

Column E Explanation

This form is intended as an aid to completing the Column E explanation. It is not an official form and its use is voluntary. Names, addresses, protocols, veterinary care programs and the like are not required as part of an explanation. A Column E explanation must be written so as to be understood by lay persons as well as scientists.

1. Registration number: 83-R-0005
2. Number of animals used in this study: 13
3. Species (common name) of animals used in the study: Bighorn Sheep
4. Explain the procedure causing pain and distress:

Bighorn sheep known to be carrying bacteria responsible for pneumonia were bred and allowed to lamb in individual pens to evaluate whether we could identify an adult sheep that is a "super shedder" of bacteria resulting in death of lambs. The additional objective of this study was to determine if we can detect which bacteria are most responsible for lamb death in the field and what clinical or behavioral traits may indicate that a lamb will not survive or that a ewe is a chronic carrier. This was a small pilot study and part of the aim of this study was to evaluate subjective measures of disease to try and determine best endpoints for lambs with respiratory disease in future research at our facility.

Lambs were infected naturally through close contact with their mothers and monitored daily for clinical signs of disease as well as an array of behavioral traits that could indicate state of disease. Clinical disease was seen in all 6 lambs. 2 lambs were identified to have moderate or severe disease and were humanely euthanized; however, 3 lambs appeared to have such a rapid and non-descriptive course of disease that we were unable to intervene before death based on our observation criteria. Observations from the day prior to death showed that the lambs were lethargic, but did not rate as moderate or severe in other symptoms such as coughing, respiration, nasal or ocular discharge. Finally, 1 lamb showed primarily head shaking as a clinical sign which was not listed on our criteria.

5. Provide scientific justification why pain and/or distress could not be relieved. State methods or means used to determine that pain and/or distress relief would interfere with test results.

Very little is understood about the mechanisms that contribute to lamb death after an outbreak of respiratory disease in wild bighorn sheep. Management efforts to intervene such as providing antibiotics, anti-parasitics or supplemental feed/minerals have failed to improve survival. Even in captivity – intensive treatment of lambs with fluids, analgesics and antibiotics will fail to clear infection. To be able to recognize which pathogens will lead to lamb death, we had to allow lambs to become clinically symptomatic with respiratory disease. Domestic sheep

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with these pathogens can become clinically affected with these same bacteria; however, their lambs may not always die from the infection. Because we do not know whether some bighorn lambs are able to become infected and then clear the disease, we had to allow symptoms to progress to a stage at which it seemed unlikely that the lamb could survive. This research showed us that the clinical course of disease may vary greatly based on the predominant bacterial pathogen responsible. In some cases, lambs will have a very long clinical course of disease that is slowly progressive and in other cases the disease seems to rapidly lead to septicemia and death. Most of these lambs were infected with multiple bacteria – but seemed to vary greatly in which bacteria predominated in the clinical course of disease. Unfortunately, this makes it very difficult to determine the best endpoints as even diagnostic testing such as serology or culture may not indicate which bacterial pathogen is dominant in the disease course of a given lamb. So far, only pathology results have been able to show the predominant pathogen or pathogens.

Research at our facility is focused on management strategies that can be implemented on free ranging wildlife. Additionally, if bighorn lambs are handled extensively in their first weeks of life, we see a relatively high rate of abandonment from their mothers. Therefore, we did not use other parameters to evaluate state of disease (temperature, lung auscultation, CBC etc.) – as these measures would be impossible to implement in the field and could also result in abandonment at our facility. Results from this study will lead to a modification of our evaluation criteria for endpoints for respiratory disease in bighorn lambs at our facility.

6. What, if any, federal regulations require this procedure? Cite the agency, the code of Federal Regulations (CFR) title number and the specific section number (e.g., APHIS, 9 CFR 113.102).