral infection that induces impaired pulmonary defenses and secondary bacterial colonization of the lungs. My areas of interest within this complex include the interface between the commensal nasopharyngeal microflora with pathogenic species and investigating the influence of social behavior on the transmission dynamics of these pathogens.

Marc Caldwell received his Doctorate of Veterinary Medicine at Auburn University. He currently serves as an Associate Professor in Field Services at the UT Veterinary Medical Center. His research career is focused on infectious diseases of food animals and he is particularly interested in bacterial pathogenesis and host-pathogen interactions.

From describing the complex interactions between the host and pathogen, to the interactions between hosts and the dynamics of social connections that influence pathogen transmission, our research indicates that cattle provide an excellent opportunity for investigating natural respiratory infections.
Dr. Lori Cole is the new director of Animal Compliance Support. She is excited to be here at UTK after performing a similar role at a primate center for two years. She is just beginning to contact investigators to arrange monitoring sessions. Feel free to contact Dr. Cole at 974-9074 for questions about the IACUC or post approval monitoring process. Her goal is to observe every protocol at least once over the course of a protocol’s three year approval period.

Did you know that OLAC can provide training specifically tailored to meet the needs of your lab? Investigators that have taken advantage of this specialized training in the past have requested topics on lab animal anatomy, anesthesia, surgical prep, handling and restraint, blood sampling techniques, and tail biopsies. In addition, OLAC offers an open invitation to our rodent handling, restraint, and experimental techniques lab. Feel free to contact OLAC with a training request and we will do our best to accommodate your needs.

To sign up or schedule a training session please contact Chris Carter either by phone: 974-5546 or email: clcarter@utk.edu

OLAC Training

Appalachian Branch Technician of The Year

This award is designed for animal technicians or research technicians who have performed their duties in an exemplary manner.

Wes Adams, who works in the WLS laboratory animal facility, was awarded the Technician of the Year Award. Wes is described as “a team player that focuses on animal welfare.” His Supervisor stated “his attention to detail in the cleanliness of the facility is to be commended.”

Wes plans on continuing his education in animal science and welfare by completing the AALAS certification levels. He volunteers at the Knoxville Zoo and the McMinn Co. Humane Society, evidence of his concern for animal welfare at all levels, ranging from research and teaching, to education and rescue work.

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