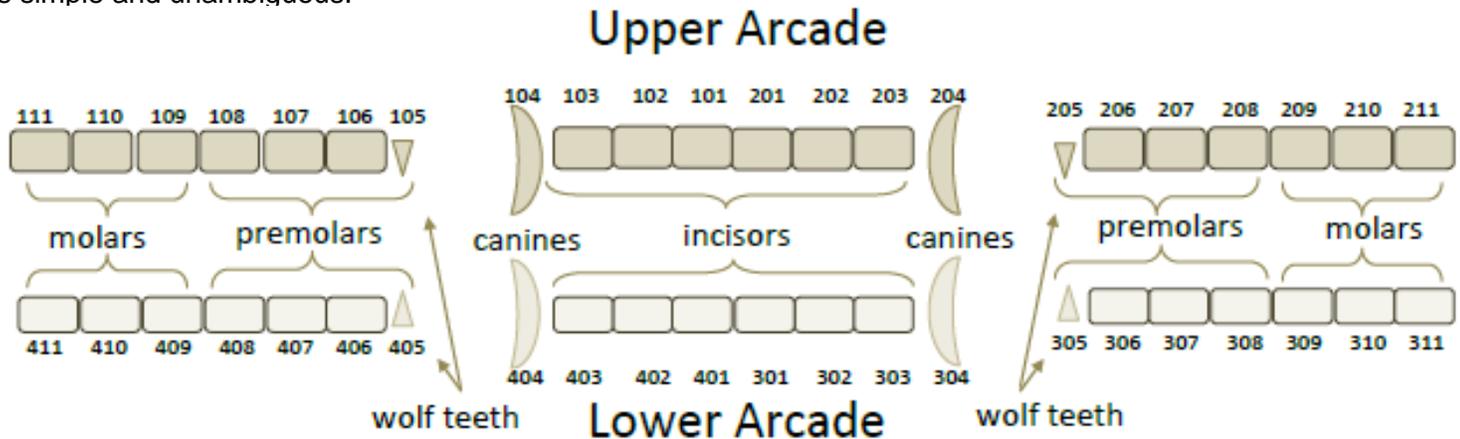


THE BASICS OF EQUINE DENTISTRY

As a rural practitioner, performing an oral exam and dentistry is a routine part of the job. Oral health in patients who do not receive routine veterinary care can have significant and sometimes catastrophic effects on their quality of life.

Before undertaking any discussion of equine dentistry, you must understand the nomenclature used to identify teeth. The chart below shows the numbers assigned to each tooth in the Traidan system. The system is simple and unambiguous.



For several reasons, it is important to be able to tell the owner the approximate age of the horse you are examining. They may have been given an inaccurate age when they purchased the animal. They may have found the animal. They may have given you an inaccurate age as a means of testing you. In all cases, it is a basic tool that you should master.

The eruption table and the table of incisor wear below will help you learn to do this. You will be expected to utilize these tables to determine the ages on every patient we see.

EQUINE DENTAL ERUPTION TABLE											
Age	Incisors			Canine	Wolf	Premolars			Molars		
	01's	02's	03's	04's	05's	06's	07's	08's	09's	10's	11's
0-7 days	Erupt										
0-14 days						Erupt	Erupt	Erupt			
4-8 weeks		Erupt									
6-9 months			Erupt		Erupt						
9-15 months									Erupt		
1 yr											
2 yrs										Erupt	
2 ½ yrs	Erupt					Erupt					
3 yrs							Erupt				
3 ½ yrs		Erupt							Erupt		Erupt
4 yrs											
4 ½ yrs			Erupt								
5 yrs											
6 yrs											

Deciduous	Incisors	In general, whiter smaller, with longitudinal grooves and ridges , surface is more oval
Permanent	Incisors	In general yellower, larger, more rectangular, uppers (100's,200's) with two distinct grooves on front service, lowers (300's, 400's) with a single groove

*canine teeth form in both males and females; however they are generally smaller in females and only erupt in about 30 %.

Note that the first molars (the 09's) are the oldest teeth (with an occlusal surface) in the horse's mouth

INCISORS CHARACTERISTICS USED TO ESTIMATE THE AGE OF THE HORSE

Occlusal surface features		Middle 01's	Intermediate 02's	Outer 03's
Eruption		2 ½	3 ½	4 ½
In Wear		3	4	5
Level		5	6	7
Cup Gone	Hollow upper portion of the In-folding of infundibulum found between the tongue and the star	6	7*	8*
Dental Star Appears	yellow to brown linear secondary dentin that occludes the pulp cavity. Appears between the lip and the cup, linear to oval to round as horse ages, then moves toward center of tooth	5	6	7
Round		9	10	11-12
Galvayne' Groove Appears*				9- 10
Galvayne' Groove Disappears*				30
No Enamel Spot		13-16		
Oval to round		5-9		
Round to Triangular		10-15		
Triangular-to Rectangular		16-20		
*disappearance of the cup as well as appearance/disappearance of Galvayne' groove (as many as 50% of horses may not have this groove) are considered unreliable by some practitioners				

Profile of the Upper Corner Incisor (103 & 203)	
Wider than Height	5-9
Square	9-10
Taller than Width	10 +
Hook Appears	7, again at 11-13

Dental wear (and its utility for aging) is affected by many factors including breed, conformation and diet (affects both tooth formation and tooth wear)

The shape of the corner incisor changes as the horse ages.



Shorter than width (<9)



Square (9-10)



Taller than width (>10)



Dental Star



Infundibular Cup



5 year old



15 year old

The angle at which the incisors meet becomes more acute as the horse ages



Almost 3 years. Central incisor is permanent, but not yet in wear



Almost 5 years. All incisors are permanent, and almost fully in wear.



As the horse ages, the cups disappear and the shape of the incisor's table surface changes. The Cups are replaced by the "mark" seen in the photo on the far right. The shape of the mark changes from oval to round between the ages of 5 and 12 and disappears between the ages of 12 and 18.

Dental Star appears as early as 5, 6, & 7 and moves toward center of tooth as the horse ages. This becomes the only table surface feature of the centrals between 15 and 18.

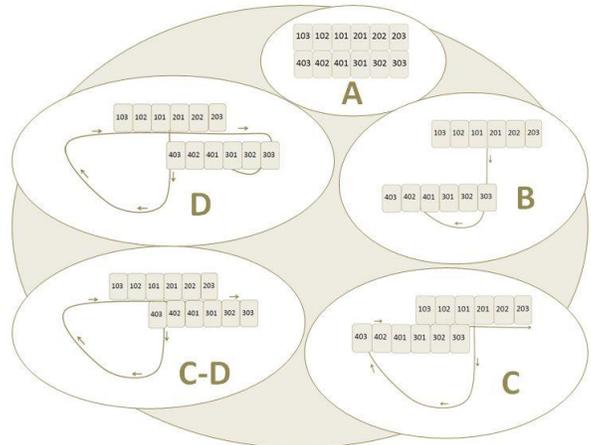
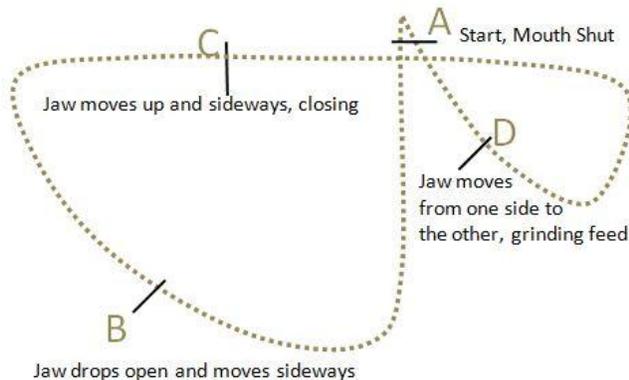
Infundibular Cup disappears around 6, 7, and 8, then becomes the "mark" (enamel ring) as the horse ages. The shape of the mark changes from oval to round between the ages of 5 and 12 and disappears between the ages of 12 and 18.

You must have a basic understanding of development, form, and function of the masticatory system in order to develop an understanding of equine dentistry.

Horses are meant to spend a large portion of their time eating low quality feed. The long periods of time spent grinding food causes a great deal of wear on their teeth. For this reason the horse's teeth are very long, with a great deal of tooth below the gum line early in life. The tooth erupts at a constant rate until there is no tooth left to erupt.

On average horses lose about 2-3 mm of tooth annually to the grinding forces that occur when they chew. This is referred to as attrition. Factors that affect attrition include:

1. The complex chewing cycle (varies from horse to horse).



The 3 stages of chewing shown in these diagrams are

- Opening Stroke (A-B)
- Closing Stroke (B-C)
- Power Stroke (C-D)

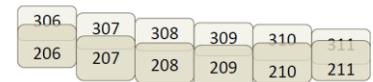
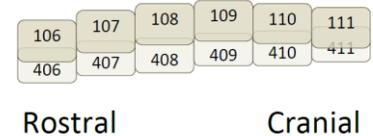
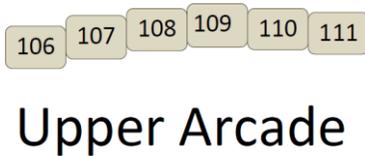
It has been suggested that some horses are one sided chewers, a condition that could significantly affect attrition patterns.

2. Feed type

- Nutrition affects formation
- Affects length of time chewed, affecting attrition

3. Confirmation of the dental arcades

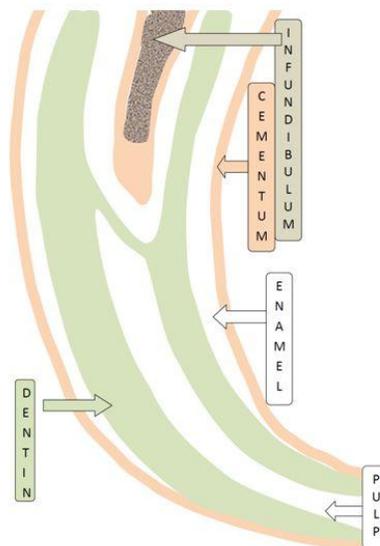
- The upper arcades consist of wider teeth that are set further apart than the lower arcades.
- In addition, the upper arcades may be set slightly forward of the lower arcades.
- This can have a significant effect on dental attrition, and is what causes points to occur on the outside of the upper arcade, and the inside of the lower arcade. There is no tooth to wear against these surfaces, and therefore grind them down.



4. Anatomy of the tooth.

- The tooth consists of multiple layers with different characteristics. The layers are;

- Pulp
- Cementum
- Dentin
- Enamel
- Infandibulum

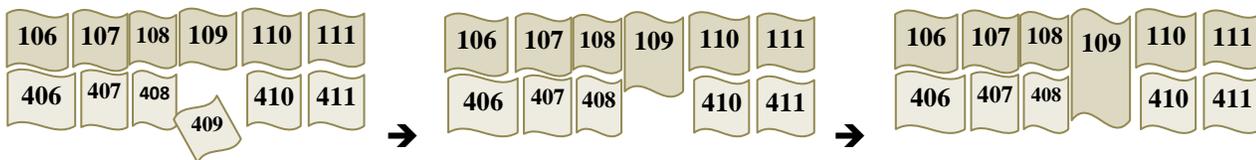


- Cementum is a living tissue and is the most adaptable of the tooth layers. It is found in the infundibulum and covering the entire crown. It is worn from the occlusal surface after the tooth erupts. It is deposited to the crown below the gum line for the life of the tooth. It adds to the size and strength of the tooth and protects the enamel. The deciduous incisors appear whiter due to the relative lack of cementum compared to the permanent incisors.
- Enamel is the hardest component of the tooth but it is brittle. It is 98% mineral, essentially dead and has no ability to repair itself. There are three types
 - a. Type 1, found on the inside edge of the enamel folds
 - b. Type 2, found at the enamel to cement border
 - c. Type 3, found in a very thin layer at the enamel to cement and enamel to dentin borders
 - d. Upper cheek teeth have more type 1 than type 2
 - e. Lower cheek teeth type 1 and 2 are essentially equal
 - f. Incisors are almost solely type 2
- Dentin consists of 70% minerals and makes up the majority of the tooth. It is produced by odontoblasts and pulp. The process occurs as the tooth erupts, preventing the pulp from becoming exposed. There is primary and secondary dentin. Secondary dentin can be regular or irregular.
- The pulp maintains a relatively large blood supply. It lays down secondary dentin to close the pulp cavity as the tooth erupts. This narrows the pulp cavity and strengthens the tooth as it ages. The blood supply and ability to lay down secondary dentin allow younger horses to fight pulp infections and repair themselves. Horses younger than 7 or 8 have more brittle teeth due to the lower ratio of secondary dentin. Older horses, with a higher ratio of dentin, have much stronger teeth. Root formation is completed by the age of 2, however separate pulp channels may not be completely formed in the mandibular cheek teeth until the age of 5-6 years.
- In addition to the Cementum, Enamel, Pulp, and Dentin, incisor and upper cheek teeth (premolars and molars) have a structure called an "infundibulum". This is an infolding of the peripheral enamel in the center of the tooth, which is filled by varying amounts of cementum. The incisors each have an infundibulum (colloquially called a "cup") the cheek teeth each have 2 infundibula.

Common Malocclusions

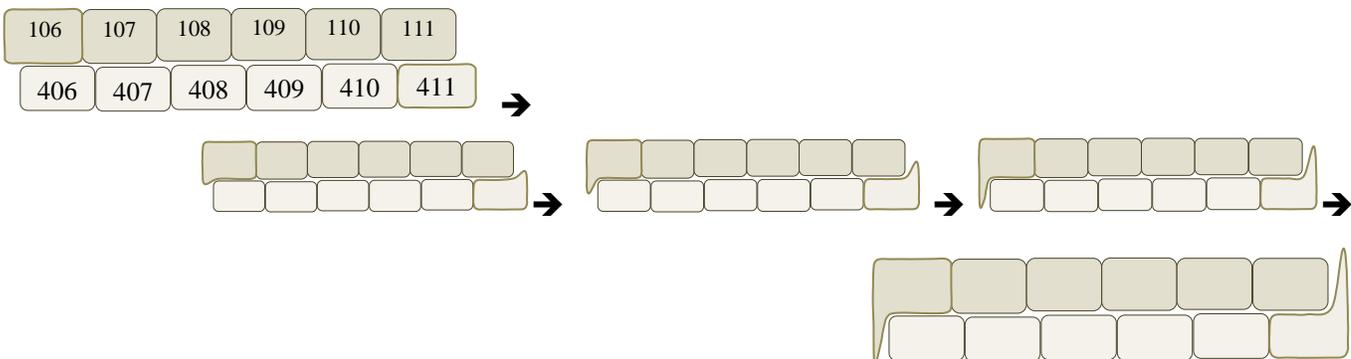
All of the following malocclusions if untreated will eventually prevent the patient from closing their mouth, leaving them unable to chew. These malocclusions normally occur bilaterally.

Step Mouth

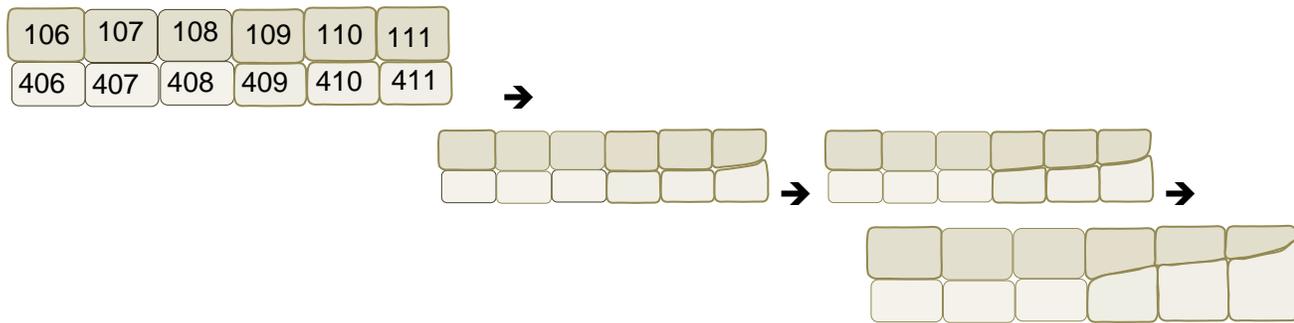


Equine teeth wear to reflect the tooth opposite them. The loss of a tooth prevents the opposing tooth from undergoing the natural process of attrition, resulting in a "step mouth".

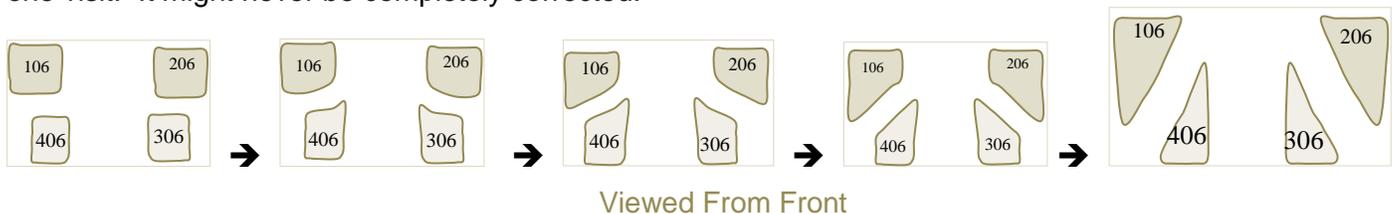
Rostral and caudal hooks are caused by incomplete occlusal contact during mastication.



Ramps form at the back of the mouth on the lower arcade



Shear Mouth forms when the buccal surface on the lower arcades and the lingual surface on the upper arcades wear away. This condition requires both dental and dietary management, and will not be corrected in one visit. It might never be completely corrected.



PERFORMING DENTAL WORK

Most routine dental work can be done with hand floats, and without a speculum. Performing a complete oral exam requires a full mouth speculum, and power equipment is required to address many dental abnormalities. You must allow your patient to periodically rest their jaw when wearing a mouth speculum. Speculums should be closed after a maximum of 15 minutes.

Equipment

- Bucket of water with small amount of nolvasan
- 400 ml dose syringe to rinse mouth
- Light source
- Wedge speculum
- Full mouth speculum (We carry Huassmann or MacPherson type)
- Hand floats
- Power float

Note: never set the equipment down on the ground. Always place floats and syringe back into the bucket and power float on top of a table or the platform on the back of the bus.

As an equine practitioner, performing an oral exam will be a routine part of your job. You may as well develop a system for this now. A thorough exam involves more than looking into the oral cavity. Not all patients will allow you to touch their mouths without sedation, but as you develop some skill, you should be able to examine most patients without.

Before looking into the patient's mouth;

- Look for/ask about signs of quidding (dropped feed)
- Check manure for feed that has not been well chewed.
- smell the patient's breath
- check both nostrils for even air flow

- Ask the client about eating habits, problems eating or changes in weight, appetite, or feed preferences. At times you will want to observe the patient eating prior to administering sedation. Watch for
 - problems chewing
 - problems swallowing
 - dropping feed
- Look at/feel the patients head.
 - Look for asymmetry in the jaw, the sinuses and the sides of the face.
 - Palpate the joint (Temporomandibular joint or TMJ)
 - Feel the upper molars and premolars for;
 - Packed feed (may pack feed to keep sharp buccal points away from their cheeks while eating)
 - Sharp buccal points
 - You sometimes feel the points through the cheek
 - Your patient protest (pushing points into the cheek may hurt)
 - Markedly uneven or missing teeth
- Percuss the sinuses. (Knock or tap and listen for tone differences from one side to the other)
 - They should be empty and sound hollow.
 - If filled they will thud, indicating a problem. (often related to oral health issues)
- Examine the lips inside and out
- Check lateral excursion (move the arcades against one another side to side)
- Check caudal rostral excursion (raise and lower the head and see how far the incisors move front to back in relation to one another)
- If you found sharp buccal points during the exam, you may want reduce these before you continue. Opening the mouth will push the points into the check, causing and the patient may object.

Check the oral cavity

Use caution when examining mouths

- Do not get bitten.
- remove watches or other jewelry before placing your hand in the mouth

- Rinse the mouth, particularly the area between the teeth and the cheek
- Face your patient into the sun
- Using your thumb, press up on the roof of the mouth in the inter-dental space
- Hold the tongue between the arcades. (They are less likely to close their mouth if it means biting their own tongue)

Use care when holding the tongue. To avoid damaging the hyoid apparatus, causing permanent neurologic symptoms, you must brace your hand against the patient and move with them when holding the tongue. If you cannot maintain this contact with the patients jaw release the tongue.

- Check for
 - ulcers
 - packed feed
 - sharp points on the outside of the upper arcade
 - sharp points on the inside of the lower arcade
 - lost teeth
 - retained caps
 - malocclusions
 - Rostral and Caudal hook.
- Release the tongue
- Smell your hand

- Repeat on the other side

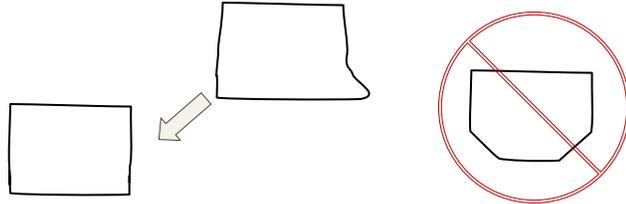
Not all patients will need care. For those who do, formulate a plan to address dental disease and perform prophylactic dental care.

We are not

- creating bit seats,
- floating all surfaces of the tooth until they are completely smooth, etc...

We address problems i.e.

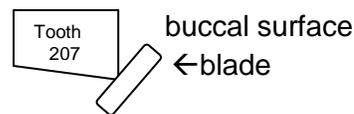
- remove points that cause oral ulcers
- extract infected or loose teeth
- reduce overgrown teeth



The most common problem associated with learning dentistry is inadequate pressure or movement to remove tooth while floating. Do not waste your time. If the speculum is open, move forward.

Floating should involve a routine system

- Start with the upper arcade
 - Floating the upper arcade without a speculum, using hand floats will:
 - Reduce the amount of time a speculum is in place,
 - Help teach proper blade angle. (If your blade is incorrectly angled the patient can bite it).
 - Start in the middle of the upper arcade.
 - Use straight head float
 - Hold blade at 45° angle to points/tooth
 - Use short light strokes.
 - Increase stroke in length and strength as movement gets easier
 - Listen for change in tone from higher to lower and hollow, indicating points have been removed
 - To assess effectiveness look at where the tooth particles are on the blade.
 - Even distribution = good blade angle
 - Tooth only on blade tip = move handle medially (toward you)
 - Tooth particle on near end of blade = move handle laterally (away from you)
 - If the patient can bite the blade, your angle is incorrect
 - Finish the upper arcades starting the lowers
 - Use a very thin blade to reach to the upper 11's,
 - Use a slight closed angle for caudal hooks. If available,
 - Power equipment causes less trauma to the cheeks
- To utilize power equipment for (for anything other than buccal points in a quiet horse), you will need to sedate your patient, and place a mouth speculum.



NOTE: If you are involved in a dental procedure and are using a mouth speculum maintain a hand on the horse's head. Speculums can cause serious injury if the horse moves unexpectedly.

- Address hooks on lower 11's
- Address hooks on the 6's and lingual points on lower arcades

THE POWER FLOAT-just the basics/Important use and storage notes

For complete information regarding the power float see the printed the printed copy of the manuals in the back of the equine binder or visit the power float website

- **Never submerge the grinding wheel/float head into water**
- Lube the power float after each use (daily when used)

BATTERY POWERED CORDLESS MODEL OPERATION

- Only operate the adjustable clutch on setting 13 or 14.
- Only operate the rpm range selector at setting number 2.

TOOTH COOLING

Do not float on a single tooth or group of teeth for longer than 10 seconds without cooling the tooth (teeth) with cold water. Repeat floating and cooling procedure as needed until procedure is completed.

CHARGERS

- 15 minute wall plug battery charger
- 1 hour cigarette lighter/electrical accessory charger