

CFH SYMPTOMS IN BIGHORN SHEEP (*Ovis canadensis*)

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Unless otherwise indicated all photos were taken by Eugene Beckes.

A. FACIAL MALFORMATIONS ON BIGHORN SHEEP



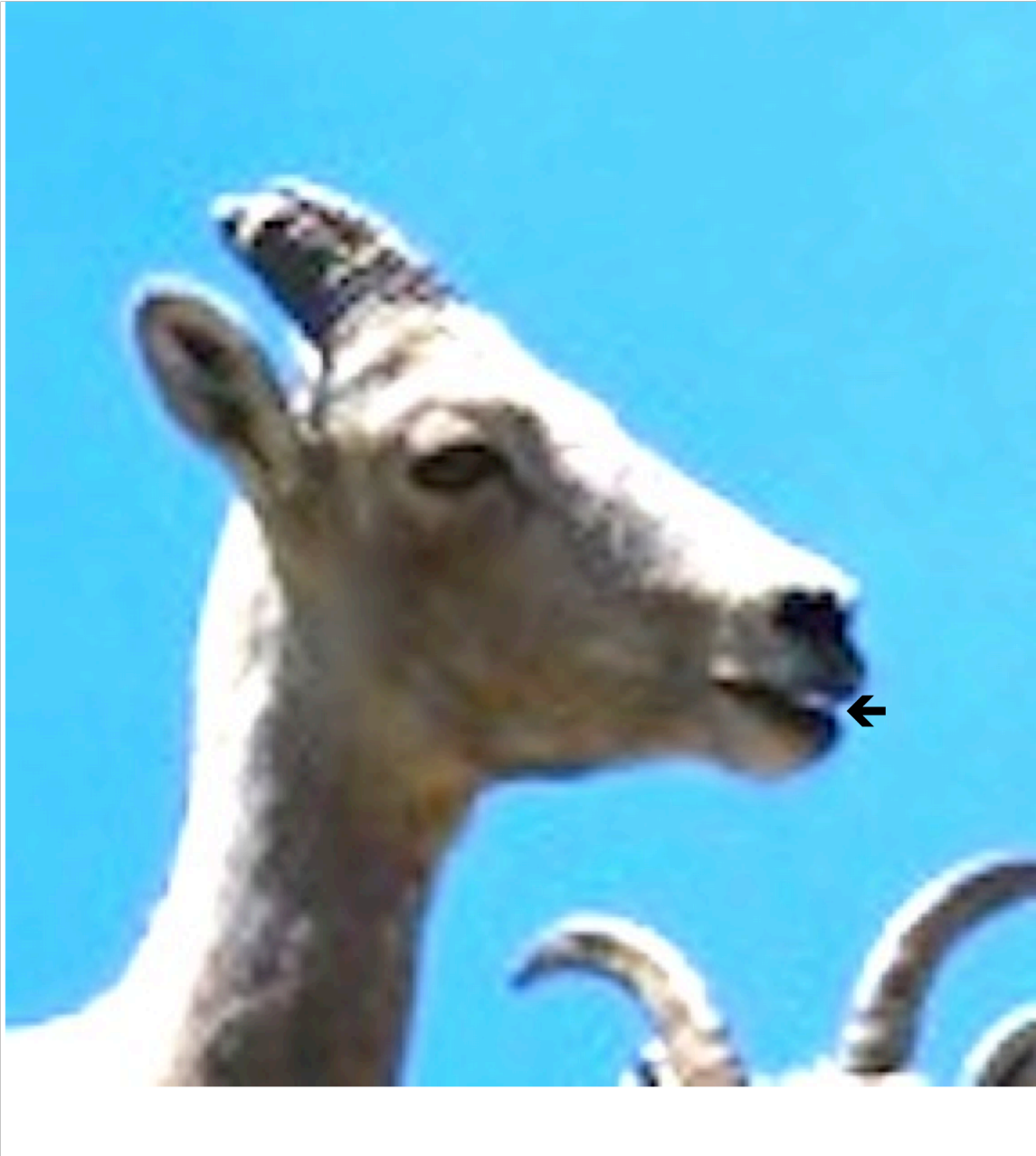
This bighorn sheep lamb appears to have a normal bite. The lower lip is tucked in immediately behind the back of the upper lip. The mouth can entirely close and the lower incisors are not showing at all, because the lower lip completely covers the lower incisors and contacts the back of the upper lip. This constitutes a normal bite on an ungulate species. Where or when this photo was taken is unknown. It is used here to illustrate what constitutes a normal bite on a bighorn lamb as far as can be determined without direct examination of the mouth.



This newborn bighorn sheep lamb was born prior to 1995. Like the previous lamb, the lower lip entirely covers the lower incisors and tucks in behind the upper lip as is normal for an ungulate (see arrow pointing to the lower lip). Compare the bites of this lamb and the older lamb in the previous photo with the faces and bites of lambs in photos taken at the National Bison Range in June 2013, shown below. Some of the NBR lambs appear to have normal bites, but several have obvious underbite and two have lower incisors that are forward of the upper lip because the premaxillary bone is so short.



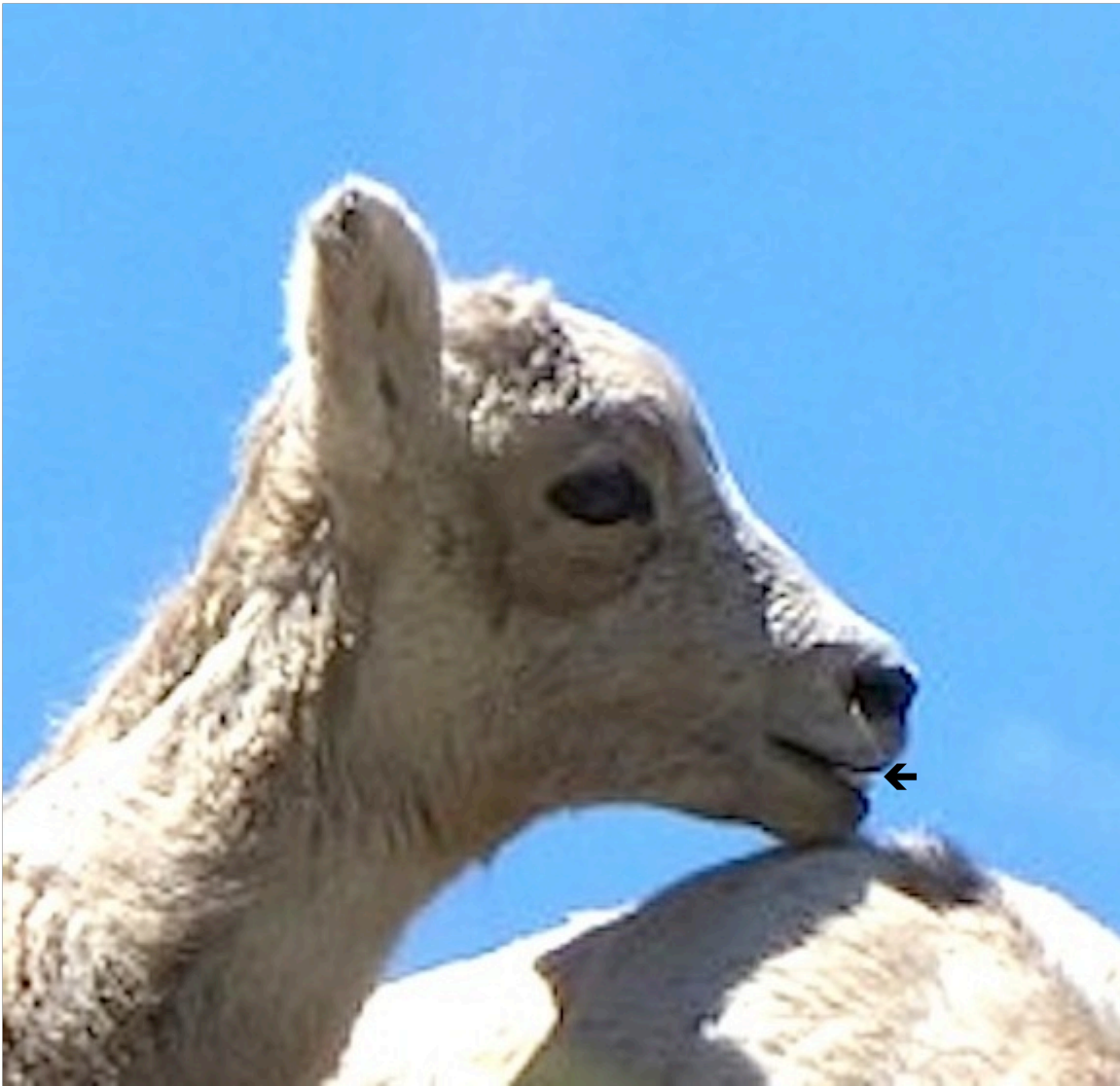
In this mostly side view of a bighorn ram, the lower lip tucks in behind the back of the upper lip, the mouth is closed, with no incisors are showing. The upper face appears to be normal in length and the muzzle is fairly perpendicular to the line of the upper facial bones from the muzzle to the forehead. This is easily observed in a photo or with binoculars on a live animal. It is likely that the incisors contact the dental pad based on the fact that everything appears to be normal in configuration externally. This ram is shown here for comparison with the sheep in subsequent photos which have underdeveloped premaxillary bone and underbite, referred to by medical professionals as brachygnathia superior.



This female bighorn sheep photographed at the National Bison Range has such a severe underbite/brachygnathia superior that it can't close its mouth. The front of the lower lip is forward of the anterior of the upper lip and the lower lip cannot close over the protruding lower incisors (see the arrow pointing to the protruding incisors). The upper face appears to be short because of an underdeveloped premaxillary bone. There is no doubt at all that this ewe has a severe underbite, even though the photo is somewhat fuzzy because of being cropped and enlarged.



This female bighorn sheep has fairly severe brachygnathia superior/underbite, as evidenced by the widely spaced protruding lower incisors that are almost even with the front of the upper lip. The lamb behind her, likely her lamb, can't close its mouth. The lower incisors on the lamb are very visible and protrude beyond the front of the upper lip. The anterior of the lower jaw appears to be crooked and twisted to the left (see where the arrow points to the tipped protruding lower incisors). This lamb's underbite is extremely severe and the upper face is very short (see the area of the face between the two arrows). The birth defects indicated by the arrows are easily seen even though the photo is a bit fuzzy from being enlarged. The lamb in this photo will likely die of starvation when it has to survive by grazing. These sheep were photographed in June 3013 at the NBR.



This is another lamb with a severe underbite/brachygnathia superior, but not as severe as the lamb in the previous photo. Note the short upper face and muzzle, the protruding lower incisors that are nearly even with the front of the upper lip and the fact this lamb can't close its mouth over the protruding lower incisors. The underbite/brachygnathia superior on this lamb and the lamb in the previous photo is so obvious that the lambs do not need to be directly examined to see that they have this serious birth defect. Even people who are not professional wildlife biologists or researchers can recognize the underbite on these lambs.



This lamb photographed at the same angle as the lamb on the previous photo can close its mouth and the lower lip is tucked in behind the upper lip (see arrow), as it should be with a normal bite. Whether this lamb has very mild brachygnathia superior would have to be determined by direct examination of its mouth. Based on the photo alone, this lamb appears to have a normal bite.



Because this lamb's mouth is open, you can see how widely spread apart the lower incisors are (see where black arrow is pointing at the widely spaced lower incisors). This contributes to the problem of the incisors being far wider from outside to outside than the width of the dental pad the incisors are all supposed to contact. Also the incisors are obviously forward of the dental pad, even though the dental pad is not visible. The front of the lower lip is well forward of the front of the upper lip, opposite of normal and this is not because the lamb's mouth is open.



Fortunately, there are several lambs in this NBR sheep herd that appear to have a normal bite, can close their mouth and will be able to graze in a normal manner.

On male Bighorn Sheep killed by hunters in Montana in 2009, of 19 examined, 10 had brachygnathia superior/underbite. That is 53% with underbite. Ungulates with underbite cannot graze efficiently, thus often suffer from malnutrition in winter.



This photo of a female desert bighorn sheep shows a severe underbite. This photo was taken by a tourist and posted on the Internet.



On this adult male bighorn sheep, the underbite/brachygnathia superior is very obvious, with the lower lip forward of the upper lip and the lower incisors exposed when the mouth is closed as much as it will close (see the protruding lower incisors where arrow is pointing). This photo was taken at the NBR in June 2013.



Ram #1 has an obvious and easily observable underbite as evidenced by the lower lip being even with the upper lip and the lower incisors showing when the sheep was relaxed with the mouth closed as far as possible.



This photo of the same ram, Ram #1, shows him with his mouth closed over his lower incisors. The lower lip is even or even a bit forward of the upper lip.



Ram #2 is a young ram. While the lower incisors are not visible in his side view photo, it is easily seen that the lower lip is even with or slightly forward of the upper lip and the upper face appears short overall, strongly indicating at least moderate brachygnathia superior/underbite. Direct examination is the only way to be certain of an underbite on such animals.



Ram #3 has exposed lower incisors and the lower lip forward of the upper lip, indicating at least moderate brachygnathia superior.



On Ram #4, the underbite/brachygnathia superior is very obvious, with the lower lip forward of the upper lip and the lower incisors exposed.



Ram #5 also has obvious brachygnathia superior as evidenced by the lower lip being well forward of the upper lip, even though the lower incisors are not quite visible in this side view of his face. Compare this ram's face and mouth with that of the normal ram on page 3. This ram's upper face appears short and the muzzle is tipped upward rather than being perpendicular to the line of the upper face.



Ram # 6 also has at least slight brachygnathia superior as the front of his lower lip is even with the front of the upper lip, although not as severe as some of the rams in the previous photos. Again the only way to be absolutely certain of an underbite on animals with slight brachygnathia superior is by direct examination.



Ram #7 was photographed from the front and so bite cannot be determined for certain, but the lower incisors appear to be worn down evenly and are spaced evenly, indicating a normal bite. Also, from this angle, the front of the lower lip appears to be well behind the upper lip, as it would be with a normal bite. Based on this photo this ram appears to have a normal bite.



Ram #8 in this and the next photo appears to also have a normal or nearly normal bite. The lower lip is not forward of the upper lip in either photo. Only direct examination would tell for certain.



Another photo of Ram #8 and again the bite appears to be normal or very close to normal from the photo. Note the front of the lower lip is well behind the front of the upper lip as is normal on a ruminant.



Ram #9 appears to have a moderate underbite. The lower lip is forward of the upper lip and the premaxillary bone definitely appears to be short.



Ram #10 appears to have a normal bite. The lower incisors do not show and the lower lip appears to be well behind the upper lip.



Ram #11 also appears to have a normal or close to normal bite. He can completely close his mouth and the lower lip is not forward of the upper lip.



This young ram photographed on the National Bison Range has brachygnathia superior/underbite, as evidenced by the lower incisors being visible and the lower lip nearly even with the upper lip. All of the sheep photos shown in this document, which were taken by Eugene Beckes were sent to the biologists at the National Bison Range. Whether the NBR biologists are doing anything about the animals on the NBR having serious birth defects is unknown.



Splitting headache. *Brian Oswood of Bozeman captured this image of a ram that obviously was recently locking horns with something in the Lamar River Valley.*

This is a of a bighorn sheep ram that was shown in a magazine. This ram can't close its mouth over the lower incisors. It has lost the left middle incisor, possibly during a fight or because the jawbone became disintegrated as shown on the cleaned skull bones and lower jaw shown on page 31, and the tooth fell out.



This photo of four bighorn rams was in the Montana Outdoors Magazine. As it is unknown where these rams were when they were photographed, they are simply examples to show how to observe underbite on photographed bighorn sheep or on animals examined with binoculars.

One ram, the one in the lower left was the only ram that did not have fairly severe brachygnathia superior/underbite. The lower lip on the ram's mouth on the lower left is behind the upper lip and the lower incisors are not showing, as they are on all the other rams.

The ram's mouth on the upper left has fairly severe underbite with the incisors completely showing and the lower lip forward of the upper lip (opposite of normal). The middle ram has a slight underbite and the ram on the right has a fairly severe underbite, as evidenced by the position of the lower lips and the amount that the lower incisors are showing.

The fact that this photo was used in a magazine published by Montana Department of Fish, Wildlife and Parks' suggest the people who are in charge of protecting our Montana wildlife can't recognize a very serious birth defect on the animals they are supposed to be protecting.

CLEANED SKULLS OF RAMS KILLED BY THE MDFWP BECAUSE OF PNEUMONIA.

This and the next two pages have two views of three different bighorn rams that were killed by MDFWP because of pneumonia. These sheep were either from the Bitterroot Valley or from Bonner area. I took these photos to show what to look for on a dead animal. Note the short narrow premaxillary bone on all the sheep.



This ram had an underbite because of the premaxillary bone being underdeveloped. The short narrow premaxillary bone is obvious and the incisors were wider than the dental pad. The jaws were closed and the molars completely meshed, thus having the mouth open, chewing and other such factors, which have been used by those who deny the birth defects are present in wildlife populations, are not applicable.



This photo shows a top view of the same ram's underbite. The incisors were only a little wider than the dental pad, but as can be seen, the incisors completely encircle the anterior of the premaxillary bone where the dental pad is located. There is no contact anywhere by the lower incisors, making it difficult for the animal to bite off foliage.



This is another adult ram with brachygnathia superior/underbite. Page 30 shows another view of this same ram's malformed facial bones.



Besides having an underbite, this ram has very disintegrated bone on the anterior of both the lower jaw and the premaxillary bone. Eventually, the disintegrated bone around the lower incisors would have caused the teeth to fall out, beginning with the two middle incisors. Having no middle lower incisors very seriously affects a sheep's ability to procure adequate nutrition, even worse than having an underbite.



This adult ram also had an obvious underbite and the incisors were wider than the dental pad.

B. REPRODUCTIVE MALFORMATIONS ON BIGHORN SHEEP



Eleven male bighorn sheep were photographed on the National Bison Range on June 23-2013. Every sheep in this photo, on which the scrotum is visible, has a normal length, bilateral scrotum. These rams appear not to have birth defects of the reproductive organs, which are a symptom of endocrine/hormone disruption, including thyroid hormone disruption.



This bighorn sheep ram has a normal scrotum with bilateral hemiscrota that contain both testes well away from the body wall. I took this photo in Yellowstone National Park.



This ram photographed in Glacier National Park by Eugene Beckes has misaligned hemiscrota, with the left hemiscrota forward of the right hemiscrota. Consequently, the right hemiscrota blocks the view of the left hemiscrota, so the ram appears to have only a half a scrotum.



This cropped view of the scrotum of the ram on page 34, shows the left edge of the left hemiscrota barely showing to the left of the right hemiscrota. Both hemiscrota are much shorter than normal for a bighorn ram. Compare this scrotal configuration with that of the normal ram on page 33. There is almost no resemblance between the two. Even though this is a younger ram than the ram on page 33, age difference should not make the scrotal configuration so different.

I observed a bighorn ram in YNP that had only a very short bump (almost no scrotum), but did not have a good camera at that time. Few bison in YNP now have a normal scrotal configuration. Most have short bumps, misaligned hemiscrota or only one hemiscrota present at birth. No one seems to notice, which is disturbing, but not as disturbing as so many males having reproductive malformations.