

From: [REDACTED]
Sent: Tuesday, August 11, 2020 5:38 PM
To: 'Mike Cox' <mcox@ndow.org>
Cc: 'Phil and Linda Nuechterlein' <[REDACTED]>
Subject: RE: recent outcome of Wild Sheep Working Group meeting

Hi Mike,

Thanks for the update. We appreciate you moving our request forward with your committee. We appreciate the involvement of Mike Miller and Daryl Lutz. Mike was part of the original Canyonlands summit as well as WAFWA llama disease considerations and has some background perspective that is currently lacking. Scott has a working relationship with Daryl and we have confidence in his straightforward approach. We will certainly be interested in attending any forum or discussion with WAFWA/WSWG regarding llamas and disease issues. I wrote a couple of comments in your points below regarding the perspective of the llama community. Thanks, Stan (Scott, and Phil)

From: Mike Cox <mcox@ndow.org>
Sent: Thursday, July 23, 2020 11:11 AM
To: [REDACTED]; 'Phil and Linda Nuechterlein' [REDACTED]
Subject: recent outcome of Wild Sheep Working Group meeting

Stan, Scott, and Phil,

We had our summer Wild Sheep Working Group meeting over a week ago associated with west-wide Western Association of Fish and Wildlife Agencies (WAFWA) summer conference where many other committees and working groups met as did the Wildlife Health Committee (WHC) involving wildlife vets and health professionals. I had spoken to Dr. Mike Miller, lead wildlife vet for Colorado Parks and Wildlife and chair of the WHC a month ago on the risk of pack llamas to wild sheep. Mike is very astute and pragmatic on disease issues and well respected. He and I agreed that this topic has been kicked down the road for too long and blown out of proportion relative to the other documented disease risks we wild sheep managers deal with much more frequently and with more serious consequences. So he added it to his WHC mtg agenda. I sat in on his meeting on July 9 and he sat in on our WSWG mtg on July 13. The outcomes and tone from the meetings were:

- Llamas and South American Camelids are in the same Taxonomical Order as wild sheep but not in the same family (Camelidae vs. Bovidae). What does that really mean? Most diseases seem to not cross Families but a few have. In my professional opinion,

it's not a good argument to stand behind. We have seen what happens when you house different species together - Covid-19, SARS, MERS; potentially Scrapies and CWD

We note llamas are from a different suborder, Tylopoda, that is not to be dismissed as the equivalent of familial separation. The differences of camelids compared to the members of the suborder, ruminantia, are such that the suborder, Tylopoda, was created to be populated exclusively by camelid species. The name Tylopoda (padded foot) itself denotes a significant difference in the suborder based on foot structure vs ruminantia in which all species have a cloven hoof with a sole. There is significant hematological difference in the red blood cell morphology and physiology. Llamas (camelids) have more, smaller, flat red blood cells offering more surface area and also hold oxygen molecules at a lower surface tension that makes available a higher percentage of the oxygen carried. They also have a unique immune system that produces small heavy chain antibodies that actually invade pathogen cells as well as classic antibodies that confer lasting immunity. That's why camelids, specifically, are the focus of development of palliative treatment for the coronavirus species you mention as well as broad spectrum vaccines for influenzas and even cancer treatment. It also explains why camelids have only a few recurrent pathogens that are species specific or environmental. The prion mediated Scrapie (sheep) and CWD (cervids) are unlikely pathogens in llamas based on their forage based diets and the lack of vehicle for introduction of the prions. Llamas are induced-ovulators vs cyclic ovulators in the ruminantia order and have an 11.5 month gestation and diffuse placentation vs the cotyledonous attachment found in ruminants. Their ocular structure and function is markedly different from the ruminant eye as well. Llamas are also uniquely able to digest cellulose and recycle urea that more fully utilizes protein content in their feed. There are other differences that point to a unique evolutionary path vs ruminantia, but the most notable separation is the lack of camelids sharing diseases with ruminants. This is noted by paleontologists and taxonomic scientists who are using current science to expand the separation of these suborders.

There is no current dataset of pathogen testing using PCR to test for pathogens in pack llamas. Sorry, but pathogen testing using only culture methods to identify sero and biotypes is old news. The most critical and trigger pathogen (*Mycoplasma ovipneumoniae*) that contributes to all the historic and current pneumonia dieoffs in wild sheep was looked for but never found using culture-only methods, and it wasn't until 2012 that we finally detected it using DNA fingerprinting methods.

We are pointing to the pen tests over the last 25 years as the strongest indication llamas do not have *M. ovi*. This pathogen has likely been involved in all the die offs previously primarily attributed to *Pasturella* spp., causing the term pasturellosis to morph into polymicrobial pneumonia with the identification of the role *M. ovi* plays in effecting the pneumonias. While culture methods are not as definitive as PCR, lack of any confirmation via culture to date is somewhat reassuring. We are also aware of swabbing done by Besser and Highland in the last few years that surely would have used PCR confirmation since culturing is old news. I assume if those were positive we'd have heard about it. Have PCR tests been performed in cattle and horses? They were included in the earlier pen tests and have the same track record as llamas of not carrying *M. ovi* based on those. Given both those species have a relatively high number

of endemic diseases compared to llamas, we would assume those species would be the logical place to start with PCR testing. Cattle would be the obvious place to begin with this testing given they are from the same family (Bovidae) as the wild sheep and goats and the fact they endemically carry a number of other diseases which wild sheep are susceptible to. Has such testing taken place? It would be helpful to us to know just what has been done regarding PCR testing in these two species prior to our scheduled discussions.

- Just like city vs. country folk, there is fear-mongering vs. living the hard life everyday with a grand appreciate of reality. We bighorn sheep managers have been dealing a long time with the devastation of domestic sheep transmission with a much different perspective than thin-horn managers who have not. I don't see that dichotomy of exposed vs. naïve wild sheep changing anytime soon. I'm not a fan of the notion "to fear something you have no knowledge of"
- Both the WHC and WSWG agreed that we both represent WAFWA and that for managers to speak solo about a disease risk is disrespectful to wildlife health professionals, so we are developing a joint committee to address the topic. I hope to have our first virtual meeting by mid August
- A common recommendation by many is to hold a facilitated forum/gathering of wild sheep and pack llama folks and other key objective and knowledgeable professionals to seek a better appreciation of each other's perspective and industry and find a "path forward" as Daryl Lutz coined, to prevent inappropriate decisions on pack llama use being made by every different land management agency office like what happened recently with the Tonto NF in AZ.

I am also not a fan of bureaucracy but I work for one. I wish decisions were more swift and less painful. Will keep you posted on the work in progress. In the meantime I would ask that you have an open mind and willingness to attend a facilitated forum with us hopefully sooner than later.

Mike



Mike Cox

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Mike Cox

From: [REDACTED]
Sent: Thursday, July 9, 2020 12:51 PM
To: Mike Cox <mcox@ndow.org>
Cc: 'Scott Woodruff' [REDACTED] 'Phil and Linda Nuechterlein'
[REDACTED]
Subject: Canyonland Summit Settlement

Hi Mike,

I'm circling back with you to carry on with a theme that emerged on our recent phone call. We informed you of the precedent set in the Canyonlands Summit proceedings regarding llama's carrying and communicating disease to wild sheep. The attached summary of the settlement with the DOI was the result of extensive documentation and presentation of research over four years from 1994-1997. Based on the findings and precedent of that rather extensive proceeding, DOI chose not to pursue banning llamas and having to defend the impending filing of a legal challenge by the llama industry. As we pointed out in our earlier conversations, there has been no change in the fundamentals of llama /wildlife epidemiology that would alter the merit of this settlement.

Based on these foundational facts and subsequent pen studies, testing, and clinical findings that underwrite the validity of those facts, the llama industry sees no reason to implement or provide additional testing to continue their historic presence in wild sheep ranges and furthermore, dismisses as out of hand, the Wild Sheep foundation's call for provisional testing to enter sheep ranges. The WSF lacks both basis and standing to make any such demand. Thank you for your engagement and consideration of our position.

Ad Hoc Committee for Llama Public Lands Access:

Stan Ebel-CO

Scott Woodruff-WY

Phil Nuechterlein-AK