



## 2017 RWAF Conference

### **VET PROFESSIONALS STREAM**

Welcome to what is now our 14<sup>th</sup> conference, which we are thrilled to be hosting in Scotland. This year we are once again pleased to be able to bring you a variety of lectures, all chosen carefully to keep you up to date with the latest research and techniques.

We welcome any feedback and any suggestions for next time. We are hugely grateful to our team of educators today, and as ever, thanks to our sponsor, Burgess Pet Care.

Thanks therefore go to the following people:

Dr Richard Saunders  
Dr Livia Benato  
Dr Elisabetta Mancinelli  
Dr Molly Varga  
Dr Nadene Stapleton  
Dr Emma Keeble  
Dr Kevin Eatwell  
Dr Craig Hunt  
Dr Ivan Crotaz

Moreover, of course, huge thanks to all of you for coming along and supporting this event. It would not have been possible otherwise. We hope you have a useful and educational day.

Alan, Emma, Rae, Richard & Ros

*Team RWAF*



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**Nadene Stapleton BVSc, MRCVS**

Nadene graduated from The University of Melbourne in 2000. Throughout her career she has had the pleasure of working in various different settings including equine race track work, mixed practice and small animal practice. She was a locum vet for the largest collection of Australian native wildlife in the world just fresh out of university, which she admits was a steep learning curve! She has participated in volunteer work in China with bears being rehabilitated from the bile trade and locumed for many years leaving a wake of newly "exotics knowledgeable" colleagues behind her.

She is a self-confessed crazy bunny lady and has been at the Beaumont Animal Hospital since 2009 where she treats exotics of all shapes and sizes but admits she has become known as the "bunny vet" which suits her just fine. She is passionate about improving the lives of animals through education and teaches the new veterinary and vet nursing generations on all things exotic. In addition to two rabbits, she lives with a lizard, a tortoise, parrots, a cat, a fish and one very tolerant magician!

**Kevin Eatwell BVSc (hons) DzooMed (Reptilian) DipECZM (Herpetological and Small mammals) MRCVS**

RCVS Recognised Specialist in Zoo and Wildlife medicine, ECZM Recognised Veterinary Specialist in Herpetological Medicine

Senior Lecturer in Rabbit, Exotic and Wildlife Medicine, Head of the Dick Vet Rabbit and Exotic Practice

Kevin graduated in 1995 from Bristol University. He has worked for first opinion and referral exotic veterinary practices, zoological collections, wildlife hospitals and for commercial clinical pathology laboratories over his career so far. He currently works as a Senior Lecturer and Head of the Rabbit and Exotic Animal Practice at the Royal (Dick) School of Veterinary Studies, Edinburgh.

**Emma Keeble BVSc Dip ZooMed (Mammalian)**

Emma Keeble graduated from the University of Bristol in 1994, working in mixed veterinary practice, wildlife rehabilitation and small animal exotic pet first opinion and referral practice before joining the University of Edinburgh, Dick Vet Rabbit and Exotic Animal Practice in 1999. She was veterinary surgeon to Edinburgh Zoo for 10 years as part of this role. She gained her RCVS Diploma in Zoological Medicine (Mammalian) in 2006 and became a RCVS Specialist in 2007. She is currently a lecturer and clinician in rabbit, exotic animal and wildlife medicine and surgery at Edinburgh University with a high clinical teaching caseload of pet exotic species, both first opinion and referral cases.

She lectures to veterinary professionals nationally and internationally on exotic pet, zoo and wildlife medicine. She has published widely in veterinary books on exotic pets, wildlife casualties, reptile neurology and rabbit neurology, and has edited books on rabbit, ferret and rodent medicine and surgery and wildlife casualties. She has a particular interest in *Encephalitozoon cuniculi* infection in pet rabbits.

**Craig Hunt BVetMEd DZooMed Cert Sam RCVS MRCVS**

Craig qualified from the Royal Veterinary College in 1997 and proceeded to work in mixed-species practice in East Sussex for 5 years. A subsequent move to Gloucestershire for 3 years followed, before settling at Chine House Veterinary Hospital in November 2005. He obtained the RCVS Certificate in Small Animal Medicine in 2000 and the RCVS Certificate in Zoological Medicine in 2002. In 2013, he was awarded the RCVS Diploma in Zoo Medicine, one of only a small number of veterinary surgeons to achieve it in this country. In 2014, he was recognised as a specialist by the RCVS.

He is a member of numerous “exotic” animal societies including BVZS, AAV, ARAV and AAZV. His spare time is spent pursuing hobbies in falconry, cooking, scuba diving and looking after a large menagerie at home! More recently, he has been helping his partner, Wendy, in promoting the UK’s first pet blood bank.

**Ivan Crotaz BVetMed MRCVS**

Ivan is the Docsinnovent lead veterinary consultant for companion animal anaesthesia. He graduated from the Royal Veterinary College in London in 1999. Ivan is both a general practitioner and sees second opinion medical and surgical rabbit cases, as well as lecturing on rabbit husbandry, medicine and surgery. He has been the veterinary advisor to Docsinnovent since the start of the v-gel® development programme and has provided invaluable insights and contributions in investigating and advising on upper airway anatomy, best anaesthesia practice, post mortem studies, v-gel® design and clinical trials. Ivan's initial cadaver investigation work for v-gels® was published in Veterinary Anaesthesia and Analgesia in 2010 and has other work in the process of approval and write-up. He delivers lectures and webinars on airway management including the use of supraglottic devices in companion animal species. Ivan has been involved in all aspects of v-gel® development, design and testing for all species and uses his knowledge of alternative airway management techniques to champion the concept of advanced airway management as a way of reducing cross infection, morbidity and mortality in veterinary anaesthesia.

**Richard Saunders BSc (Hons) BVSc MSB CBiol DZooMed (Mammalian) MRCVS**

Richard qualified from Liverpool University in 1994, obtained his Certificate in Zoological Medicine in 2001 and his Diploma in Zoological Medicine in 2010. As many of you will know, Richard has made a huge contribution to improving domestic rabbit health and welfare in too many ways even to count. It is a pleasure to have him as the RWAF Vet Advisor. One of Richard's most notable achievements – so notable that it's been recognised with nominations for both a CEVA and a Pet Plan award – is his trailblazing work to bring the RVHD2 vaccine to the UK. Richard worked tirelessly to make this happen and as a result, around 70,000 rabbits have been protected against this fatal disease in the UK already. Richard's contribution to RWAF as a vastly knowledgeable and passionate vet is vital and his input helps shape the strategy of the RWAF.

# Beaumont Sainsbury Animal Hospital

Royal Veterinary College  
Camden



**Dr Nadene Stapleton**  
Consultant in Exotic Animal Medicine and Surgery



Many of the images used in this presentation are from:

Surgical Management of Ear Diseases in Rabbits Rebecca Csomos, DVM, PhD, Georgia Bosscher, DVM, Christoph Mans, Dr med vet, DACZM, Robert Hardie, DVM, DACVS, DECVS

Clinical Technique: Treatment of Periapical Infections in Pet Rabbits and Rodents Vittorio Capello, DVM

The Progressive Syndrome of Acquired Dental Disease in Rabbits Frances Harcourt-Brown, BVSc, FRCVS, RCVS recognized Specialist in Rabbit Medicine and Surgery



# WARNING

## Graphic Content

(And a smattering of random cute stuff to balance it out)



### Rabbit Abscesses

- Anatomy/physiology
- Types of abscesses and their causes dental/fight wounds/ear abscesses
- Investigation
- Treatment options
- Complications
- Prevention
- Questions



### Rabbit abscesses – what's all the fuss about?

Abscesses are common in cats and rabbits why are they so difficult to treat in rabbits?

#### 1. LIMITED CHOICE OF ANTIBIOTICS

- Gut microflora
- P-L-A-C-E rule

#### 2. THICK CAPSULE

- Less systemic signs
- Hard for antibiotics to penetrate
- Unlikely to burst then heal like cats

#### 3. THICK (often sterile) PUS

#### 4. HIDE SIGNS OF ILLNESS



## Fight Wound Abscesses

- Usually occur on body
- History of a fight
- Often a wound or scab evident
- Easier to deal with than most abscesses



## Fight Wound Abscess: Investigations

Usually diagnosed from history / physical examination/location  
Fine needle aspirate  
Sometimes difficult because of thick pus (use large needle)



## Fight Wound Abscess: Treatment Options

### SURGERY

- Antibiotics cannot always resolve
- Complete removal
- Lancing less likely to be successful



## Dental Abscesses

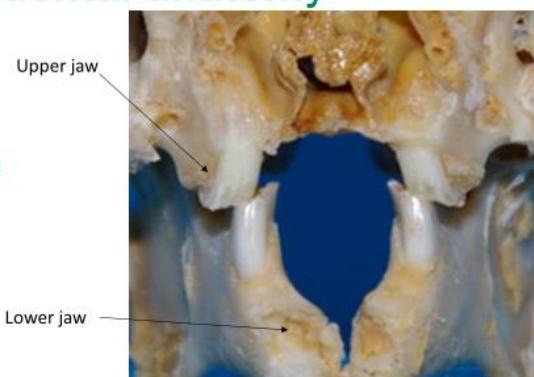


## Anatomy: dental anatomy

**Continuously growing teeth**

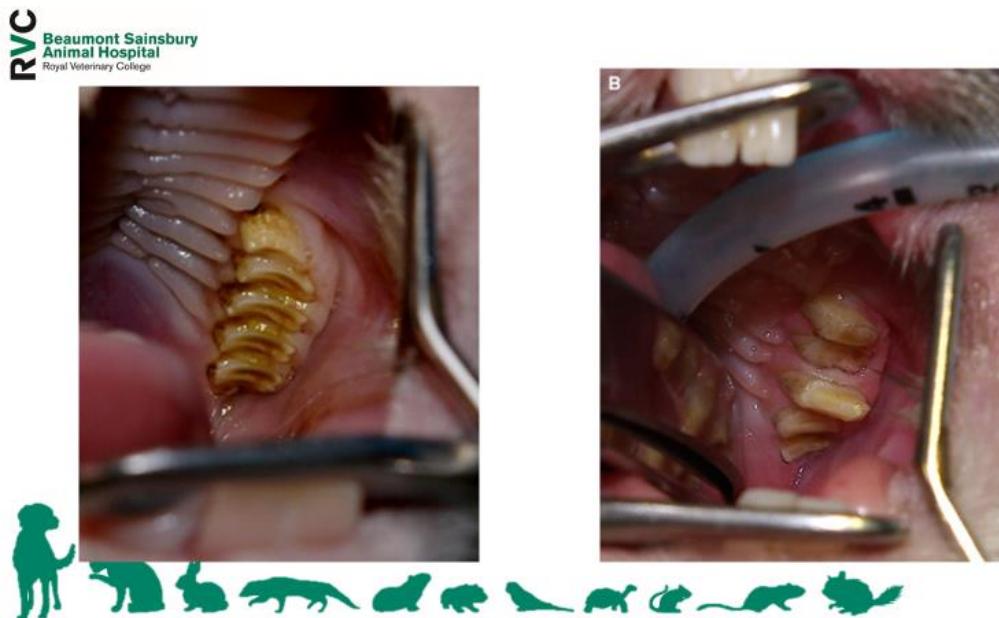
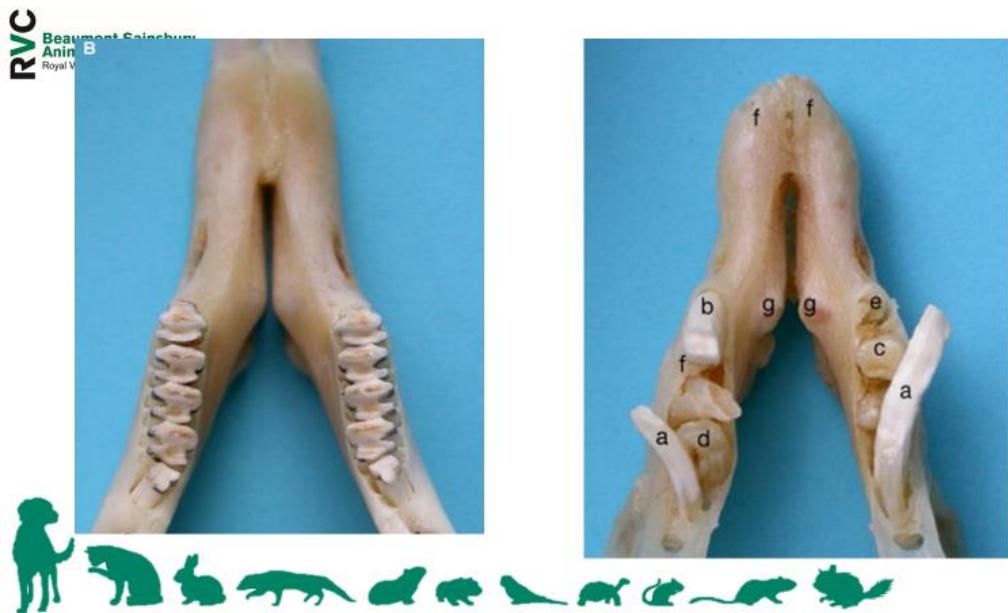
**Movement of jaw depends on type of food eaten**

- **Chomping** (carrots)
- **Grinding** (hay and grass)



Normal xrays  
and photos







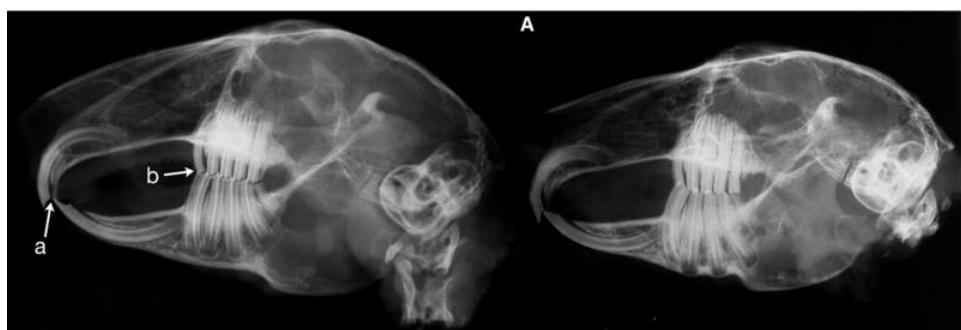
## Dental Abscesses: Causes

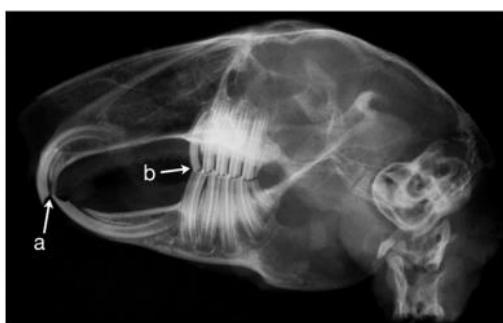
- Incorrect diet
- Calcium/Vit D imbalance
- Selective feeding
- Overgrown teeth
- Root elongation
- Trauma
- Genetics



## Dental Abscesses: Investigations

- Anaesthesia!!
- Oral exam
- Endoscope
- Xray
- CT scan
- Culture and sensitivity





## Dental Abscesses: Treatment

Lancing

Complete removal not possible

Clean and close

PMMA beads

**MARSUPIALISATION**



## MARSUPIALISATION

Treatment of choice in most cases

Success depends on:

1. Ability to remove focus of infection (TEETH/BONES/SOFT TISSUE)
2. Post operative care

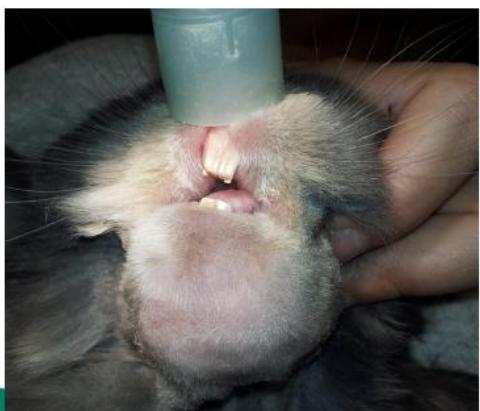
IS A **LOT** OF WORK FOR OWNERS POST OPERATIVELY

(seems) WELL TOLERATED BY RABBITS



## Complications

- Osteomyelitis – bone infection
- Jaw fractures
- Recurrence
- Gut stasis
- Anorexia







## Importance of advanced imaging – CT scans

Gives the veterinarian a better idea of the complexity of the structures involved

Helps plan surgery

Gives a better idea of prognosis





## Prevention of dental disease/abscesses

1. Try and give all rabbits outside time in a predator proof area.  
Access to sunlight (not filtered through a window) helps maintain good calcium and vitamin D balance.
2. Try and feed a minimum of a ball of hay the same size as the rabbit every day – make sure they eat it!
3. Reduce adult rabbits ration of pellets to encourage hay eating average 2kg rabbit give one dessert spoon full a day (if you must)
4. Encourage grass eating wherever possible
5. Regular dental check ups = early intervention

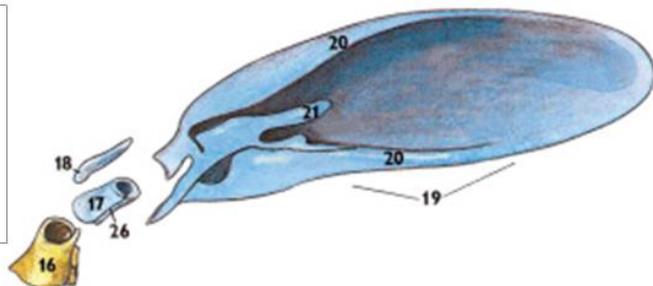


## Ear base Abscesses



## Anatomy: ear anatomy

- 16. Boney part of ear canal
- 17. Annular cartilage
- 18. Scutiform cartilage
- 19. Auricular cartilage
- 20. Helix
- 21. tragus



## Ear Base Abscesses

- Lop rabbits - caused by the lopping of the ear
- Wax trapped
- Weak spot
- Hard to identify
- Often show no clinical signs
- Show no signs of pain
- "Tip of the iceberg"

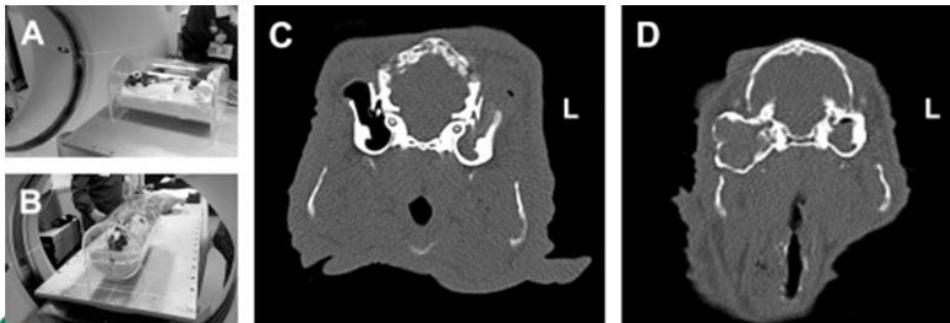


## Ear Base Abscess: Investigations

- Palpation
- Ear exam
- X ray
- CT scan



## CT Scan



## Ear Base Abscesses: Treatment Options

Antibiotics?

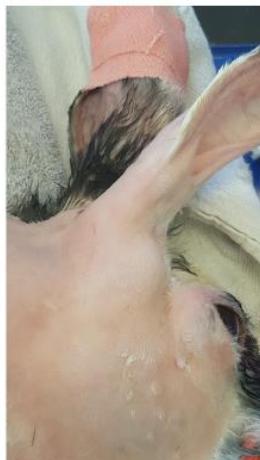
Ear drops

Ear flushing

Surgery

Prevention





## surgery

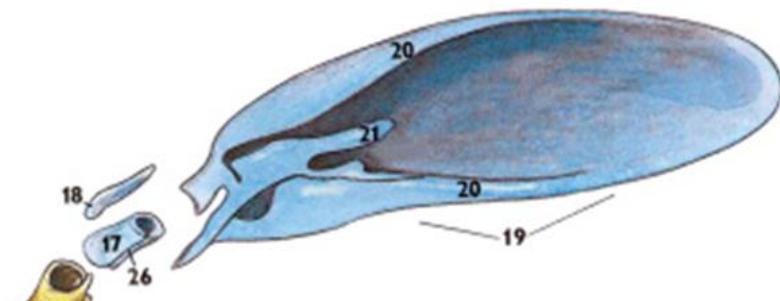
Surgery best chance of success  
in most cases

Not possible in every case

Involves the removal of most of  
the ear canal

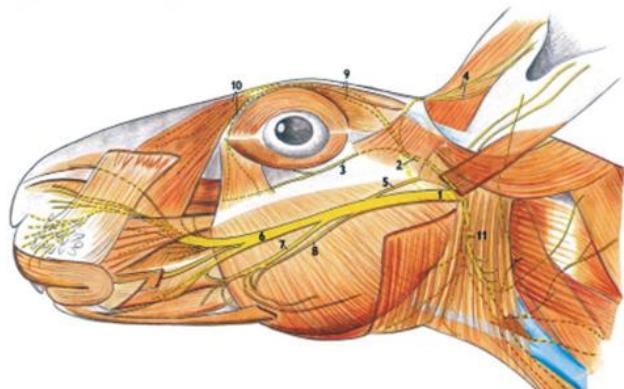


## Ear canal ablation



## Surgery: Complications

Bleeding  
Auriculo palpebral nerve  
paralysis  
Eye problems  
Balance problems



## Palliative Care Options

Surgery not always possible  
Quality of life  
Hard to assess pain  
Pain relief  
Antibiotics – Penicillin?



## Prevention

Ear Cleaning??  
Responsible breeding practices



## Questions?



## **Stasis – causes, diagnosis and treatments**

**Kevin Eatwell BVSc (hons) DzooMed (Reptilian) DipECZM (Herpetological and Small mammals) MRCVS**

**RCVS Recognised Specialist in Zoo and Wildlfie medicine**

**ECZM Recognised Veterinary Specialist in Herpetological Medicine**

### **Overview of the rabbit Gastrointestinal tract.**

Rabbits are hind-gut fermenters, adapted to digest a low quality, high fibre diet consisting mainly of grass. Gut transit time is rapid and eliminates fibre from the digestive tract as soon as possible. The stomach is thin-walled, and poorly distensible with a well-developed cardia and pylorus. Vomiting is not possible. Food, caecal pellets and ingested hair are normally present in the stomach, in a loose latticework. Contents then pass to the small intestine. The ileum then enters the caecocolic junction.

The colon is sacculated and banded. Colonic contractions separate fibrous from non-fibrous particles, and fibre moves rapidly through the centre of the colonic lumen for excretion as hard faecal pellets. Antiperistaltic waves move fluid and non-fibrous particles back along the luminal walls within the sacculations into the caecum for bacterial fermentation. Three to eight hours after eating, soft mucus-covered caecal pellets (caecotrophs) are expelled and eaten directly from the anus. Arrival of the caecotrophs at the anus triggers a reflex licking of the anus and ingestion of the caecotrophs, which are swallowed whole and not chewed. The mucus covering protects the caecal pellet bacteria from the low stomach pH. Caecotrophs remain in the stomach for up to six hours with continued bacterial synthesis, and eventually the mucus layer dissolves and the bacteria are killed. This process allows absorption of nutrients and bacterial fermentation products (amino acids, volatile fatty acids and vitamins B and K), and the digestion of previously undigested food. A food item can thus pass twice through the digestive tract in 24 hours.

A muscular band of richly innervated tissue with a thickened mucosa, the fusis coli, lies in the colon and acts to regulate colonic contractions and controls production of the two types of pellets. Stressors will affect this neurological control of GI function and motility.

### **Causes of gastrointestinal stasis.**

Gastrointestinal stasis is a common presenting sign in rabbits. The proper function of the gastrointestinal tract is critical and so advising the client on appropriate feeding of their rabbits and the importance of this should be routine.

In the clinical setting we need to understand the underlying factors leading to these presentations and advise our clients accordingly. Gastrointestinal motility can be adversely affected by a number of factors:

The most common cause of gastric stasis and ileus is a low fibre, high carbohydrate diet. Food intake and GI motility are co-dependent; thus anorexia will cause hypomotility, and hypomotility will cause anorexia.

### **Factors leading to reduced GI motility in the rabbit.**

Lack of dietary fibre.

Anorexia.

Chronic dehydration.

### **Environmental stressors:**

Proximity of predators.

Proximity of a dominant/competitive rabbit.

Change/destabilisation of group hierarchy.

Sudden change of diet.

Change of housing.

Transport.

Extremes of weather/temperature.

Loss of a companion.

Pain.

Post-surgical adhesions.

Ingestion of toxins (eg lead).

Heavy moult (fur passage through the GI tract).

Foreign body.

Reduced gut motility leads to dehydration of gut contents, which decreases motility further. From the list of underlying causes its worth noting that some of these are present in all cases presenting to the vets. Prophylactic treatment for gastrointestinal slowdown is therefore routine for all patients hospitalised. Auscultation may yield negative results in a normal rabbit that has just been stressed in the waiting room.

Clinical history and clinical assessment of the rabbit should enable you to determine if there is a likelihood of an obstruction.

### **Clinical signs of gastrointestinal stasis can be variable:**

Demeanor: Quiet or hiding away through to collapse and hypothermia.

Anorexia – this may be sudden in onset or progressive over time.

Abnormal faeces – these may be reduced in number, size or absent.

Abdominal pain: hiding away, flattening abdomen on the ground, tooth grinding.

Progression of signs to depression, lethargy, dehydration and death

**On palpation of the abdomen typically a number of scenarios can be seen. These can be associated with weight loss, lack of GI sounds and the presence of faecal pellets in the descending colon may be variable.**

**Normal** - Full abdomen with doughy GI content throughout. Some compressability.

**Empty** – Gastrointestinal tract is less full than expected, abdomen with doughy GI content throughout. Some compressability. Not eaten this morning.

**Dilatated** - Gastrointestinal tract has gas distention some pain on palpation and gas can be felt moving under fingers. Less full than expected, abdomen. Some compressability of bowels. Gas production from ileus.

**Impacted** – Caecal contents are firm to touch and can be compressed but long delay before spring back to normal. May also have gas production. Large faecal pellets can be palpated in colon.

**Tympanic** – Stomach is enlarged and does not compress. Pain on assessment. Rest of GI tract less full than normal and may have minimal gas present. Occasionally caecal tympany.

Gastric stasis leads to dehydration and impaction of the normal stomach contents, which include hair (commonly referred to as a hairball, trichobezoar or “woolblock”). The stomach still has some compressability.

The impacted material can be palpated and seen radiographically as a gastric mass surrounded by a halo of gas. True “hairballs” can be found in long-haired rabbits such as Angoras, which can ingest excessive amounts of long hair.

Non obstructive ileus will follow on from untreated gastric stasis and is a continuation of the same process. In practice the two conditions are often present together. Clinical signs are similar, but with ileus, pain is a prominent feature, manifest as tooth-grinding, a hunched posture and reluctance to move

Obstructive ileus is an emergency, and it can sometimes be difficult to distinguish between obstructive and non-obstructive ileus. Rabbits will develop true obstructions with dried ingesta and hair ("trichobezoars") (the vast majority of cases), and ingested foreign materials such as carpet, rubber, plastic. The most common sites are the pylorus, proximal duodenum and ileocaecocolic region. i.e. from stomach outflow to the large intestine.

Always think about possible underlying diseases processes such as neoplasia, abscesses or surgical adhesions.

### Differentiation of non-obstructive and obstructive ileus

Non-obstructive ileus	Obstructive ileus
Dilatated	Tympanic
Gradual onset (days to weeks)	Sudden onset (24-48 hours)
Gradual reduction in faecal size and output	Faecal output stops suddenly
Initially bright, gradual onset of depression and abdominal pain	Severe depression, abdominal pain and reluctant to move
Mild to moderate dehydration	Shock – slow CRT, pale mucous membranes, severe dehydration
	Death in 24-48 hours

A rabbit can of course can have both conditions at once.

**Both of these cases will need stabilisation.**

### Treatment of gastric stasis and non-obstructive ileus

Treatment is aimed at supporting the rabbit and restoring normal motility. Rabbits should be hospitalised in quiet surroundings away from potential predators to minimise stress.

Analgesia – buprenorphine 0.03 mg/kg Sc/IV TID, meloxicam 0.6mg/kg SC/IV BID. If concerns regarding marked pain then use methadone 0.5mg/kg SC/IV every four hours. Consider risk of Gastric ulceration if marked distention and may avoid NSAID's.

Fluid therapy - generally intravenous fluids are indicated. Maintenance volumes are 100ml/kg/day. Oral fluids also given to hydrate stomach contents in ileus. Do not give oral fluids to rabbits that are potentially blocked.

Motility modifiers – Ranitidine 4mg/kg PO BID. Can add in metaclopramide 0.5mg/kg Sc/PO BID, cisapride 0.5mg/kg PO BID. Caution if you feel there may be a blockage present.

Assisted feeding – commercially available high fibre herbivore recovery diets, slurries of ground rabbit pellets, vegetable baby foods. Always offer hay. If there is a potential obstruction do not syringe feed.

Should you be keen evaluation of the arterial blood gas and acid base balance of the rabbit can provide you with a prognosis on the severity of compromise and possible hepatic involvement. Blood glucose can be used as part of the overall assessment of the patient, *not* used as a guide for surgical intervention.

### **Making the diagnosis of a surgical case.**

#### **Radiography:**

##### **Radiographic findings of ileus:**

Compacted material in stomach and sometimes caecum, often with halo of gas.

As symptoms progress, entire GI tract gas-filled. Stomach usually last to bloat.

Fluid only present late in disease

##### **Radiographic findings of obstruction:**

Fluid and gas present cranial to obstruction

Bubbles of gas in stomach, not halo

If radiography is consistent with a surgical *candidate* then stabilisation should be performed as above. However these will also be markedly hypothermic and so surgery should not be undertaken until they are normothermic. Decompression is also needed to ease pain, reduce pressure on the thoracic cavity and reduce the risk of stomach rupture and ulceration.

Rarely barium studies are indicated to evaluate chronic or repeat offending GI cases.

### **Decompression.**

Use a long otoscope cone placed as a mouth gag. Oxygenate the rabbit and have a crash box ready. You will make the rabbit mouth breathe via the otoscope tube. Pass a stomach tube (typically 4mm) into the stomach and aim to alleviate gas and fluid. If there is a blockage try injecting some fluid just to move fur/food contents away from the end of the stomach tube prior to aspirating again.

MANY surgical candidates will spontaneously resolve as a result of this care and become medical cases. The blockage can move further down the GI tract.

However if the obstruction persists then surgery must be undertaken.

### **Aims of surgery:**

If there is marked gastric tympany then emergency decompression may be needed. This may be performed first or after the obstruction has been relieved.

Remove the blockage by milking it into the large intestine wherever possible.

If the blockage cannot be moved then perform an enterotomy.

If you confirm there is a large amount of hair present then the gastric contents could contain more – just waiting to cause another blockage.

Thus many surgeons evacuate the stomach contents anyway to avoid this risk. The do however increase surgical time and contamination of the abdominal cavity. This is a clinical judgement call on a case by case basis.

If you have emptied the stomach, refill it (via needle and syringe) with warmed hartmanns solution and ensure this passes freely down all the way to the large intestine.

Antibiotics are indicated in the perisurgical period and trimethoprim sulphonamides (TMPS) usually suffice.

Continue on aggressive fluid therapy, analgesia, prokinetics and supportive feeding. The first feed should be carbohydrate based for rapid energy assimilation (you have just emptied the stomach and small intestine).

### **Other therapeutic options:**

Exercise – helps to stimulate GI motility. **YES.**

Abdominal massage – aims to encourage gas movement through the bowel. **NO.** This just causes pain.

Simethicone at 20-40mg/kg po qid – surfactant used if large amounts of gas are present. **NO.** Rabbits cannot vomit or eructate. Maybe consider giving via stomach tube then trying to decompress the rabbit. However, frothy bloat is not an issue.

Bromelin and papain (Papaya and Pineapple juice) – aims to digest keratin. **NO.** Does not work.

Grooming – get rid of fur before they can ingest it. **YES.**

It may take up to three days or more for faecal output to resume.

# **Top Tips for a Successful Rabbit Consult**

**Emma Keeble BVSc Dip ZooMed (Mammalian)**

**RCVS Recognised Specialist in Zoo and Wildlife Medicine**

**Dick Vet Rabbit and Exotic Animal Practice**

**University of Edinburgh**

## **Introduction:**

Rabbit medicine is a fast developing field of veterinary medicine, with owners expecting an increasingly high standard of care for their pets. Rabbits are prey species and unless habituated to transportation, handling and restraint, these events will be highly stressful. Competent handling by veterinary staff is essential to reduce stress and avoid iatrogenic trauma and all staff should receive appropriate training. The essentials of clinical history vary significantly compared with those for dogs and cats, as husbandry and diet are entirely different. The rabbit is also unique in many of its anatomical, behavioural and physiological features and responses, requiring special knowledge to interpret the relevance of key clinical findings.

There are **five key areas** to ensure a positive and successful consultation process for pet rabbits. These are as follows:

- 1. Ensuring as stress free a process as possible for the rabbit and owner (from pre-consult to finish)**
- 2. Obtaining a thorough and accurate clinical history, including husbandry and dietary details**
- 3. Observing the rabbit from a distance, prior to any handling**
- 4. A thorough and complete clinical examination (N.B. EVERY rabbit should undergo an otoscope examination of the ears and cheek teeth)**
- 5. Clear and concise communication with your client regarding your findings, proposed treatment plan and any changes to husbandry and diet required**

### **1. Pre-consult:**

Any visit to the veterinary surgery should be assumed to be a highly stressful event for most pet rabbits. Most rabbits are not accustomed to being taken out of their home environment, restrained in a carry box and transported, all of which are stressors for a prey species. There are, however several key steps that can be implemented to help reduce this stress as much as possible and these are outlined in Figure 1. It is possible to habituate pet rabbits to car journeys, providing positive rewards and this should be encouraged from an early age. Advice should be given to the owner prior to transportation, either from the reception staff over the phone at time of making the appointment, via email or web sites.

**Figure 1: Key steps that can be implemented by the owner to help reduce stress during transport of pet rabbits.**

<b>Client Advice to reduce stress during transport of pet rabbits</b>
Always contain the rabbit in a suitable well-ventilated carry box, with a non-slip floor
The rabbit can be habituated to the carry box beforehand (place in the rabbit's enclosure and place food inside the box on a regular basis)
Place bedding / hay from the animal's enclosure in the carry box to provide a familiar scent
Bring the companion animal along too
Place favourite food items in the carry box (e.g. fresh herbs)

Arrival at the veterinary clinic should also be as stress free as possible. Rabbits should not be placed in a shared waiting area where there are predator species (cats and dogs), the ideal situation being a separate waiting room. If this is not possible then asking the owner to wait outside in the car until it is time for their appointment is one possible solution. Reception staff should be trained to recognise potential emergency situations where the rabbit may require immediate admission by a veterinary nurse for assessment. For example acute trauma cases (e.g. haemorrhagic fight wounds), hypothermia and collapse, acute bloat and severe dyspnoea (indicated by open mouth breathing), as rabbits are exceptionally good at hiding the severity of their illness.

## **2. Clinical History**

As with all species, a thorough and accurate history is of key importance. This is especially true for pet rabbits due to their innate ability to hide signs of disease and consequently owners can overlook subtle changes in behaviour, appetite and faecal output at times of illness.

Obtaining a full clinical history can be time-consuming, however this is a key part of the overall assessment for that animal and will lead to a quicker and more accurate diagnosis being made. If the allocated consultation time is short, one solution is to ask the client to fill in a history form whilst waiting, or contact the client via email to get this filled in for the vet to review prior to the consultation. It is important to update information on husbandry and diet on a regular basis and routine health checks and vaccinations are an ideal time to discuss these. Inappropriate diet, housing and general management can predispose to a variety of different health problems and diseases which may be preventable and will ensure better overall welfare for your rabbit patients.

As long as the rabbit is not critically ill, a history should be taken before the examination begins. Prior to history taking a brief chat with the client and observation of the rabbit in the carry box will help determine whether immediate action is required (for example open mouth breathing, indicating severe dyspnoea and requiring immediate oxygen supplementation).

A standard approach to history taking is advisable to ensure all relevant points are covered (see Figure 2). This can be adapted on an individual practice basis, however

questions to determine the animal's housing, diet, vaccination status and gender are key.

**Figure 2. Key points to be covered when taking a clinical history for a rabbit patient.**

Key point	Comments
<b>Signalment</b>	Age, sex, neutered status, breed, coat colour
<b>Ownership</b>	How long in owner's possession, where obtained from, companions, in contact animals
<b>Housing</b>	Indoors / outdoors, type and size, bedding, litter training, frequency of cleaning and disinfectant used, access to wildlife / other animals, environmental enrichment
<b>Diet</b>	What fed, amounts and frequency (20g/kg/day pellets max), water source, access to grass, treats given, supplements used
<b>Vaccination status</b>	Vaccines used, date given (ask specifically about RHV-2)
<b>Previous problems</b>	Any relevant previous ill-health / medical history
<b>Current concerns</b>	Duration of illness, presenting signs, frequency of occurrence, demeanour, any treatments received or diagnostic tests performed

### **3. Observation of the rabbit from a distance**

This is **essential** prior to any 'hands on' examination. A respiratory rate can be obtained during this part of the examination. Ideally during the history taking the carry box is placed on the consultation room floor with the door open to allow the rabbit to come out of the box and explore. Most rabbits are happy to do this, however nervous rabbits may remain in the box and can be observed in situ. It is important to disinfect the floor between patients if using this technique. Alternatively, the box can be placed on the examination table and the lid of the box removed to visualise the rabbit. A wealth of information can be gained from this simple technique. Observations on the rabbit's gait, demeanour, faecal production, respiratory pattern, body condition, coat quality, any ocular disease and any facial asymmetry can be made at this time.

### **4. Restraint for Examination**

Rabbits can react unpredictably being prey species and sudden movements are not uncommon, which can result in injury to the rabbit (limb or spinal fractures are possible) or handler.

Ways to minimise the risk of sudden movements in your rabbit patients are outlined in Figure 3.

**Figure 3: Measures to reduce stress when examining rabbit patients.**

Measure	Comments
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Non slip surface on table and scales (e.g. towel)	A new towel for each patient should be used
Use calm quiet movements	Avoid sudden noises
Always support the back and hind limbs when lifting the rabbit	Reduces risk of trauma to the patient
Never leave rabbit unattended on the table	High risk it could jump
Place back in carry box after handling to reduce stress	A cool down period helps reduce stress
Bunny Burrito	May be necessary to restrain aggressive or flighty animals
Tonic immobility (dorsal recumbency)	Highly stressful trance-like state, avoid using even in habituated animals

### Clinical Examination

The author's preferred systematic approach is outlined here, however there is no 'right or wrong' way, as long as a full examination is performed to cover all the aspects detailed in Figure 4. This is essential as rabbits being prey species typically hide signs of ill-health.

**Figure 4: A systematic approach is essential for a thorough clinical examination of the pet rabbit and should include all areas outlined in this figure.**

Clinical Examination	Comments
<b>Vital Parameters</b>	
Heart Rate	154-300 beats/min normal
Respiratory Rate	30-60 breaths / min normal
Rectal temperature	38.5-40°C normal (<37°C needs attention)
<b>Stethoscope Examination</b>	
Auscultate heart	Heart is positioned more cranially than in dogs and cats
Check pulses	Pulse rate and quality evaluated simultaneously with auscultation of the heart. Use femoral artery or central auricular artery
Auscultate lung fields	Dorsal and ventral, left and right sides. Note character and pattern – URT or LRT, abdominal component, expiratory / inspiratory effort
Auscultate gut sounds	Dorsal and ventral, left and right sides, auscultate for 2-4 mins. Reduced with stress or GI stasis
<b>Cranial to Caudal Examination</b>	
Examine eyes	Mucous membrane colour, cornea, hydration status, discharges and type, nasolacrimal puncta, gentle pressure on globe, 3 <sup>rd</sup> eyelids, conjunctiva, ophthalmoscope exam
Examine nose	Discharges or crusting, assess air flow, asymmetry
Examine ears, including ear base palpation and otoscope exam	Assess pinnae, examine ear canals, cytology essential if otitis externa present, palpate base of ear for out pouching, especially in lop-eared breeds

Palpate jaw	Palpate ventral mandible, bilateral masseter muscles, lateral maxillae and zygomatic arches. Palpate cheeks for any sharp lateral premolar or molar cheek tooth spurs. Assess lateral movement of mandible.
Examine fur coat and skin	Especially around eyes, dewlap, medial forepaws, ventrum and dorsum
Demonstrate lymph nodes	Submandibular, pre-scapular and popliteal
Check chest compliance	Younger animals are more pliable than older animals
Palpate abdomen	Thin walled abdomen – so take care. Systematically palpate stomach, small intestine, caecum, colon, kidneys, bladder. The liver, pancreas and spleen difficult to palpate unless abnormal
Examine ventrum	Assess mammary chain, anus, genitals, inguinal scent glands, mucous membrane colour. Look for any faecal or urine staining
Sex	Check this is correct!
Pododermatitis check	Common at point of the hock. Can extend linearly along the plantar surface. Check forelimbs too
Palpation of limbs	Also check nail length
Dental examination • Examine incisors • Cheek teeth otoscope exam <b>(EVERY VISIT)</b>	Assess also capillary refill time on gingiva. Usually performed at end of examination (see later notes for more detail)
Weight	Record at <b>EVERY</b> visit, over 10% weight loss in 1 month is a major concern (if not part of a dietary plan!)
Body Condition score (1-5) See 'Rabbit Size-O-Meter' ( <a href="http://www.pfma.org.uk/rabbit-size-o-meter">www.pfma.org.uk/rabbit-size-o-meter</a> )	Visual assessment and palpation of ribs, spinous processes and pelvic bones

### Dental Examination

- Performed last at end of examination
- Rabbit in sternal recumbency is best (not on back)
- Explain limitations to owner of otoscope exam.

### Incisor examination

Note direction of growth, any malocclusion, ribbing, discolouration, infection, occlusal angle and loose, fractured or absent teeth.

### Cheek teeth examination with otoscope

(N.B. Take care not to occlude the nares).

Insert otoscope cone between commissure of mouth and lateral incisors and (whilst visualising) introduce cone along the buccal surface. It is common to abrade the gingival margin of the 1<sup>st</sup> premolar tooth if the cone is introduced too far. The 1<sup>st</sup> and 2<sup>nd</sup> premolar teeth, upper and lower arcades are easily assessed with this technique. Chewing can help with visualisation of molar teeth further along the arcade. Remove the otoscope cone and reintroduce in the opposite side to assess all arcades. This procedure must be performed at EVERY consultation and any changes noted in the clinical records.

Abnormalities that may be detected include: irregular crown height and wear, occlusal surface angulation and irregularities, dental spikes, absent or loose / fractured teeth, mucosal ulceration, impacted food, glossitis, neoplasia, abscesses, halitosis, excessive saliva accumulation, haemorrhage or purulent material within the mouth. (N.B. the vascular plexus at the base of the tongue can be confused with an area of haemorrhage, but is normal).

##### **5. Client Communication**

Clear and concise communication with your client regarding your findings and a discussion of the treatment options available is essential at the end of the consultation. Good advice is key to improving overall welfare of the pet rabbit and is an investment for the future. Practice policies and advice sheets on rabbit related topics should be formulated such as vaccination protocols, neutering advice, nutritional and husbandry information and routine dental checks.

# Rabbit Dental Disease & Practical Management

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## Anatomy

The dental formula of the adult rabbit is:

$$I: 2/1 \ C: 0/0 \ P: 3/2 \ M: 3/3 = 28$$

The molars and premolars are grossly similar and may be collectively referred to as **cheek teeth**. Incisors and cheek teeth have a long clinical crown and no anatomical root (**Aradicular-hypsodont** or **Elodont**). The tooth root is referred to as the **reserve crown**

All the teeth grow continuously throughout life in the healthy individual at an approximate rate of 10-12cm/year. The rate of growth increases with increased abrasive food and when teeth are out of occlusion. Enamel ridges on occlusive surfaces of cheek teeth interlock with opposing teeth during mastication.

Food is acquired by lips, cut into small pieces by the incisors and manoeuvred by the tongue to enable mastication by the cheek teeth before being swallowed. Rabbits chew on one side of the mouth at a time due to the mandible arch being narrower than the maxillary arch. During mastication the jaw moves in a wide, unilateral arc and is guided by ridges and valleys in the teeth.

## Aetiology of Dental Disease

Dental disease in rabbits most commonly occurs as a result of deficiencies in husbandry and diet. Lack of dental wear (usually a result of being fed excess concentrates and insufficient hay) and metabolic bone disease (poor diet and lack of UVB exposure) are the most common aetiologies. Breeds such as the Dwarf Lop appear over-represented and this probably reflects a genetic susceptibility due to changes in skull morphology compared to the wild rabbit. Injuries to the jaw and skull, commonly a result of a fall, may result in malocclusion and dental disease. Congenital incisor malocclusion is common in the dwarf breeds.

## History

Given that the majority of dental diseases in rabbit are at least in part a result of deficiencies in diet and husbandry, it is essential that the husbandry and diet are investigated in detail. The type and quantities of hay, mix, pellets, greens and treats offered **and** eaten should be ascertained. Is the rabbit kept indoors, outside or confined to a hutch and how often is it allowed access to grazing?

Many rabbits with dental disease may have a history of intermittent anorexia and/or GI stasis and may display changes in demeanour and behaviour (e.g. aggressive, less interactive). If painful the rabbit may select food items which require less chewing or which can be swallowed whole. Pain may reduce grooming behaviour and caecotrophy leading to an unkempt coat and perineal soiling respectively; infestation with *Cheyletiella* and/or *Listerophus* mites may also be a result of inefficient grooming. Respiratory disease may occur concurrently as a result of poor husbandry, stress and immune compromise or as a result of tooth roots extending into the orbit or nasal cavity.

### Clinical Examination

Given the frequency with which dental disease occurs in rabbits it is essential to **always examine the teeth** during a clinical examination. It is virtually impossible to conduct a complete dental examination in the conscious rabbit and lesions are easily missed. Therefore always examine the oral cavity in all rabbits that are under general anaesthesia for any other reason and do not be afraid to advise further examination under anaesthesia if you suspect dental disease.

Work methodically - observe and palpate the whole head thoroughly looking for any asymmetry, swellings, discharges and abnormal reflexes (e.g. facial nerve paralysis). Retract the lips to examine the incisors for shape and occlusion and for horizontal ridging (in more subtle cases, ridges may be detected by running a finger nail over the enamel. An auroscope cone or speculum is used to examine the molar crowns, tongue, palate and ear canals.

The rest of the body should be examined in a logical manner similar to other mammals in order to assess the overall health and the presence of concomitant disease.

During the course of the clinical examination the following clinical signs may alert the clinician to the possibility of dental disease:

- Epiphora
- Ptyalism ('Slobbers')
- Nasal discharge
- Unkempt coat
- Ectoparasites

- Caecotroph accumulation
- Asymmetry of face/skull
- Resentment to oral exam (individual variation)
- Saliva, blood +/- discharges on oral exam

### Information for the Owner

It is prudent to discuss a few specific points with the owner to help prevent potential future poor compliance and client discontent which include:

- Treatment for acquired dental disease is rarely a ‘one-off procedure’ since the teeth (28 in total) grow continuously throughout the rabbit’s life. Thus, spikes, spurs and overgrown crowns will tend to reform over a few weeks to months resulting in relapse. The main exception being incisor removal in young rabbit with congenital malocclusion in which case early extraction will likely **reduce** the need for further dentistry.
- The frequency of dental treatment can be as much as every 3 weeks though the average is about every 12-16 weeks
- The welfare of the rabbit can be much improved (and the cost reduced!) if dental treatment is performed **before** the rabbit demonstrates signs of oral pain; practically speaking this ideal is achieved over time by judging the treatment interval required for the individual patient based on the severity of dental and soft-tissue pathology at each dental treatment
- **Euthanasia** is the only feasible alternative in most cases if the owner is unable to commit to the time and cost of treatment.

### Investigation

Haematology, serum biochemistry and urinalysis are helpful to assess the general health status of the patient prior to anaesthesia and treatment. Radiography of the skull is essential to help form a prognosis and identify tooth root pathology, tooth occlusion and osteomyelitis; multiple views may be required including straight lateral, left and right lateral-oblique, dorsoventral and rostrocaudal views; intra-oral views are useful in selected cases but require specialised plates. Radiography of the chest and abdomen is helpful to screen for concomitant disease. Tooth root involvement in cases of epiphora and/or dacrocystitis may be investigated using dacrocystography.

With the patient suitably anaesthetised mouth gags and retractors are used to expose the oral cavity. Good illumination is essential and is best provided with a quality head torch; magnification using loupes is ideal. If available, rigid endoscopy is very useful with the added

advantage of allowing imaging and documentation of the findings and treatment. Each tooth is assessed for its occlusion and stability and for the presence of any spurs or decay. The gingiva, buccal mucosa, tongue and palate are examined for the presence of pockets, foreign bodies, food impaction, infection and ulceration. The skull is palpated thoroughly and any abnormal swellings are palpated and probed whilst looking for sinus tracts into the oral cavity, ears, nose and conjunctival sac (usually identified by the presence of pus).

### Dental Equipment

The basic dental kit would include a mouth gag, cheek dilators, tongue depressor, molar cutters and a diamond rasp (the latter is not ideal; see later)

Additional equipment may include molar and incisor elevators, sinus rongeurs, slow speed dental handpiece with straight nosecone and burrs to burr molars (diamond disc with shield to trim incisors) and a high speed dental handpiece with cutting bur or diamond disc to trim the incisors. A variety of burrs are available - a cross-cutting burr and a diamond coated burr are most useful.

### Treatment – Incisors

Incisors are best trimmed using a cutting burr or disc attached to a motorised dental handpiece. **Clippers are not an acceptable method** due to a significant risk of splitting the tooth, causing at the very least pain, at worst a root abscess. Maloccluded incisors generally require trimming every 3-6 weeks; Sedation may be required.

Incisor extraction is generally preferred over trimming. However, if malocclusion has been long standing extraction may be difficult due to malformation of the roots.

### Treatment – Molars

Anaesthesia is ESSENTIAL, though clients will often ask whether treatment can be performed conscious.

Molar spurs, if small, may be removed using molar clippers or rongeurs though there is a risk of iatrogenic tooth fractures if performed incorrectly (usually trying to remove too-large a piece). For most spurs a burr attached to the straight cone of a slow-speed dental handpiece is preferable, taking great care to prevent soft tissue damage. Hand held rasps are not ideal as they may loosen teeth further, and there is an increased risk of causing soft-tissue trauma and severe, life-threatening haemorrhage from tearing the inferior alveolar vessels.

There is some argument as to how much crown should be removed. Some advocate removal of points and spurs only whereas others advocate reducing all crowns down to the gingiva. Either may be suitable depending on the individual case. Radiography of the skull is essential if contemplating reducing crown heights; it is important to ascertain tooth growth is not arrested before reducing crown height. Burring of crowns removes the enamel ridges and therefore reduces the ability to chew effectively **BUT** reducing crown height may alleviate pressure on nerves when chewing and therefore reduce pain. Ultimately, the aim of treatment is to eliminate pain and restore normal function though restoration of perfect anatomy is rarely, if ever possible.

### Molar Extraction

The main indications for molar extractions are loose crowns and root infection/abscessation. Removal of a tooth with a spur with the aim of preventing spurs is not often indicated as acquired dental disease tends to affect all the teeth and removal of one or two teeth rarely solves the problem.

The **intraoral approach** to molar extraction is probably best reserved for molars which are already significantly loose or in which the root has been resorbed (dental radiographs required). A rabbit molar elevator may be used or an elevator may be fashioned from an 18G hypodermic needle. Molar extraction forceps are available to enable removal from the oral cavity once the tooth is suitably loose.

The **extraoral approach** is more suitable where molars are fully formed, which are not very loose and/or have malformed roots and/or are abscessed. The root may be identified using palpation and radiography. The skin overlying the root is incised and a dental burr or rongeurs used to remove bone overlying the root. Elevate the root using 18G needle or small feline elevator. Note – mandibular molars are generally much easier to approach and extract than are maxillary molars due to the majority of the latter's roots being situated in the orbit.

### Molar Root Apicoectomy

Apicoectomy may be appropriate in selected cases to prevent regrowth of molar spurs. The procedure is relatively easy to perform on the mandibular molars but access to apices of the maxillary roots is technically demanding and potentially excessively traumatic to the patient. The affected mandibular tooth root is generally easily palpated as a firm swelling on the ventral aspect of the mandible. Following routine surgical skin preparation the skin and periosteum are incised over the swelling ventrally. Where mandibular bone is still present it may be removed using a small rongeur, dental elevator or 18G hypodermic needle taking great care to

avoid iatrogenic jaw fracture. The germinal epithelium of the affected molar is then gently removed using the tip of a hypodermic needle and the tooth and wound flushed with saline prior to routine closure. The procedure, if performed correctly prevents further growth of the molar which over time wears away and may even loosen and fall out.

In the short to medium term appropriately selected rabbits seem to benefit from the procedure mainly due to reduced frequency of dental procedures though in the long term there may be complications due to difficulty masticating food and there may be a predisposition to periapical infection and abscessation.

### Perioperative Care

- Hospitalise in quiet area out of sight and sound of dogs and cats
- **Analgesia** → Buprenorphine, NSAID, local nerve block(s), topical (Bonjela, Orabase)
- **Fluid therapy** → maintenance 50 - 100ml/kg
- **Prokinetics** → ranitidine, metoclopramide, cisapride
- **Assist feeding** → syringe/hand feeding, lots of fresh hay, grass and leafy vegetables and weeds
- Clean any discharges especially around nares

### Feeding the Rabbit with Dental Disease

There is often confusion amongst vets and owners alike as to how best feed a rabbit with dental disease. The authors advice on feeding **HEALTHY** rabbits with **HEALTHY DENTITION** is to feed ad-lib hay and grass, offer about an eggcup full of pellet diet (per 2-2.5kg rabbit) per day along with a selection of leafy greens, weeds, herbs and edible branches and to avoid fruit and root vegetables altogether. In some cases the pellet proportion is increased if the rabbit is unable to maintain ideal body condition score on the diet.

It is unfortunately common to hear the same dietary advice being given to rabbits with significant dental disease. Rabbits with dental disease may find it very difficult to impossible to eat hay, grass and greens in sufficient quantity to maintain bodyweight and health and in many cases the act of chewing is very painful. Thus forcing such a rabbit to eat a predominantly hay diet will likely cause pain and suffering. By the time the rabbit has developed clinically apparent dental disease, the dental-health benefits of chewing hay are all but lost.

It is clear therefore that many rabbits with dental disease cannot and should not be made to eat the same diet described for the healthy rabbit with healthy dentition.

Rabbits with maloccluded/extracted incisors but with normal molars are able to acquire and chew hay in a similar manner to rabbits with perfect dentition and as such can be fed the same as healthy rabbits though since the snipping action of the incisors is lost, greens may be best sliced into strips.

Rabbits with molar disease often need an increase proportion of pellet and leafy greens and in severe cases may be fed almost exclusively on pellet/greens. Hay/grass should still always be available and veggies may be best finely chopped. In mild to moderate cases hay/grass may still be fed at the higher rate taking care to regularly assess body condition score.

Also note that rabbits with dental disease, housed with rabbits with normal dentition may need to be fed separately, at least for part of the day to enable them to get their fair share since the healthy rabbits with more-efficient dentistry are able to eat more quickly and therefore steal the best items before there disadvantaged companions who are left to eat the less-nutritious items.

## AIRWAY MANAGEMENT TECHNIQUES IN RABBITS

Ivan Crotaz BVetMed MRCVS

### Overview

For some time, it has been known that the death rates in rabbit anaesthesia are much higher than in other common companion animals. This can be attributed to many factors, including lack of experience with the species, lack of appropriate monitoring and most commonly the difficulty of establishing and maintaining an airway during anaesthesia. Rapidly establishing, maintaining and monitoring an airway should reduce serious respiratory complications – these complications are implicated in the majority of rabbit anaesthetic deaths.

3 major options are available for rabbit airway management:

#### **Face masks:**

- Useful for preoxygenation and short procedures.
- Rapid
- Minimal equipment
- Poor facial access
- Difficult to use with capnography
- Less controlled, higher risk anaesthesia
- Significant gas leakage, health and safety risks to staff



The best in the author's experience are the clear masks with a silicone or rubber diaphragm. The small/extra small sizes are suitable for the majority of rabbits. Care needs to be taken to make sure that the rubber diaphragm does not rub and cause corneal trauma. Masks should either be held firmly in place or preferably tied in place with a length of gauze/bandage tie. The mask should be supported so that it follows the orientation of the maxilla as shown in the photograph. This minimises leakage and reduces the risk of corneal damage

#### **Supraglottic airway devices (v-gels):**

- These devices are anatomically designed to fit the rabbit upper airway and sit over the glottis forming a soft pharyngeal seal and allowing ventilation.
- Very rapid placement and technique is easy to learn.
- Wide airway does not increase airway resistance and work of breathing
- Autoclavable and re-usable (40 times)
- Cost per use approximately the same as single used endotracheal tubes
- Appropriate for majority of surgical procedures and many dental procedures
- Good access to incisors/rostral molars but poor access to caudal mouth and pharynx.

- Poor technique can result in displacement from the glottis. Procedures such as incisor removals can displace the epiglottis within the v-gel, requiring a small corrective movement.
- Capnography is important to identify correct placement and maintain high quality monitoring

Supraglottic airway devices sit in the pharynx and open an airway over the glottis allowing ventilation through the glottis and trachea without actually performing intubation. When correctly designed, they provide a wide airway of the same diameter as the trachea (hence no increase in airway resistance). They are constructed from soft materials and are much more comfortable and less traumatic to the tissues of the upper airway. v-gel devices were designed specifically to fit rabbit upper airway anatomy (most other supraglottic devices were designed for humans and give poor results in rabbits).

Once the rabbit has been anaesthetised, the pharynx should be checked for foreign material and cleared if necessary. Lidocaine spray should be applied to the larynx and the rabbit should be preoxygenated using a face mask (it is likely that 4-5 breaths of 100% oxygen should be sufficient in a healthy rabbit). The v-gel is then inserted into the mouth, following the midline until the tip enters the pharynx. At this point it will elevate the soft palate, allowing the epiglottis to fold and drop into the airway channel. Further insertion allows the v-gel to drop over the base of the tongue at which point the airway channel should line up with the glottis, the epiglottis should unfold inside the v-gel and the tip enters the epiglottis (giving a low pressure gas seal). With experience, this position can be easily felt, but the easiest way to check correct insertion is to connect the v-gel to a capnograph and look for CO<sub>2</sub> traces. Normal v-gel insertion should take 10-30 seconds and is considerably faster than intubation.



#### **Endotracheal intubation:**

- Good oral and pharyngeal access
- Relatively hard to displace from position (although if poor technique is used tubes are easily pulled out)
- Use new tubes every time— New endotracheal tubes are very cheap but they harden quickly after washing, making intubation difficult and increasing trauma risk. Check pharynx before intubation and remove food material, desensitise the larynx prior to intubation.

- Disinfection of used tubes creates risk of chemical mucosal trauma on the next use
- Severe increase in airway resistance and increase in work of breathing.
- Tracheal and laryngeal trauma risk
- Practiced technique +/- extra equipment needed to perform intubation
- Capnography is important to identify correct placement and maintain high quality monitoring

If the diameter of an endotracheal tube is halved, the airway resistance of the tube goes up by 16 times. A normal rabbit trachea is about 5mm diameter – therefore using a 2.5mm endotracheal tube increases the resistance to breathing and thus the workload of the patient by 16 times. It is very important to use a capnograph for intubated rabbit patients and most patients will benefit from active ventilation during anaesthesia (ventilator or manual IPPV). Iatrogenic laryngeal trauma is reported in rabbits. It is difficult to know how common this is in practice as few post-anaesthetic mortality cases have proper post mortem examinations. It is likely however that given the blind intubation technique that most clinicians use, intubation trauma is at least as common in rabbits as in cats.

However, there are good indications for endotracheal tube use in rabbits – in detailed oral surgery a small tube allows good surgical access.

3 intubation techniques exist. In all three techniques, a new endotracheal tube should always be used. This allows maximum flexibility and softness to reduce trauma risk and ensures that there will be no cross infection. The tubes should be lubricated with a water based lubricant, making sure that the lubricant cannot block the airway.

All rabbits should be fully anaesthetised making sure that there are no cough or swallow reflexes. Coughing is a response to laryngeal and tracheal trauma or pain and should not be part of a 'normal' anaesthetic. Coughing on insertion is often recommended as a guide to correct placement but observing traces on a capnograph is safer and more effective.

**Blind insertion method** – The tube is gently advanced past the incisors in the midline and over the base of the tongue into the pharynx. The tip is guided slightly laterally to downfold the epiglottis and then centrally again to pass through the glottis. Some authors recommend holding the end of the tube next to your cheek to feel exhaled breath, confirming the proximity of the glottis, prior to full insertion. No more than 3 placement attempts should be made in order to reduce trauma risk. This technique is best practiced on cadavers prior to live patients and presents the highest trauma risk of all three techniques.

**Guided insertion method** – either a straight bladed laryngoscope (such as the Flecknell laryngoscope) or an otoscope can be used. The laryngoscope or otoscope cone is used to elevate the soft palate and disengage the epiglottis into a ventral position on the floor of the pharynx. With a laryngoscope, the tube is gently fed forwards aiming for the centre line of the epiglottis. With an otoscope cone, it is best to feed a flexible stylet through the cone and into the trachea. The catheter is retained in place while the cone is removed and then an endotracheal tube is fed over the catheter and into place in the trachea.

**Endoscopic guided technique** – Either a straight or flexible endoscope can be used (the technique is easier with a flexible scope). The endoscope is used to elevate the soft palate and disengage the epiglottis as above. The endotracheal tube is then fed into the pharynx under direct visualisation. The endoscope tip needs to be slightly proximal to the glottis and the endotracheal tube can be fed down the trachea when the arytenoid cartilages open.

In conclusion, it can be seen that the ability to intubate every patient does not make you a good rabbit anaesthetist, and indeed in some situations, intubation actually increases the risk of complications significantly. The safest situation is that in which the anaesthetist chooses an appropriate management method for the patient and procedure and monitors the airway and respiration carefully throughout the anaesthetic and recovery period.

#### **Take home points:**

1. Face masks should be as small as possible and always tied in place to achieve a better seal.
2. Capnography is essential and will massively improve your standard of anaesthesia.
3. Almost all rabbits hypoventilate. Accept that IPPV is a normal 'default' procedure for a rabbit anaesthetic.
4. Balance the pros and cons of all airway management techniques to give the best outcome for your patient. The new supraglottic devices allow very rapid establishment of an airway and are appropriate for many routine and emergency procedures.

## Rabbit Case Studies

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### Case 1

“Bunny-bunny” is a 2-year-old neutered male dwarf lop who jumped out of his young owners’ arms and put out a paw to break his fall, and instead fractured his right radius and ulna.



Should we promote carrying rabbits like this, and what are we going to do about Bunny-bunny?

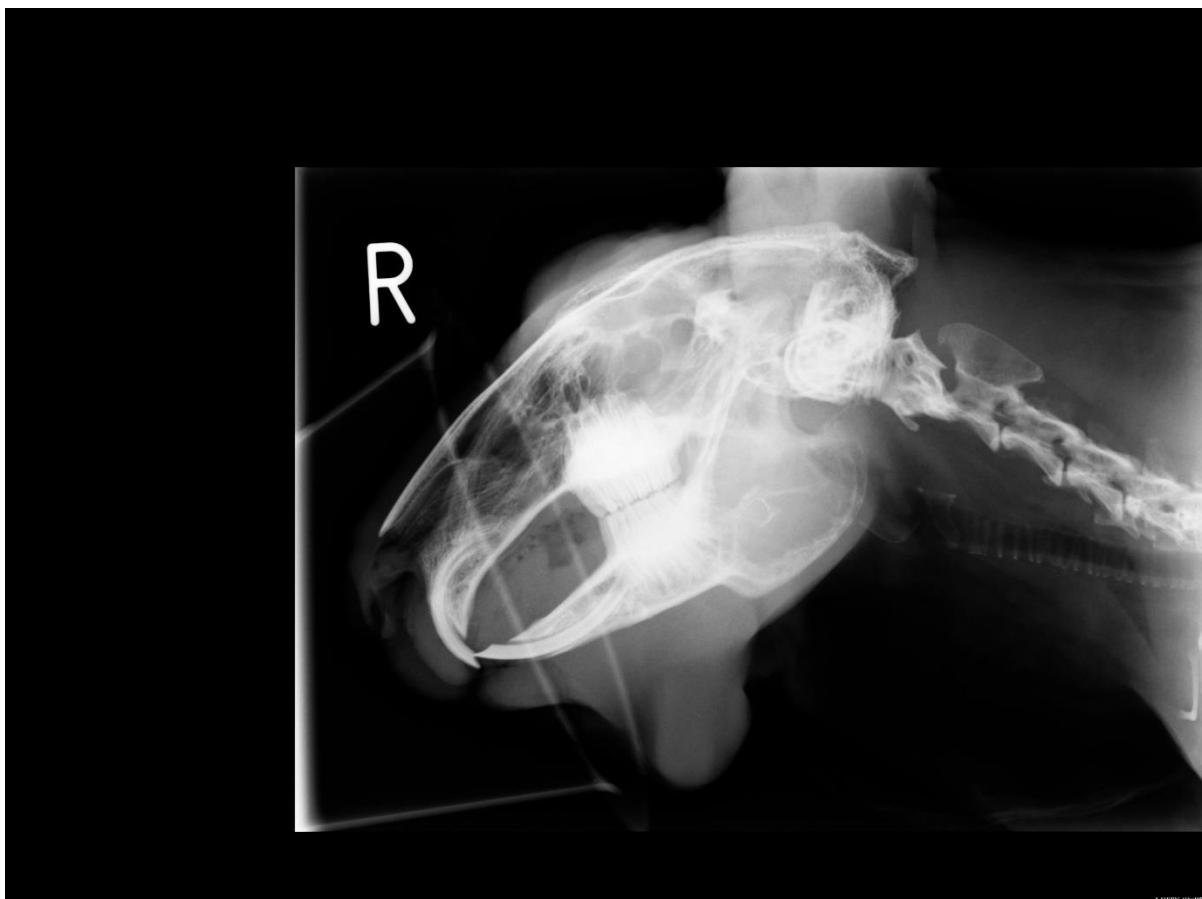
### Case 2:

Arfur is a 4-year-old entire male English rabbit. He is a very friendly rabbit, well socialised with human beings, and greets his owner happily every evening after work. Over the past 2 weeks he has developed a thickened lump under his chin. Being concerned about abscessation of dental origin, you take the following x-ray.

What are we seeing here, both in terms of what abnormality IS there, and what ISNT?

What treatment options are there?

What preventative treatments are available to avoid this, and other, potential problems, and do you think that they are justified?



Case 3:

You are presented with a moribund 2-year-old neutered female rabbit. She is hypothermic ( $T=35C$ ), dehydrated (approximately 10% based on skin tenting), and appears to be in abdominal pain, with teeth grinding at rest, and grunting on palpation of the mid abdomen.

The following blood test results are obtained (value 1):

Parameter	Value 1	Value 2	Reference range
ALT	60	<b>200</b>	27.4-72.2 iu/l
AST	50	<b>300</b>	10.0-78.0 iu/l
CK	<b>400</b>	<b>1500</b>	58.6-175.0 iu/l

LDH	78	<b>400</b>	27.8-101.5 iu/l
BUN	10	10	10.1-17.1 mmol/l
TP	<b>80</b>	60	49-71 g/l
Alb	<b>60</b>	39	27-50 g/l
Glob	20	21	15-33 g/l
Creat	150	150	74-171 umol/l
Glucose	<b>15</b>	10	5.5-8.2 mmol/l
Calcium	<b>4.0</b>	<b>4.0</b>	2.2-3.9 mmol/l
Sodium	<b>125</b>	132	130-155 mmol/l
HCT	<b>44</b>	<b>0.16</b>	0.3-0.4 l/l

What further procedures and tests would you suggest in this case?

How would your approach differ if the values were as in the second column (Value 2)

Case 4:

You are presented with a 2.5 year old neutered male Dutch rabbit with a 6 month history of intermittent dysuria. Variously, polyuria, pain on urination, red urine, urine scalding of the medial thighs and polyuria/polydipsia have been noted. He has been treated by several different vets and practices. He arrives with this radiographic image:



What would your diagnostic and treatment plan consist of?

Case 5:

You are presented with an 8 year old neutered female rabbit whose companion died 2 weeks ago. Shortly after that, left sided unilateral epiphora and dacryocystitis developed, and now there is excoriation dermatitis developing under the eye. There is marked hyperaemia of the eyelid mucosal surfaces. A standard bacteriology swab sent to Idexx has come back with no significant growth and there is little response to fucidic acid.

What are your options for diagnosis and treatment of this problem?

# RWAF CONFERENCE 2017

## Rabbit Dentistry Wet Lab



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RCVS Recognised Specialist Zoo and Wildlife Medicine  
Chine House Veterinary Hospital

- Introduction (15min)
- Dental examination (skull) (10min)
- Dental Examination (oral) (10min)
- Nerve Blocks (15min)
- Incisor Trimming (10min)
- Molar burring (10min)
- Incisor Extraction (15min)
- Molar Apicoectomy (15min)
- Molar Extraction (intra/extra-oral) (15min)

## Introduction - Equipment

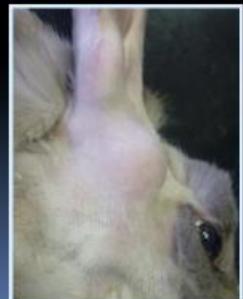
- **Basic** → mouth gag, cheek dilators, tongue depressor, molar cutters (and rasp?)
- **Additional** → molar and incisor elevators, sinus rongeurs, slow speed dental handpiece with straight nosecone, high speed dental handpiece, variety of burrs



## Introduction - Equipment



## Examination of Head



## Examination – Oral Cavity



## Nerve Blocks: Mental Nerve



## Nerve Blocks: Mandibular Nerve



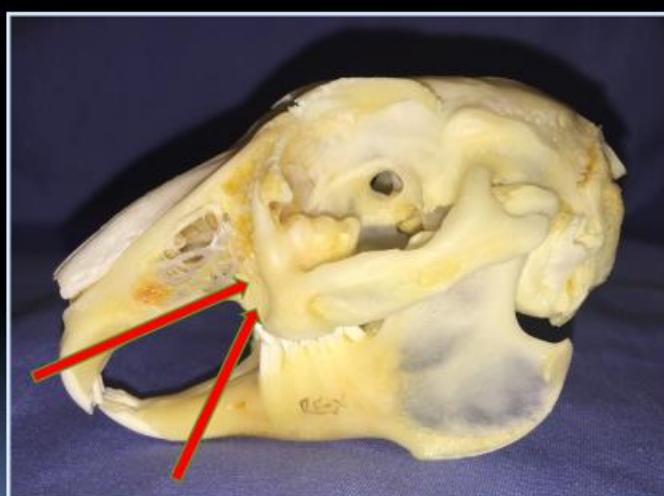
## Treatment: Incisors

- Incisor Trimming → motorised dental handpiece
- **DO NOT USE CLIPPERS OF ANY KIND!!**
- Incisor Extraction → often preferable though if long standing can be very difficult



Diamond disc cutter and incisor elevators  
(Veterinary Instrumentation)

## Nerve Blocks: Infraorbital Nerve



## Treatment: Incisors

- Incisor Trimming → motorised dental handpiece
- **DO NOT USE CLIPPERS OF ANY KIND!!**
- Incisor Extraction → often preferable though if long standing can be very difficult



Diamond disc cutter and incisor elevators  
(Veterinary Instrumentation)

## Treatment: Incisors



**DO NOT DO THIS!!**

## Treatment: Molars

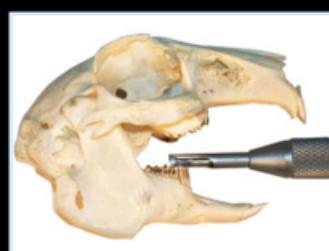
- Anaesthesia is ESSENTIAL
- Spur removal:
  - ⇒ molar cutters/rongeurs if small spurs
  - ⇒ motorised burr for larger spurs



## Treatment: Molars

### Crown Reduction:

- ⇒ Rasps are generally not advised as they may cause loosening of teeth, soft tissue trauma and haemorrhage (inferior alveolar vessels)
- ⇒ Motorised burrs on straight, slow-speed handpiece or a Dremel are preferable



## Treatment: Molars



## Treatment: Molars

- Removal of spurs only vs. radical reduction ??
- Ascertain tooth growth not arrested before reduce crown height → radiograph skull
- Burrng/raspng removes enamel ridges and reduces ability to chew effectively
- Reducing crown height may alleviate pressure on nerve potentially reducing pain
- Ultimately the aim of treatment is to eliminate pain and restore normal function
- Restoration of perfect anatomy is rarely possible

## Molar Apicoectomy

- Mandibular molars
- Affected tooth root is palpated as a swelling on the ventral aspect of the mandible
- Skin and periosteum are incised over the swelling ventrally



## Molar Apicoectomy

- Bone may be removed using a small rongeur, dental elevator or 18G hypodermic needle
- **CARE! JAW FRACTURE**
- Germinal epithelium x2 is removed using the tip of a hypodermic needle
- Flush with saline prior to routine closure

## Molar Extraction: Intra-Oral

- High risk of iatrogenic jaw fracture with poor technique
- Difficult unless already significant loosening
- Root may be best extracted using extra-oral approach
- Rabbit molar elevator and/or 18G needle



## Molar Extraction: Extra-Oral

- Identify root by palpation and radiography
- Incise skin and use dental burr or rongeurs to expose root
- Elevate root using 18G needle or small feline elevator
- Mandibular much easier than maxillary