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To the WAFWA Wild Sheep Initiative & Wildlife Health Committee,  
I am writing this letter as a veterinarian and scientist who has worked with camelids, among other species, for over 30 years. I have never owned a camelid nor participated in any activity involving wild sheep, except for treating a small handful of Bighorns in my clinic over the years. As a large animal internist, biomedical researcher and university professor, I have worked with camelids in both clinical and scholarly capacities. I am the primary editor and author of a leading textbook about them and hold an endowed professorship of camelid medicine at my university. I host an international conference of camelid veterinarians every two years, and am involved in several strong networks of information exchange about camelids. I have no financial interest in camelids, but feel I am knowledgeable about them, and constantly wonder at their unique features. Some of those are of great interest in the research community: camelids' high altitude and dry climate adaptations, diabetes-like metabolism and unique heavy-chain antibodies may all offer pathways to improve the lives of humans and animals in a variety of domains.

I have read the most recent Brief on South American Camelid Disease Risk to Wild Sheep prepared by the WAFWA Wild Sheep Initiative & Wildlife Health Committee. The recommendations in this document are that camelids who enter wild sheep territory should be kept isolated from animals known to carry pathogens transmissible to sheep, that they should not enter thin horn sheep range and that a comprehensive microbiologic catalog for camelids should be created. The catalog should enable "reasonable and science-based decisions" about access of camelids to wild sheep territory.

Science is essentially using observations to explain things. It has the inherent weakness that observations always represent a subset of all possibilities, such that exceptions and remote occurrences can rarely be excluded. We hear more and more today, that "more science is needed," but that call often reflects an appetite that cannot be sated. It has often been stated that the absence of evidence is not the same as evidence of absence; this is being used as an anti-science weapon, not a serious tool. Science rarely proves facts; it uses facts to make predictions. Currently, we have the following facts: there is no evidence that camelids carry *Mycoplasma ovipneumoniae*, and years of interactions between camelids and wild sheep have led to no evidence of disease transference. Science would tell you that those facts predict that a future transmission event would be unlikely. Demanding 100% confidence would require a draconian, zero-tolerance policy such as the

one suggested in the thin horn sheep areas, and in all fairness, if imposed, should also extend to every other species of mammal, including man. Not applying the ban broadly makes it arbitrary, and defies the definition of a reasonable decision.

Camelids are natives to the North American west and most likely were only completely exterminated with the arrival of man. They doubtless cohabited with ancient breeds of sheep for millions of years. This is borne out in the fossil records. They continue to cohabit with domestic sheep throughout the Americas, mainly in combined flocks in South America and as camelid guards for sheep flocks in North America. In spite of this, there is extremely little information about pathogen transmission between the two families of animal. Where it exists, it is overwhelmingly evidence of domestic ruminants (cattle, sheep, goats), passing disease to camelids. There is copious evidence of seroconversion of camelids exposed to domestic ruminants, meaning that the camelids have been exposed to the ruminant pathogens and have had an immune response. There is far less information that those transmissions cause serious or long-term disease in the camelids.

Using this paucity or lack of evidence as a tool to highlight uncertainty is a weak parlor trick: "there's no evidence that it does, but we don't know that it doesn't." There is undisputedly less information about infectious diseases in camelids than there is in domestic ruminants. This relates to a number of factors, most importantly the lack of major disease outbreaks in camelids. Why study something that you can't find and doesn't seem important? There have not been comprehensive studies to identify the flora of the camelid respiratory tract because decades of routine diagnostic postmortems and body fluid samples of camelids around the world have failed to yield evidence of consistent important pathogens. The few pathogens that have been identified invariably come from ruminants, and camelids clear them or succumb to them quickly. Resident pathogens and carrier states of most studied viruses and bacteria in camelids have barely been identified, and many of the early suspects have been disproved by decades of clinical experiences.

Rather than playing the uncertainty game, which suggest no willingness to find a broadly accepted solution, WAFWA should consider working with health experts. Let's use science as a tool and not a weapon, and work together to find a path forward.

Respectfully,



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