

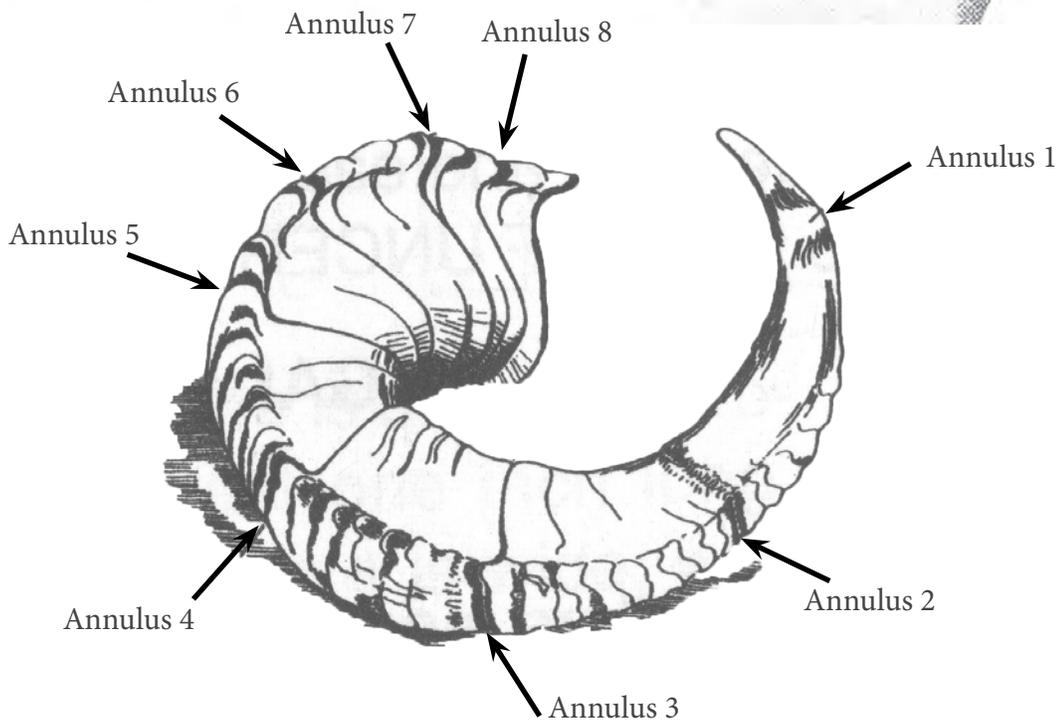
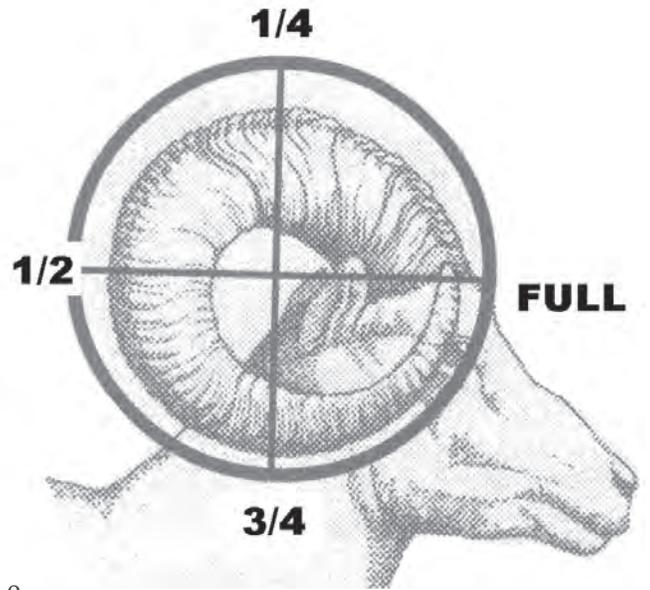
# Dall Sheep

## Guide to Judging Sheep Horns Under the Full-Curl Regulation

Alaska Department of Fish and Game

2016

---



# Dall Sheep

## Guide to Judging Sheep Horns Under the Full-Curl Regulation

**Alaska Department of Fish and Game, 2016**

### **Purpose:**

The purpose of this training manual is to provide consistency in staff methods/knowledge of aging Dall sheep using horn annuli and/or determining curl legality during the sealing process. The methods within this manual for determining age and curl size of Dall sheep have been standardized and approved by the Department of Fish and Game. *Anyone who seals Dall sheep, regardless of their experience, should study this manual.*

### **Project Content and Review:**

Steve Bethune, Chris Brockman, Mike Harrington, Tony Hollis, Tony Kavalok, Tom Lohuis, Elizabeth Manning, Kristen Romanoff, Mike Taras, Joe Want, Cyndi Wardlow, Brad Wendling.

## **Definition of Full Curl-Horn**

*5 AAC 92.990. Definitions*

*(30) “full-curl horn” of a male (ram) Dall sheep means that*

*(A) the tip of at least one horn has grown through 360 degrees of a circle described by the outer surface of the horn, as viewed from the side, or*

*(B) both horn tips are broken, or*

*(C) the sheep is at least eight years of age as determined by horn growth annuli;*

**(A) The tip of at least one horn has grown through 360 degrees of a circle described by the outer surface of the horn, as viewed from the side,**

## Measuring the Curl

Ram horns grow in a helix, like the threads of a bolt, out from the head. Horns must be viewed along the axis of the curl to see the perfect circle. For a ram to be full-curl, the outer surface of the horn, as viewed along the axis of the curl, must complete 360°.

Because horn growth varies so much between sheep, there are **3 methods of looking at the horns** to determine whether a horn grows through 360° of a circle and is full-curl. The horns only need to be deemed full-curl by **one** of the methods!

1. The Perfect Circle Test
2. The Stick Test
3. The Horn Base/Horn Tip Angle Test

### 1. The Perfect Circle Test

In the Perfect Circle Test, the sheep head is viewed from the side at such an angle that the outer surface of the horn creates a circle. If the horn tip reaches the horn base, then the sheep passes this test and is legal.

#### Viewing angle is critical.

Viewing horns at different angles will change the curl's appearance. A sublegal curl can be viewed as having a full-curl when observed at an improper angle. If the horn is viewed at an improper angle, it will not fit inside a perfect circle. Instead, it will form a flattened circle or ellipse (like an egg).



**Wrong view- Elliptical**



**Correct view- Circular**

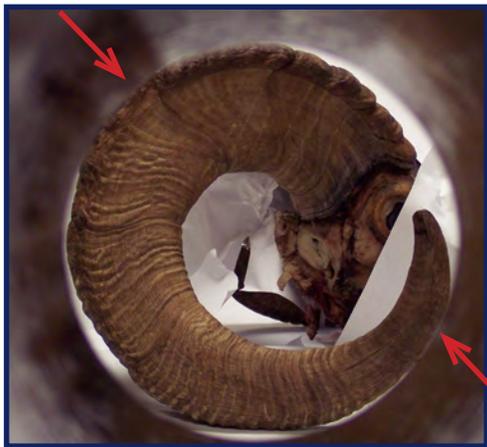
*This is not a full-curl ram. If it is viewed to make it look full-curl by putting the horn tip up to the base, the circle is flattened out to an egg shape. When the horn is turned to fit inside a true circle, the tip of the horn does not reach the base of the horn.*

One method used when the horns are extremely close to full-curl is to create the perfect circle view by looking through a tube and adjusting the horns until the view fits inside perfectly. You can then see clearly whether the horn tip has grown around to meet the base of the horns.

A 12 to 16 inch section of 4" black ABS tube works great when set up on a tripod or a shooting bag so it can be moved around. Black tubing is best because it makes the white space around the horns easier to see.

You can then take a picture through the tube to document the sheep horns.

When viewing through the tube you must take your time and move the horns and/or tube around until you get the horns to show a perfect circle within the tube. This is usually done by ensuring there is a slight and even amount of white space between the outer surface of the horn and inner surface of the tube. *White paper placed behind the horns greatly helps to view the perfect circle.*



Not the right view. Notice the area of the red arrows. There is no white space at 10 o'clock and 4 o'clock. Needs adjustment.



Better but still not perfect. The horns are still a bit out of the circle. The red arrows are pointing to areas where there is uneven, or no white space between the horns and the tube.

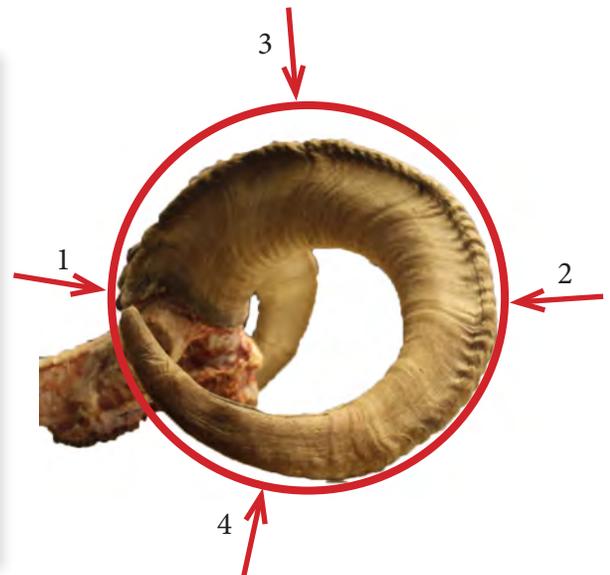


Near perfectly circular. Thin, even strip of white space around horns. Now you can determine whether the tip of the horns reach the base of the horns. This sheep is full-curl.

### Alternative Method to Demonstrate "Not" Full-Curl

Some horns will never form a "perfect circle". Another way to view the horns to demonstrate that they are **not** full-curl is to:

- View the horns through a tube.
- Align the tip of the horn so it just touches the base.
- Ensure that there is a slight but even amount of white space between the base of the horn and the tube (1) and the same space at 180° from the base (2).
- Now, if there is more space at the 90° (3) or 270° (4) points the sheep is NOT legal.



*Photos on this page used with permission from fullcurl.net.*

## 2. The Stick Test

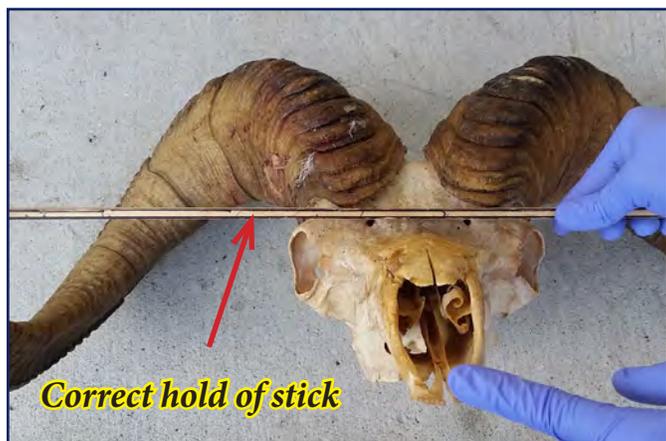
For the stick test, a straight stick or dowel is placed beneath and across the front base of both horns and extends out past both sides of the head. If one of the horn tips reaches or surpasses the plane created by the top of the stick or dowel, then the sheep is full-curl.

The top of the stick or dowel, which is placed under the base of the horns, creates the plane that the horn tips must pass. If you use the bottom of a stick or dowel, you will be giving away a quarter inch or more depending on the thickness of the stick.

*When using the stick method you must look at the sheep straight on so there is an equal amount of horn above and below the plane created by the stick held under the horn bases.*



*This is how it looks with head intact. With the correct view there is an equal amount of horn above and below the line.*



Clearly failing the stick test on both sides.



A side view of the stick bisecting the horn with equal amounts on each side.



Using a fiberglass dowel.



Clearly passing the stick test.

### 3. The Horn Base/Tip Angle Test

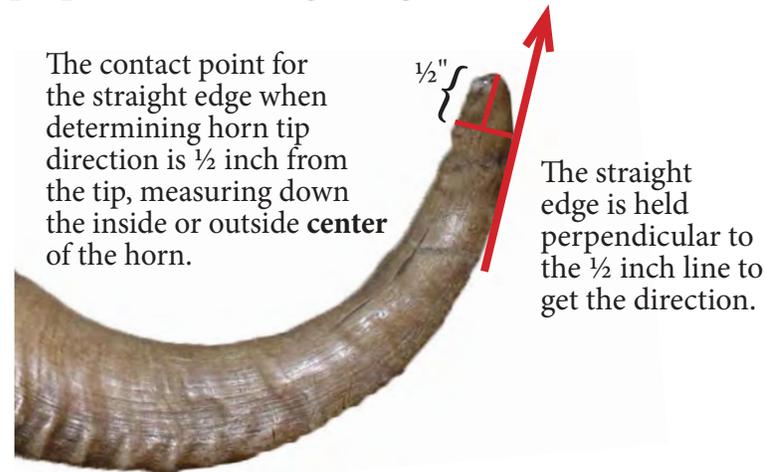
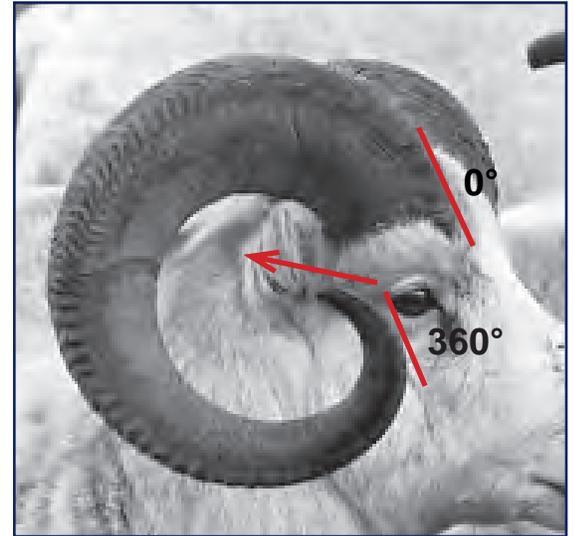
Sheep horns can grow through 360° of a circle without reaching the plane of the horn base. These horns usually drop low and wide and curl tightly as the ram ages.

In the example at the right, the horn base angle is assigned a relative starting point of 0°. As you measure the angle around the horn, it is obvious that the tip of the horn on this sheep surpasses the 360° angle required for it to be full-curl.

#### Important:

**You are measuring the direction that the tip grows compared to the direction that the base grows.**

**When determining the direction of the horn tip using a straight edge (as in the picture below), your contact point with the horn will be ½ inch from the tip, measuring down the inside or outside center of the horn (not the circumference). At this point, you can draw a line across the horn or use a rubber band to mark the spot to place your perpendicular straight edge.**



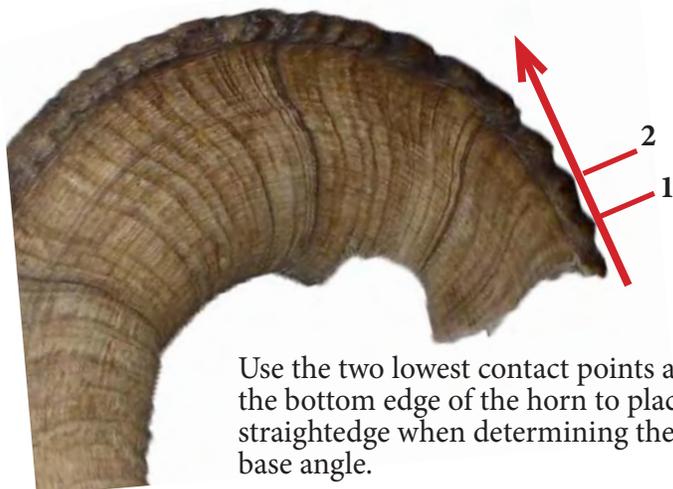
The contact point for the straight edge when determining horn tip direction is ½ inch from the tip, measuring down the inside or outside **center** of the horn.

The straight edge is held perpendicular to the ½ inch line to get the direction.



This sheep is legal. The horn tip angle is just equal to the horn base angle. These horns did not pass the stick test or the perfect circle test.

**When determining the angle of the horn base, your straight edge will have two contact points (the first two ridges up from the horn base) to determine the direction.**



Use the two lowest contact points above the bottom edge of the horn to place a straight edge when determining the horn base angle.



The horn tips of this sheep do not meet or exceed the angle of the horn base, so it fails this test. It is legal, however, as it passes the stick test.

## (B) Both horns tips are broken

The terms broken and broomed have been used synonymously by sheep hunters for years. Broken is the only term used in regulation. We do not use the term "broomed."

**Broken, as it applies to the horn tips of male (rams) Dall sheep, means:**

The lamb tip is completely absent; horn tips that are chipped or cracked are not broken if any portion of the lamb tip is present;

**Characteristics of the lamb tip include:**

1. a length of less than four inches,
2. the inside surface of the lamb tip is often distinctly concave when compared to the remainder of the horn, and
3. the lamb tip is the section of horn that is grown during the first 6 months of a sheep's life and is the section of horn distal of the first annulus, which is the swelling of the horn that forms during the first winter of life.

### Broken



*Obviously broken and jagged.*



*Worn smooth, but lamb tip is missing.*



*Horns that have broke and been worn smooth are still "broken." These horns obviously broke at some time.*



*Both horns broken and missing lamb tips.*



*This horn was either broken and worn, or just worn past lamb tip. Either way it is legal as the lamb tip is gone.*



*Both horns broken.*

### Not Broken



*Lots of horn tips are rubbed and worn down. This is not broken.*



*Rubbed and worn down but not far enough to remove entire lamb tip. This is not broken.*



*Slightly damaged and worn but lamb tip still present. This is not broken.*

# (C) The sheep is at least 8 years old

## Aging Sheep By Counting Horn Annuli

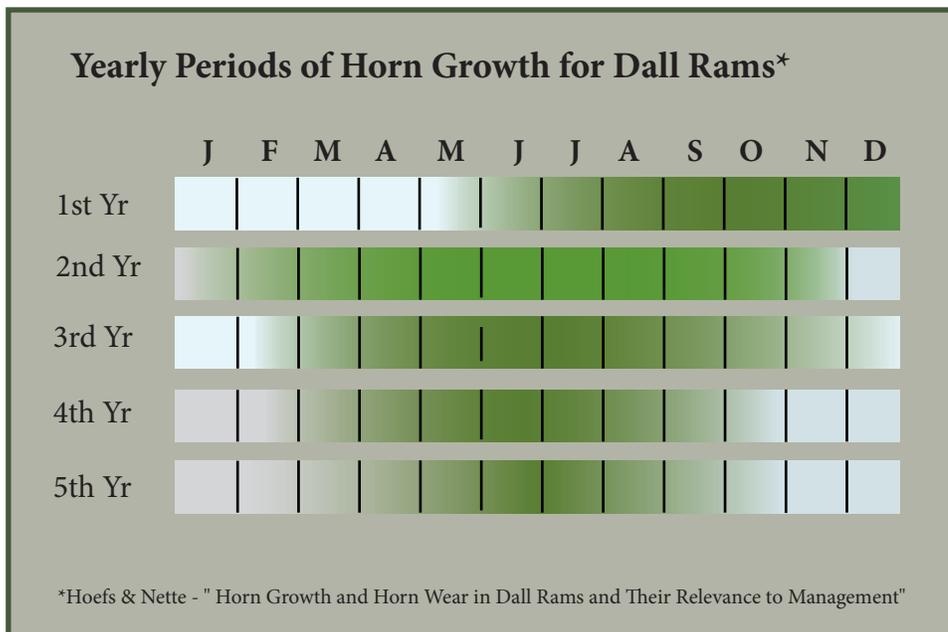
### Understanding Horn Growth

In order to age sheep accurately by counting horn annuli and to convey this information to hunters, it is important to understand the sheep horn growth process. It is also important to use as many defined characteristics as possible in your determination.

Dall sheep have reasonably stable periods of seasonal horn growth. Horn growth generally starts in early spring and ends in late fall or early winter. The time between growth periods is usually marked on each end by a well defined groove referred to as a true (primary) **annulus**. By identifying and counting these annuli, the age of an animal can be determined.

- Sheep are born around the end of May.
- Growth is relatively continuous through the first year of life although there is still an annulus formed during the first winter of a sheep's life. The lamb tip represents the first summer of life and is counted as the 1<sup>st</sup> annulus.

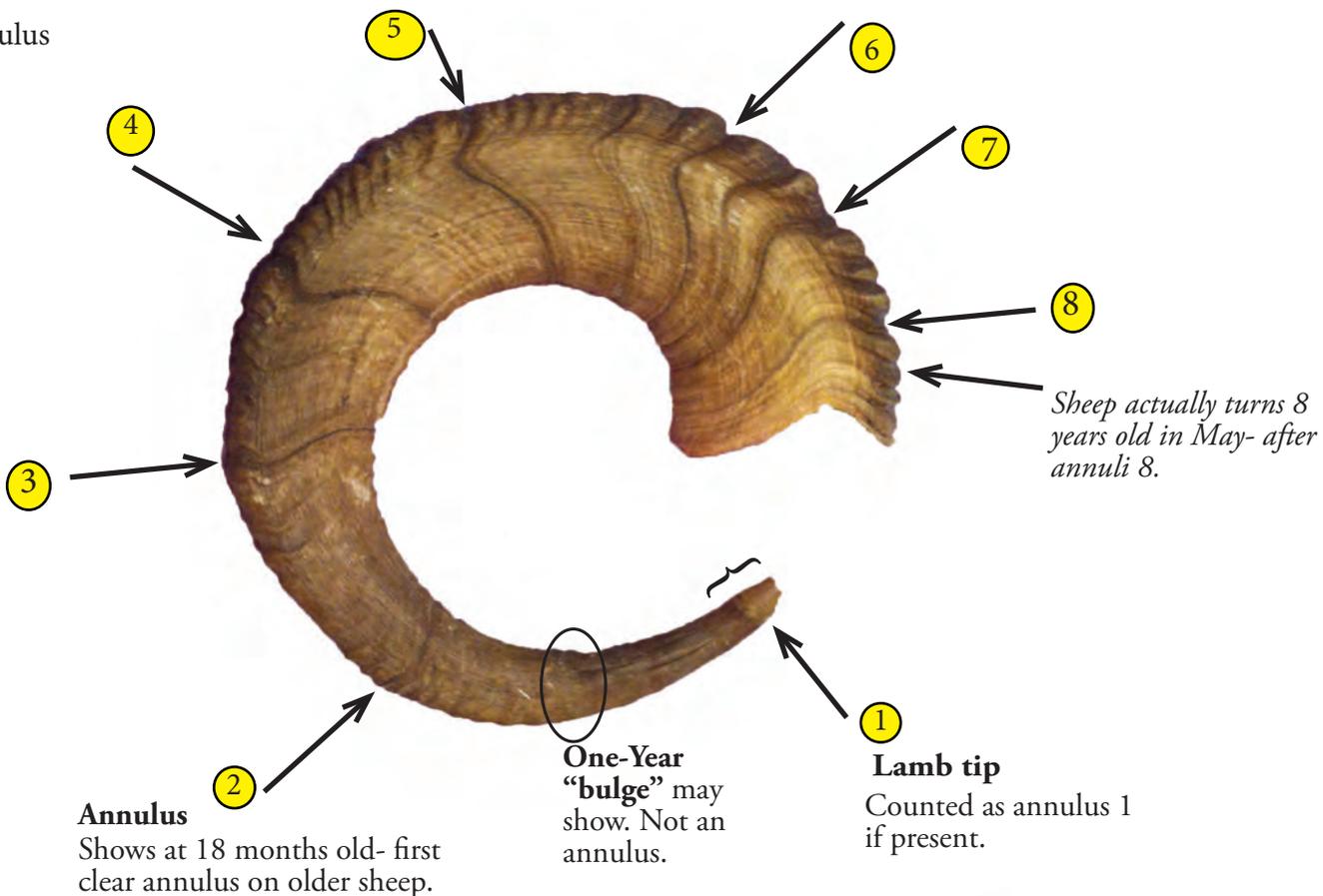
*The first annulus is always present on younger rams (rams that we don't see commonly while sealing old rams) and is slowly worn through time as the ram ages, along with the rest of the horn tip. Remnants of the first annulus can still be located and identified on the majority of all sheep (ewes, lambs, and rams), including rams that are 10+ years of age.*



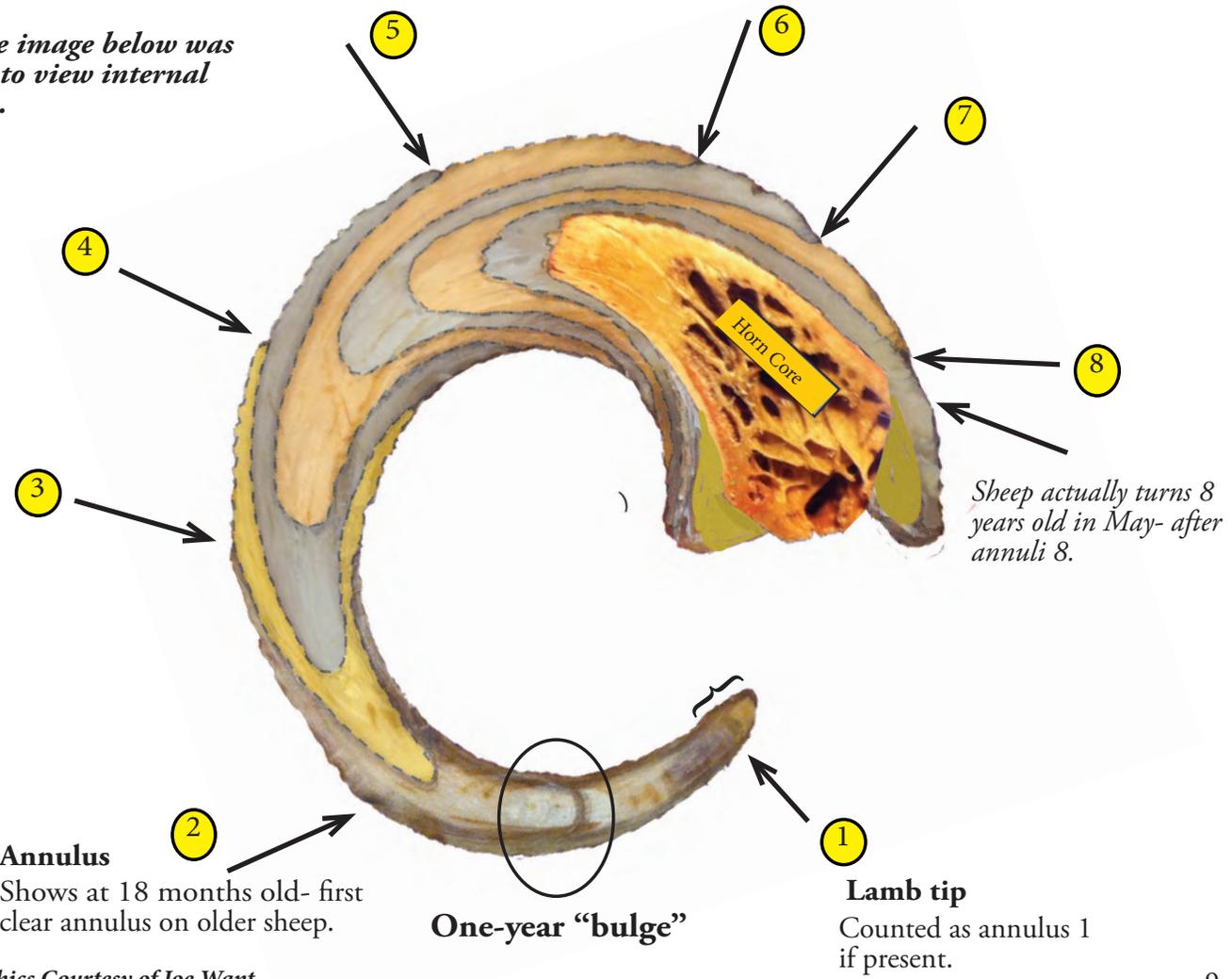
There is a gradient in the horn growth bars because horn growth gradually increases through the growing period and tapers off as the growing period comes to a close.

- Because annuli are formed during winter, they do not actually represent the date of birth of an animal, but the year of life it is in.
- Horn growth normally slows with each consecutive year of the animal's life after age 3, therefore the horn growth segments should consecutively get smaller after the 3rd annulus. This is important to know as it will help you to detect false annuli. \* *A small percentage of sheep will not follow this general rule.*

○ = Annulus



*The horn in the image below was cut lengthwise to view internal conical growth.*



# Horn Aging Terminology

## Annulus:

- A groove created from the annual stoppage in horn growth. It completely encircles the horn.
- The upper surface of the groove is rough.
- The lower surface of groove is smooth. } **see image 1 on next page**
- Deep, thin groove.
- Marks the beginning of a set of repeating ridge patterns. For example, in the latter annuli segments, a false annuli or other prominent feature tends to repeat in the segment of the following years as well. **See image of repeating patterns on page 13.**
- On annuli 3 and up, a fingernail will catch in the groove when scratching toward the tip of the horn. Running the fingernail around the groove in this manner may produce a white dander around a true annuli.
- The amount of growth between annuli normally decreases each year of the animal's life after age 3. *\*A small percentage of sheep will not follow this general rule.*

## False Annulus:

A ring that appears to be an annulus but is not. False annuli can go all the way around the horn. They usually occur on both horns in the corresponding location. These rings can be deceiving so you should ask yourself if they meet **all** of the above characteristics of an true annuli. If they do not, they are false annuli.

## Lamb Tip:

The section of horn distal of the first annulus, which is the swelling of the horn that forms during the first winter of life.

### Characteristics:

- A length of less than four inches.
- The surface of the lamb tip is smooth (no ridges along outer surface) and the inside surface is often distinctly concave when compared to the rest of the horn.
- Faint groove may be present at first annulus.
- Sometimes it is missing or rubbed down in older rams.

## First Annulus:

The terminus of the first summer of horn growth and the ending point of the lamb tip. The first annulus may be difficult to locate and identify on older rams or it may be partially or completely worn away as a sheep ages.

### Characteristics:

- Groove around the horn may not be visible in older rams although a faint one may be present.
- There is a slight increase in horn circumference (distinct swelling) at ending of lamb tip.
- The outer circumference of the horn is smooth on each side of the “bulge.”

## Second Annulus:

The annulus that is created in second winter, when a ram is 18 months old.

### Characteristics

- Groove completely encircles horn.
- Swelling is often present on both sides of the groove.
- Outer circumference of horn wrinkled on both sides of the groove.
- Groove is usually shallow.

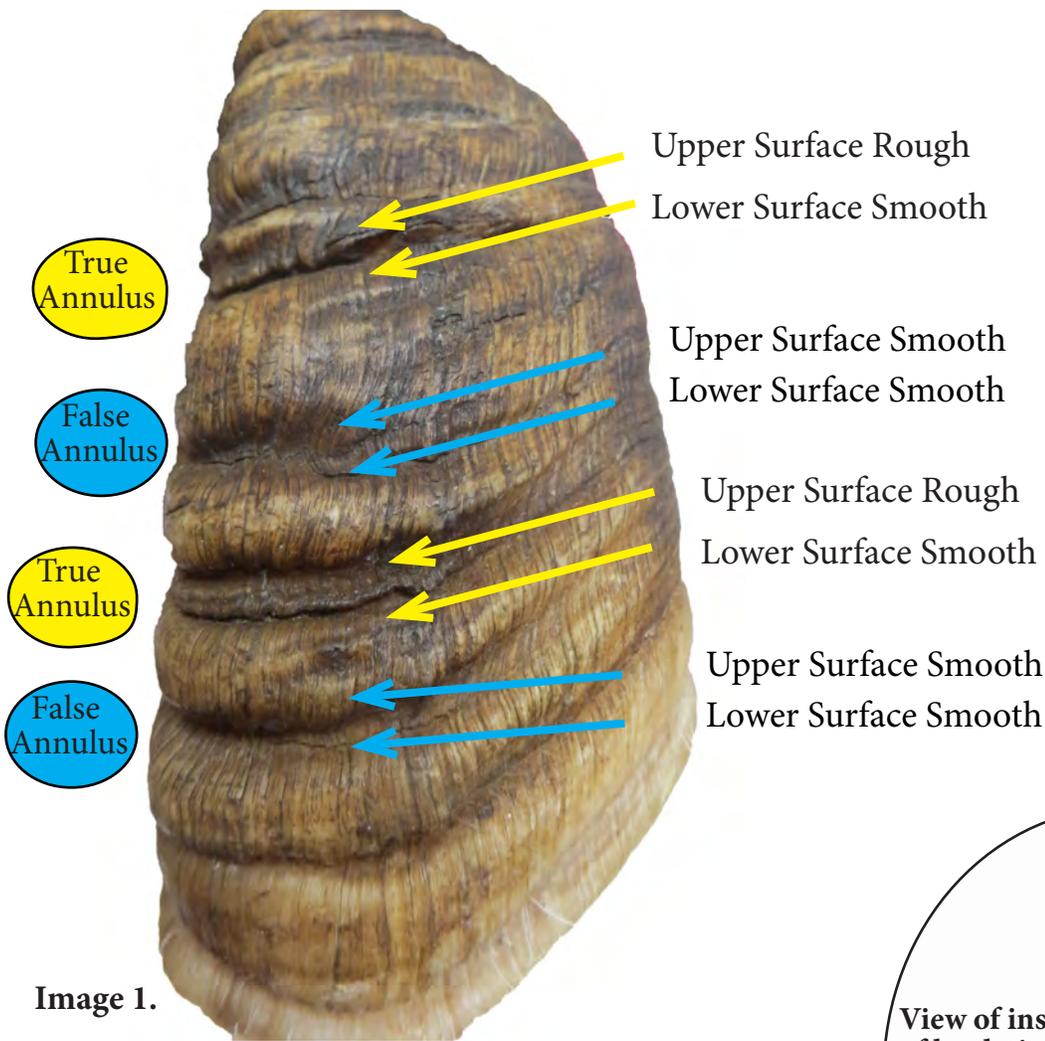
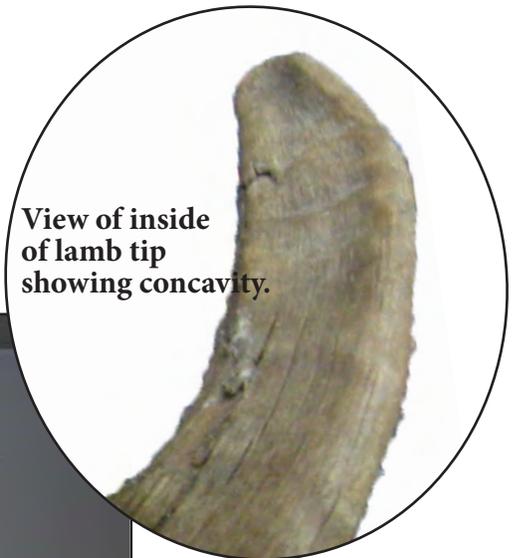


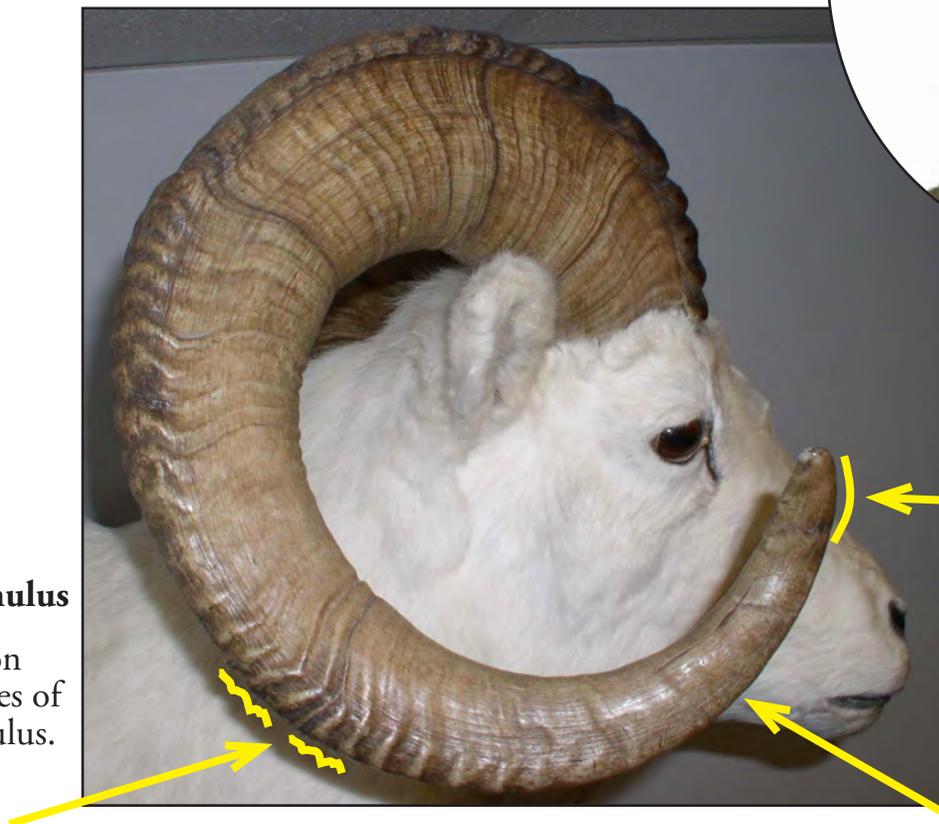
Image 1.



*Lamb tip may show concavity on the inside if not worn down.*

**2nd annulus**

Ridges on both sides of the annulus.



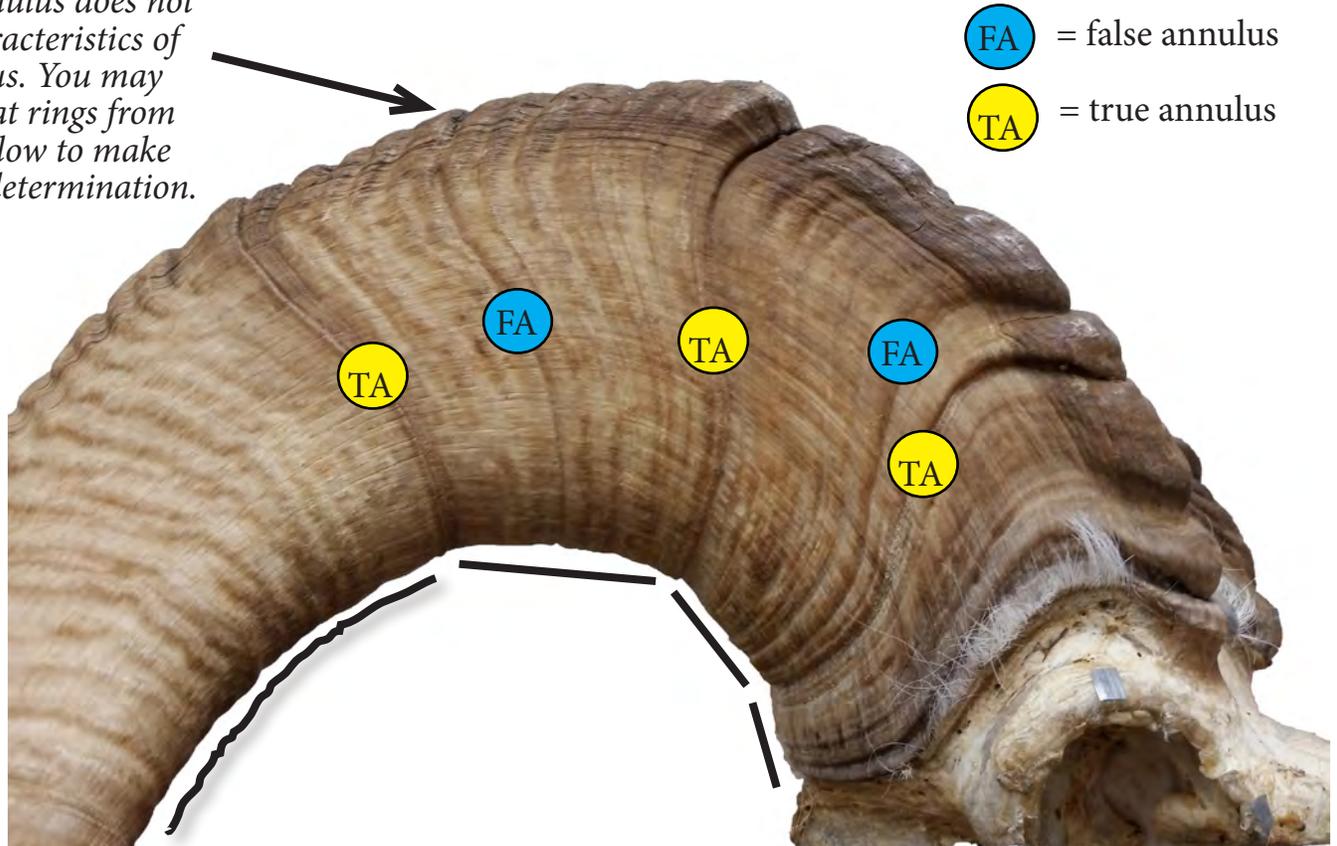
**Lamb tip**

*Sometimes you see a bulge created at the 12-month point in an animal's life. It might look like an area where the horn is swollen. **This is not an annulus.***

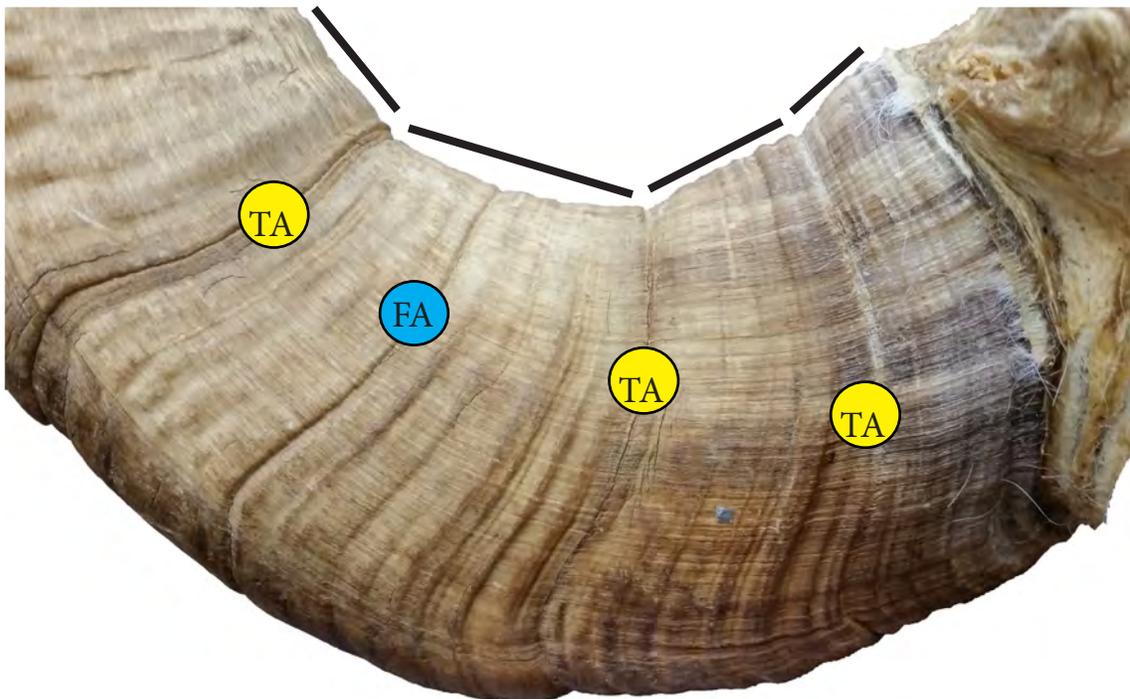
As you count annuli and get closer to the base of the horns, it is very helpful to look from the underside.

Notice horns have a relatively smooth continuous curve on the outside, but on the inside/underside, each annulus results in an abrupt change of plane to the curvature of the horn.

*This false annulus does not meet the characteristics of a true annulus. You may have to look at rings from above and below to make an accurate determination.*



*\* The false annulus labeled below has a slight angle change associated with it on the underside of the horn, but it does not meet other characteristics of a true annulus. Looks at as many features as possible.*



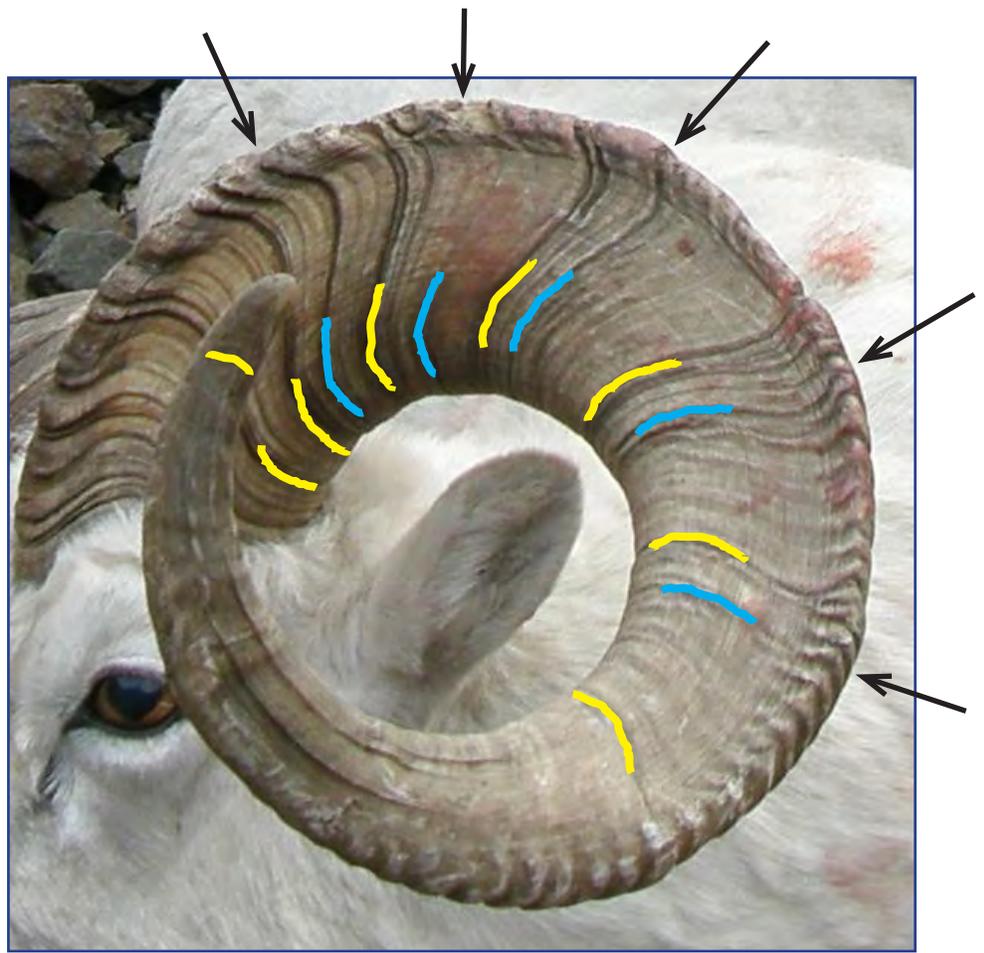
# Repeating Patterns

## Ridges and false annuli

A distinct pattern of ridges between true annuli tend to repeat themselves in the middle section of the horn. For example, if there is a false annuli in one section, it tends to repeat itself in the following growth segments. Knowing this will provide you with one more bit of information and help you better identify false annuli.

In the sheep horns on the right the arrows are pointing to a false annuli that repeats itself in each growth segment.

*\* Note how well defined the false annuli can appear. That is why you need to use all of the clues when making age determinations.*



**True Annuli** are shown marked with **yellow**.

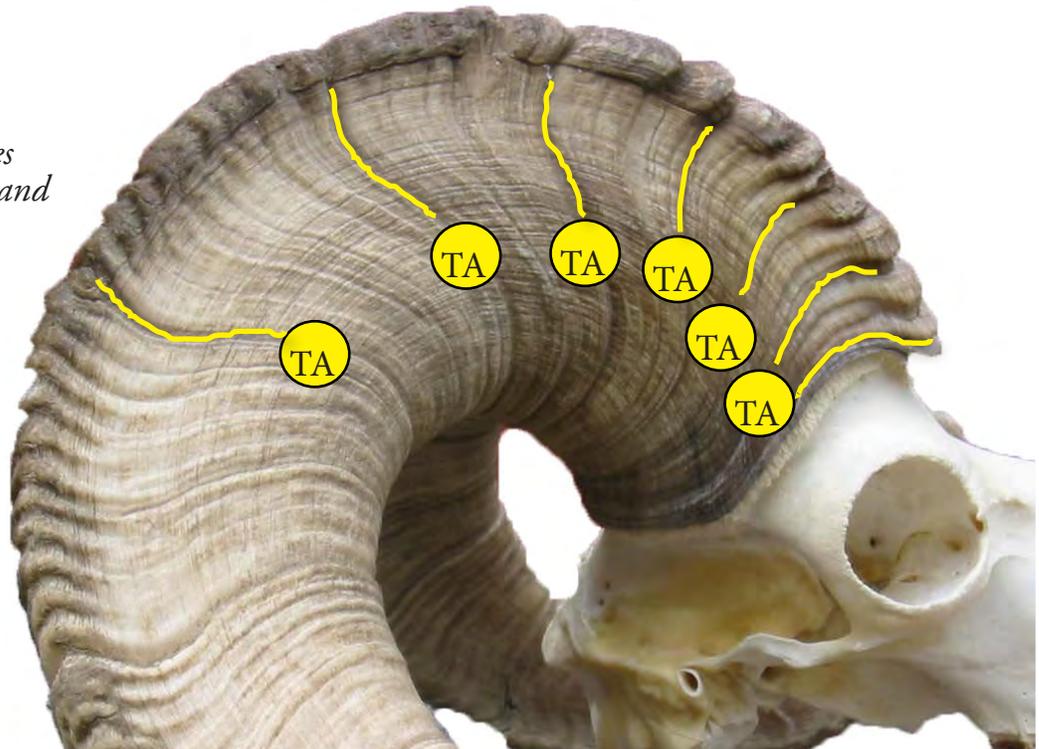
**False Annuli** are marked with **blue**.

## Decreasing Segment Size

As a sheep ages, annual horn growth slows. This causes the growth segment between annuli to successively get shorter. The growth segments near the base of the horns are usually closer together than the segments further out near the tip. If you are not seeing this pattern, you may be looking at false annuli.

*\* There is a small percentage of sheep that will not fit this description. Use as many clues as possible to determine true and false annuli.*

**TA** = True annulus

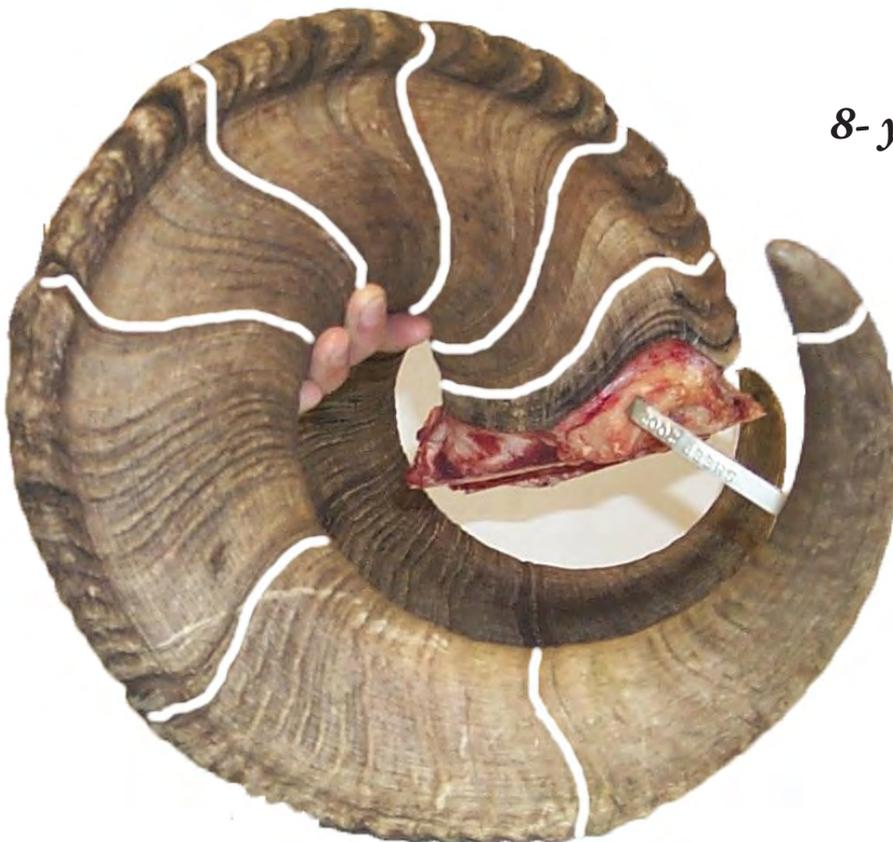


# Steps for Aging By Counting Annuli

1. Locate lamb tip (it may be missing). This is your first annulus. Designate it as "1".
2. Try to locate the "one-year bulge" which may or may not be present between the lamb tip and the second annulus. It may appear as a bulge, or may have a ring present, but this is not an annulus. Note it but do not count it.
3. Locate the second annulus. This is usually the first clear one. Designate it as "2" and continue counting the annuli toward the base of the horn.
4. Identify and mark each true annulus. Use tape or chalk. Do not use a marker.

## Notes

- You may have to look on the underside of the horn to verify that the annulus goes all the way around.
- You may have to look on the underside of the horn to see the distinct plane changes in horn arc.
- Each successive annulus will represent another annual growth cycle.
- There will be a segment of growth below the last annulus for sheep that are harvested in the fall.
- There are no hidden annuli below the hairline of sheep around 8 years old and younger. Old rams that have very little annual horn growth may have annuli beneath the hairline, but an annulus cannot be added to the number that you count, assuming there is one below the hairline.



*8-year-old ram*

# Sex Identification

## Ewes (Females)

### Horns:

- Thinner at base
- Shorter
- Slightly curved



## Young Rams (Males)

### Horns:

- Thicker at base
- Longer with age
- Curve out away from bases
- Narrow distance between bases



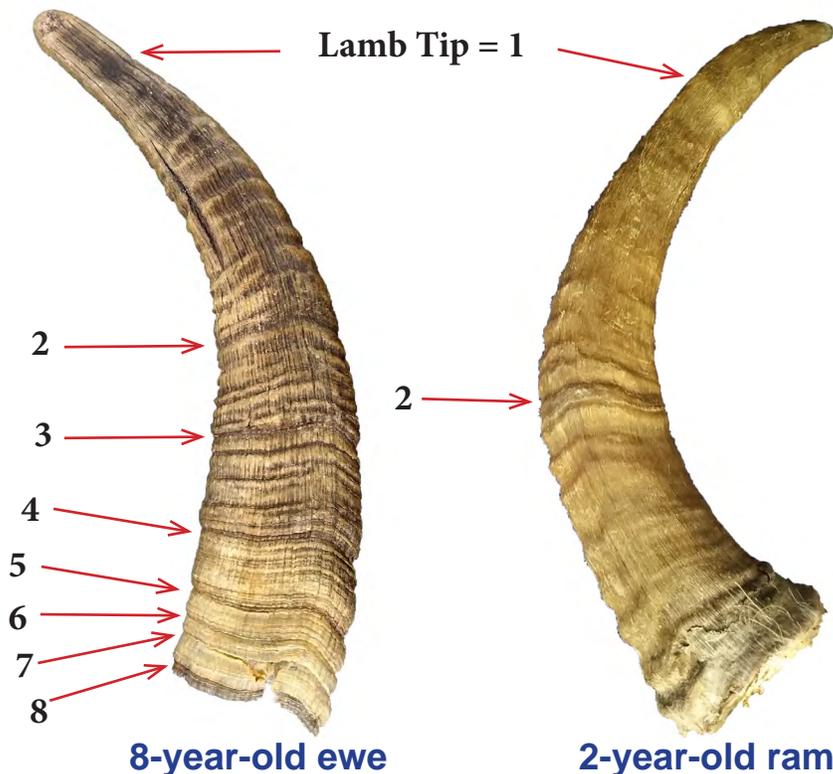
There could be possible confusion in horns of animals that are about 18-months to 2-years old. But after a year, ram horns grow much faster and this will be evident by looking at the size of the horn compared to the annuli.

The picture on the right shows a 7-year-old ewe compared to a 2-year-old ram. These show the distinct difference between the two, with the ewe horns being slender and slightly curved and the two-year-old ram horns being larger than the 7-year-old ewe horns.



Look closely at the horns to view the annuli. See the "Aging Horns" section in this manual for details.

If there are three or more annuli on horns this size, then it is a ewe.



8-year-old ewe

2-year-old ram



2016

The State of Alaska is an Affirmative Action/Equal Opportunity Employer. Contact the Division of Wildlife Conservation at (907) 465-4190 for alternative formats of this publication.

**For more information about the production of this manual please contact:  
mike.taras@alaska.gov, 907-459-7230.**