INTRODUCTION
Exotic companion mammals are the largest and fastest growing segment of avian and exotic practice today. Small mammals are often the exotics that general practitioners are most willing to treat because they have the most in common with dogs and cats. However, the differences between dogs and cats and exotic companion mammals are sometimes critical and intimidating. This section will present a potpourri of practical tips and tricks of the trade that all but the most experienced small mammal veterinarian will find informative and useful.

CLINICAL PROCEDURES
Ferret “Scruffing” Refined
For maximal restraint, grasp a ferret by the scruff high on the neck, near the ears. The amount of pinch pressure you use is more important than the amount of skin utilized. The effect is greatest when the rest of the body is suspended. You can vary the effect by supporting the rump as needed. Scruffing a ferret usually results in a big yawn, which makes oral examinations easy.

Obtaining Ferret Temperature or Fecal Specimen
To obtain a temperature on a ferret, one person scruffs the ferret (suspending him) and cradles his rump (so that his belly faces the person getting the temp), while the other person grasps his tail in one hand and inserts a thermometer with the other hand. The thermometer can then be transferred to the first hand, thus allowing the ferret to wriggle without losing the thermometer. After obtaining the temperature, put the ferret on the exam room floor in the corner. Normally, the ferret will then provide a fecal sample.

Ferret Urethral Catheterization Simplified
The ferret penis ends in a hook. The urethral opening is hidden along the convex aspect of this curve. To assist in the placement of a urethral catheter in a male ferret, first locate and inflate the lumen of the urethra with sterile lubricant using a 25 ga IV catheter. Doing so will make it easier for the tip of a 3-3.5 fr urethral catheter to pass into the lumen. The “Slippery Sam” urethral catheter (www.surgivet.com) is the easiest and most reliable catheter to use for ferrets.

PVC Coupling for Gas Delivery
A ¾ inch PVC pipe coupling works great as a small mask for delivery of gas anesthesia or oxygen. Its internal diameter is 23mm, 43% greater than that of the non-rebreathing circuit connector. It is large enough to cover the entire nose of most small herbivores, yet its outer diameter is only 27mm, so it does not interfere with dental procedures. We use it when providing nasal gas anesthesia for small herbivores, and to cover the entire face of smaller mammals like sugar gliders and hedgehogs. We have nicknamed ours “the Snozelator”. I purchased my white PVC coupleings from the hardware store for about $0.50 each, but also found clear PVC medical grade coupleings online for less than $3.00 (www.clearpvcpipe.com)
Trimming Rabbit and Rodent Incisors
Overgrown incisors can be trimmed with wire cutters, however this method runs the risk of fracturing the tooth. A better option is to cut the tooth down to the desired level with a Dremel cutting wheel or dental burr, being mindful of the heat generated and careful not to overheat the tooth. This can be safely performed on an awake rabbit or rodent, but masking with isoflurane or sevoflurane is also acceptable. The author usually attempts to restore a beveled cutting edge to the occlusal surface of the incisor after reduction.

Dremel Engraver for Filing Cheek Teeth
Dremel rotary tools are handy for a number of procedures, including filing the cheek teeth of small herbivores. The operator must used caution, however, that excessive trauma does not occur at either the rotating bit or along the spinning shaft. A safer alternative for filing cheek teeth is the Dremel oscillating engraver, the kind of engraver used to personalize valuables. The sharp engraving tip is removable, and has the same shaft diameter as the rotary bits. We replaced the engraving tip with a ball-shaped diamond bit. The result is very effective vibrating bit that will grind teeth but not hurt soft tissue. The cost of the engraver is about $30.

Golden Yellow Powder
Golden yellow is a turmeric-based herbal formula used mainly for open wounds, skin ulcers, bruises and other acute injuries. It contains herbs to reduce pain, swelling, heat and to dry up moisture. It can be purchased either in salve form or powder form and mixed with other carriers. In our practice, we mix golden yellow powder with aloe for topical administration. This mixture appears to speed healing and prevent infection in open wounds. Use caution, as this mixture can leave permanent stains in fabric or clothing (www.tcvmherbal.com)

Yunnan Baiyao
Yunnan baiyao (or yunnan paiyao) is a hemostatic powdered medicine famous for being carried by the Vietcong to stop bleeding during the Vietnam War. It is derived from several herbs, although the precise formulation is protected by Chinese law. Yunnan baiyao is indicated for internal and external bleeding, swelling, and severe pain. It also works as a disinfectant. In China, its reputation is equal to that of penicillin in the US. In our practice, we use yunnan baiyao topically for hemostasis, and systemically PO for bleeding disorders (www.tcvmherbal.com).

Rabbit Lachrymal Flush
To perform a nasolachrymal flush in a rabbit, I use a 24 ga IV catheter instead of a specialized lachrymal needle. My flush solution is usually made up from 4cc warm sterile saline, 0.5cc acetylcystein, and 0.10cc of amikacin 50 mg/ml. I anesthetize the eye with proparacaine. Using magnification and illumination, I cannulate the lachrymal puncta, and advance the catheter tip into the NL duct 0.5-1cm. I place moderate digital pressure on the lower eyelid at the medial canthus to form a seal, and then place mild pressure on the syringe plunger. If the duct is patent, the rabbit will immediately begin licking its filtrum and may sneeze; fluid will be visible from the nare. If the duct is not patent, the patient may still begin to lick, but will not sneeze, and fluid will not appear at the nare.

Use caution that you do not apply excessive pressure and rupture the NL duct. As the plugged NL duct fills it can be palpated at the medial canthus. Intermittently loosening the seal should result in backwash from the plugged duct. If there is no back flush and/or the globe becomes more prominent with each push of the plunger, rupture of the NL duct has likely occurred.
FlavoRx for Compounding
Most exotic animal medications need to be compounded into a liquid suspension for PO administration. The majority of these can be compounded in-house using the FlavoRx compounding system (www.flavorx.com). FlavoRx has regular and sugar-free base compounding syrups, and a variety of flavors for clients to choose from. Flavoring the prescription often makes the patient more cooperative, and usually gives the owner more confidence he or she can administer the medication at home. Our hospital applies a compounding fee to these prescriptions; custom flavoring is an additional charge.

SURGERY/ANESTHESIA
Over-the-Endoscope Intubation
Various intubation techniques have been suggested for small mammals. Some of these require specialty equipment, and all require practice. The over-the-endoscope technique provides direct visualization of the glottis during intubation, and can be accomplished by a solo operator. Our practice uses a 1.9mm x 6” semi-rigid fiber optic endoscope (Focuscope, MDS Inc.), which is compatible with endotracheal tubes having an internal diameter (ID) of 2.0mm and greater. The endoscope acts as a stylet for the endotracheal tube. With the patient in lateral or sternal recumbency, the endoscope / endotracheal tube combination is advanced over the base of the tongue until the tip of the epiglottis is visible through the soft palate. The tip of the scope is advanced gently in a dorso-caudal direction, lifting the soft palate and thus allowing the epiglottis to fall forward. The scope is withdrawn approximately 1cm, the tip of the endoscope is rested on the epiglottis, and the glottis is visualized. The tube/scope combination is advanced into the laryngeal opening and into the trachea upon inspiration, where positioning is confirmed by the presence of tracheal rings; most patients also cough.

Endotracheal Tube Size/Style for Selected Species

- **Ferret**: 2-2.5mm ID (Cole or straight)
- **Rabbit**: 2-3.5 ID (Cole or straight)
- **Prairie dog**: 2-2.5mm ID (Cole or straight)
- **Guinea pig**: 8-fr (urinary catheter), 2-2.5mm ID (Cole or straight)
- **Chinchilla**: 8-fr (urinary catheter)
- **Rat**: 14ga (IV catheter)

Post-Operative Support
Adequate supportive care is one of the trade secrets to a good outcome following small mammal surgery. In general, small mammals do not possess the deep energy reserves or the “will to live” that dogs and cats do. Warmth, fluid replacement, and nutritional support are important for recovering patients. Provide a small recovery cage that is warmed to 80ºF for the first few hours following surgery. Towels can be warmed in the clothes dryer or microwave oven. Maintenance fluid rate is approximately 100ml/kg/day. Parenteral fluids should be warmed prior to administration. Oral rehydrating solutions such as Pedialyte or Gatorade may also be indicated. Hand feeding is typically necessary for 1-3 days, until the patient is eating, eliminating, and maintaining body weight. Oxbow makes hand feeding formulas for small herbivores (Critical Care) and carnivores (Carnivore Care) that are nutritionally complete and convenient for staff and pet owners to use. Feed formula warmed by placing syringes of food in a large cup of warm tap water. Exotic companion mammals are fed usually 50-100cc/kg/day, divided q 4-12hr.

Slippery Elm bark
Powdered bark of the Slippery Elm tree is an effective demulcent, forming a soothing film over mucous membranes, and relieving minor pain. It can be used to help alleviate oral ulceration, such as occur in
ferrets (with *Helicobacter*, renal disease, and stress) and small herbivores (from dental malocclusion, molar spurs, and iatrogenic causes). The powder is sold in health food stores. A dilute paste is made using tap water (one 250 mg capsule into 15 cc water) and administered after hand feeding. Treatment may be applied directly to lesions (i.e. 0.50cc into each buccal cavity).

**Adequate Pain Control**
Small exotic mammals are more stoic and less communicative than their larger counterparts with regards to showing pain. At the same time, most are prey species, hard-wired for “flight”, and are therefore more susceptible to the negative effects of pain. In our practice, tramadol, buprenorphine and meloxicam have proven to be universally safe and effective in small exotic mammals. Tramadol dose is 2-4 mg/kg PO q8-12hr for most species, but in rabbits the minimum dose may need to be as high as 15 mg/kg PO q8-12hr. Buprenorphine is usually administered as preemptive analgesic 30 min prior to surgery, 0.02-0.05mg/kg SQ or IM, depending on severity and species. The dose may be repeated in 6-12 hrs. Meloxicam is typically dosed at 0.2-0.3mg/kg q 24 hrs for 5-7 days for post-operative pain, but the dose in rabbits needs to be 0.5-1.0 mg/kg PO q24h.

**Avoid “Elective” Antibiotic Usage**
Practitioners may be tempted to prescribe antibiotics post-operatively due to the notion that small exotic mammals are weaker or more prone to infection than other animals. This is not the case. Small mammal veterinarians should avoid the temptation to give antibiotics “just in case”. Especially in small herbivores, antibiotics can have negative effects on appetite and digestion. Routine spays/castrations, mass removals, and tooth trims (even with ulcerations) are examples of procedures where antibiotics are not indicated so long as sterile technique has been observed. Antibiotics are indicated for those cases in which infection is present or contamination has occurred.

**Chloramphenicol**
CMP is broad-spectrum, bacteriostatic, gets aerobes and anaerobes, penetrates pus, penetrates the eye and CNS, and is unlikely to cause GI disturbances in rabbits and rodents. It of one of the author’s first choices for abscesses and dental infections. In one study of odontogenic abscesses in rabbits, 100% of bacterial isolates were sensitive to CMP. It is metabolized by the liver, so use with caution in animals with suspected liver disease. Bone marrow toxicity reported in man and some other species is not reported in these exotic companion mammals. Dose is 30-50mg/kg PO q8-12h.

**Azithromycin**
Azithromycin is a bacteriostatic macrolide antibiotic with broad spectrum and long half-life. “Zithromax” 40mg/ml oral suspension has a variety of uses in exotics, including guinea pigs with *Bordetella bronchiseptica* infection and rats with *Mycoplasma pulmonis*. Azithromycin achieves high concentrations in bronchial secretions and has excellent ocular penetration. Dose is 15-30 mg/kg q24h PO; however, owners must be advised to discontinue the drug if anorexia or diarrhea occurs.

**Distal Urolithiasis of the Female Guinea Pig**
Guinea pig sows with distal urolithiasis may present with two distinct conditions: (1) bladder stones that become lodged in the urethra, and (2) calculi which appear to form in a diverticulum at the terminal urethra. The two conditions can be distinguished by subtle differences in presentation and radiographic appearance.

Guinea pigs with either urolith may exhibit weight loss, anorexia, hematuria, or discomfort during urination (e.g. vocalization, erratic movements). Clinical signs are more common and severe with
urethral stones, whereas diverticular stones may be found as an incidental finding on PE or x-rays. A sow with a urethral stone may exhibit straining and difficulty emptying the bladder. In contrast, a sow that has developed a stone of the diverticulum can usually produce a normal urine stream and completely empty its bladder. Urethral stones may not be palpable, but stones of the diverticulum can often be palpated just proximal to the urinary orifice. Radiographically, a stone that formed in the bladder and lodged in the urethra is oval or round, but a stone formed in the fossa is typically flattened or concave along its dorsal surface, where it lies in contact with the clitoris and distal urethra. On radiographs, diverticular stones appear closer to the skin’s surface than do urethral stones.

The clinical importance of distinguishing between the two is that a urethral stone may need to be retropulsed into the bladder for surgical removal, but a diverticular stone will not. Diverticular stones, as well as urethral stones that lodge close to the distal urethra, can be removed via the urinary orifice using ear curettes, fine forceps, sterile lubricant, and saline. Occasionally, it is necessary to incise over the stone for removal. Surgical closure of the incision is not mandatory; stricture of the urethra is unlikely if a longitudinal incision is used.

GROOMING
Nail Trimming
Nail trimming is the most common service requested for exotics and pet birds. Ferrets, rabbits, guinea pigs, and hedgehogs are among the most common mammals presented. Ferrets are typically scruffed for nail trimming. Distracting with Nutrical or Laxatone also helps. Rabbits and guinea pigs are “burrito” wrapped, if necessary. Note the unique cornified growths extending from the foot pads of some guinea pigs. These may be carefully trimmed as well. Hedgehogs are more of a challenge. They may be anesthetized, coaxed out by setting in shallow water, or nail trimmed while standing on a wire mesh (aquarium lid or tennis racquet). Sugar gliders are trimmed while wrapped in a hand towel, exposing one limb at a time. Note the specialized grooming digit, without a nail, on each hind foot.

Ear Care
Ear cleaning is routinely performed for both ferrets and rabbits. The author’s preferred cleaning agent is mineral oil. Three to five drops are instilled into the ear, and gently massaged. Wooden cotton swabs are then used to remove wax and debris. Check all ferrets for ear mites if their status is unknown. Occult infestations are common. In contrast, rabbit ear mite infestations are often severe and painful. Thorough cleaning may require sedation and may be delayed until treatment is underway.