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Chapter 11 **Ferrets**

James K. Morrissey | Matthew S. Johnston



TABLE 11-1 Antimicrobial and Antifungal Agents Used in Ferrets.

Agent	Dosage	Comments
Amikacin	8-16 mg/kg SC, IM, IV divided q8-24h ⁵³ 10-15 mg/kg SC, IM q12h ⁵²	Potentially ototoxic and nephrotoxic
Amoxicillin	20 mg/kg PO, SC q12h ⁵² 30 mg/kg PO q8h × 21 days ¹⁶	<i>Helicobacter</i> ; can use with metronidazole and bismuth subsalicylate
Amoxicillin/clavulanic acid (Clavamox, Zoetis)	13-25 mg/kg PO q8-12h ⁵² 18.75 mg per jill PO q12h ¹⁵	For treatment of <i>E. coli</i> induced mastitis
Amphotericin B	0.15 mg/kg IV 3×/wk × 2-4 mon ²⁵ 0.25-1 mg/kg IV q24h or q48h until total dose of 7-25 mg has been given ²⁵ 0.4-0.8 mg/kg IV q7d ⁵²	Treatment of cryptococcosis Blastomycosis; monitor for azotemia; total dose 7-25 mg
Ampicillin	5-30 mg/kg SC, IM, IV q8-12h ^{51,52}	
Azithromycin	5 mg/kg PO q24h ⁶⁰	
Cefadroxil	15-20 mg/kg PO q12h ⁵²	
Cefovecin (Convenia, Zoetis)	8 mg/kg SC q2-3d ⁴⁹	Second generation parenteral cephalosporin; long-acting antibiotic
Cephalexin	15-30 mg/kg PO q8-12h ⁵³	
Cephaloridine	10-25 mg/kg SC, IM q24h × 5-7 days ⁵³	Dermatitis
Chloramphenicol	25-50 mg/kg PO, SC, IM, IV q12h ⁵³ 50 mg/kg SC, IM q12h ¹⁵	14-day minimum for proliferative bowel disease For treatment of mastitis
Ciprofloxacin	10-30 mg/kg PO q24h ⁵³	Mix 500 mg tablet in 10 mL water (50 mg/mL); flavor for improved acceptance
Clarithromycin	12.5 mg/kg PO q8-12h × 14 days ⁴⁴ 50 mg/kg PO q24h or divided q12h × 14 days ⁵¹	<i>Helicobacter</i> ; use with ranitidine bismuth citrate <i>Helicobacter</i> ; use with omeprazole (or ranitidine) and metronidazole
Clindamycin	5.5-10 mg/kg PO q12h ⁵³ 12.5 mg/kg PO q12h ⁵³	Anaerobic infections; bone and dental disease Toxoplasmosis
Cloxacillin	10 mg/kg PO, IM, IV q6h ⁶⁵	
Doxycycline	10 mg/kg PO q12h ³⁷	May help with ferret systemic coronavirus infection
Enrofloxacin (Baytril, Bayer)	5 mg/kg PO, IM q12h ¹⁵ 5-10 mg/kg PO, SC, IM q12h ⁵³ 10-20 mg/kg PO, SC, IM q12-24h ⁵²	For treatment of mastitis IM for short term (generally 1 injection); injectable form can be given PO in palatable liquid; liquid for PO can also be compounded
Erythromycin	10 mg/kg PO q6h ⁵² 220 g/ton feed ⁵³	Controlling <i>Campylobacter</i> diarrhea in large groups

Continued

TABLE 11-1 Antimicrobial and Antifungal Agents Used in Ferrets. (cont'd)

Agent	Dosage	Comments
Fluconazole	50 mg/kg PO q12h ⁵³	
Gentamicin	2 mg/kg PO q12h × 10-14 days ²¹ 2-5 mg/kg SC, IM, IV q12-24h ⁵²	Parenteral form can be given PO; proliferative colitis that is nonresponsive to chloramphenicol ^{12,21} If given IV, dilute with saline and administer over 20 min
Griseofulvin	25 mg/kg PO q12-24h ⁵³	Refractory dermatomycosis; use with lime-sulfur dips q7d
Itraconazole	1.5 mg/kg PO q24h ⁴¹ 10 mg/kg PO q12h ²⁰ 10-20 mg/kg PO q24h ⁶⁷ 25-33 mg/kg PO q24h ^{25,72}	Invasive nasal cryptococcosis Histoplasmosis Cryptococcosis
Ketoconazole	10-50 mg/kg PO q12-24h ³⁹	
Lime sulfur	Dip q7d ⁵²	Dermatomycosis; see griseofulvin
Lincomycin	11 mg/kg PO q8h ⁵³	
Metronidazole	15-20 mg/kg PO q12h ⁵²	Anaerobic infections; can use with amoxicillin and bismuth subsalicylate for <i>Helicobacter</i>
Neomycin	10-20 mg/kg PO q6h ⁵²	Potential nephrotoxicity and neuromuscular blockage
Netilmicin (Netromycin, Schering)	6-8 mg/kg SC, IM, IV q24h ⁵³	Severe staphylococcal infections
Nitazoxanide (Alinia, Romark Laboratories)	5 mg/kg PO q12h ²⁵	Treatment of cryptosporidiosis
Oxytetracycline	20 mg/kg PO q8h ⁵²	
Penicillin G (sodium or potassium)	20,000 U/kg IM q12h ³⁹ 40,000 U/kg SC, IM q24h ⁵²	
Pentamidine isethionate	3-4 mg/kg SC q48h ²⁵	<i>Pneumocystis pneumonia</i>
Pyremethamine	0.5 mg/kg PO q12h ²⁵	Combine with trimethoprim sulfa (30 mg/kg PO q12h) and folic acid (3-5 mg/kg PO q24h) for treatment of toxoplasmosis
Sulfadimethoxine	25 mg/kg PO, SC, IM q24h ⁵³ 30-50 mg/kg PO q12-24h ⁵²	
Sulfamethazine	1-5 mg/mL drinking water ⁵²	
Sulfasoxazole	50 mg/kg PO q8h ⁵³	
Sulfathalidine	Mix in food at dose of 1 g/day/kg body weight ¹²	Opioid useful for management of <i>Salmonella</i> and to reduce shedding in colonies
Tetracycline	20-25 mg/kg PO q8-12h ⁵²	
Trimethoprim/sulfa	5 mg/kg PO q24h ¹⁵ 15 mg/kg IV q12h ⁸ 15-30 mg/kg PO, SC q12h ⁵²	Pyelonephritis Dosage amount of combined drugs
Tylosin (Tylan, Elanco)	5-10 mg/kg PO, SC, IM, IV q12h ^{51,52}	

TABLE 11-2 Antiparasitic Agents Used in Ferrets.

Agent	Dosage	Comments
Amitraz (Mitaban, Upjohn)	0.0125% topical solution q7d × 3 treatments, then 0.0375% q7d × 3 treatments ⁵² 0.03% topical solution to affected area q7d × 3-6 treatments ⁵³	Demodectosis secondary to other illness Demodectosis; use full concentration
Amprolium	19 mg/kg PO q24h ⁵² 100 mg/kg PO in food or water for 7 days ²⁵	Coccidiosis <i>Isospora</i>
Carbaryl powder (5%)	Topical q7d × 3-6 treatments ⁵²	Ectoparasites
Decoquinatate	0.5 mg/kg PO for at least 2 wk ⁶⁰	Coccidiosis; larger groups of ferrets
Fenbendazole	20 mg/kg PO q24h × 5 days ⁵² 50 mg/kg PO q24h × 30 days ⁵²	<i>Mesocestoides</i> infection
Fipronil (Frontline, Merial)	1 pump of spray or 1/5-1/2 of cat pipette topical q60d ⁵² 0.2-0.4 mL topically q30d ⁵²	Flea adulticide
Imidacloprid (Advantage, Bayer)	10 mg/kg topically ³⁶ 0.1-0.4 mL topically q30d ^{39,52}	Flea treatment; PD Flea adulticide; use small cat/kitten vial
Imidacloprid/moxidectin (Advantage Multi, Bayer)	1.9-3.3 µg/kg topically q30d ⁶⁰	Heartworm prevention
Ivermectin	0.02 mg/kg PO, SC q30d ⁶⁹ 0.05 mg/kg PO q30d until negative testing ⁶⁹ 0.05-0.3 mg/kg PO q24h for 1 mo after negative skin scraping ⁶ 0.2-0.5 mg/kg SC q14d × 3 treatments ⁵² 0.4 mg/kg PO, SC, repeat in 14-28 days ⁵² 0.5-1 mg/kg in ears, repeat in 14 days ⁵²	Heartworm prevention Recommended treatment for heartworms; give prednisolone (1 mg/kg/day) concurrently Demodectosis Sarcoptic mange Ear mites, ticks Ear mites; half dose in each ear; treat cats and dogs in house concurrently
Lime sulfur	Dip 1:40 dilution q7d × 6 wk ²¹	Demodectic mange
Lufenuron (Program, Novartis)	10 mg/kg SC ²⁵ 30 mg/kg PO in food ²⁵ 30-45 mg/kg PO q30d ⁵²	Flea larvicide
Mebendazole	50 mg/kg PO q12h × 2 days ²⁵	Nematodes
Melarsomine dihydrochloride (Immiticide, Merial)	2.5 mg/kg IM once, repeat in 30 days with 2 treatments 24 hr apart ⁵²	Heartworm adulticide; less commonly used; use prednisone (1 mg/kg q24h × 4 mo) following treatment
Metronidazole	15-20 mg/kg PO q12h × 14 days ⁵²	Gastrointestinal protozoa
Milbemycin oxime (Interceptor, Novartis)	1.15-2.33 mg/kg PO q30d ⁵²	Heartworm preventive
Moxidectin	0.17 mg SC once ⁶⁰	Heartworm adulticide
Paromomycin	165 mg/kg PO q12h × 5 days ⁶⁰	Cryptosporidiosis; possible treatment; use with caution, severe renal disease possible

Continued

TABLE 11-2 Antiparasitic Agents Used in Ferrets. (cont'd)

Agent	Dosage	Comments
Piperazine citrate	50-100 mg/kg PO q14d ⁵³	Intestinal nematodes
Praziquantel (Droncit, Bayer)	5-10 mg/kg PO, SC, repeat in 10 ⁵³ -14d ⁵² 25 mg/kg PO × 3 days ⁶⁰	Cestodes Trematodes
Pyrantel pamoate	4.4 mg/kg PO, repeat in 14 days ⁵²	
Pyrethrins	Topical q7d prn ⁵²	Fleas; use products safe for puppies and kittens
Pyrimethamine	0.5 mg/kg PO q12h ²⁵	Toxoplasmosis; antiprotozoal
Selamectin (Revolution, Zoetis)	6-18 mg/kg topically ^{51-53,60} 15 mg topically q30d ¹⁴ 45 mg/ferret topically ⁵⁰	Ectoparasites (fleas, lice, most mites except <i>Demodex</i>) Ear mites, fleas; PD Ear mites; although this dose has been reported in a PD study, it appears that lower (safer?) doses (see previous) are also quite effective
Sulfadimethoxine	20-50 mg/kg PO q24h ⁷ 50 mg/kg PO, then 25 mg/kg q24h × 9 days ⁵² 0.5 mL/kg of a 12.5% solution mixed into drinking water ⁵⁶	Coccidia For treatment of enteric coccidiosis in a large group of ferrets
Thiabendazole/ dex-amethasone/ neomycin (Tresaderm, Merial)	2 drops in each ear q24h × 7 days, off 7 days, on 7 days ⁵⁵	Ear mites

TABLE 11-3 Chemical Restraint/Anesthetic Agents Used in Ferrets.

Agent	Dosage	Comments
Acepromazine	— 0.1-0.25 mg/kg SC, IM ⁵² 0.1-0.5 mg/kg SC, IM ³³ 0.2-0.5 mg/kg SC, IM ⁵²	See ketamine for combination Preanesthetic; light sedation Rapid onset of sedation if given IM; doses above 0.2 mg/kg are associated with prolonged recovery times and hypothermia Tranquilization
Alfaxalone (Alfaxan, Jurox)	5 mg/kg IV ¹⁸ 5-15 mg/kg IM ²⁸	Anesthetic induction; PD Sedative
Atipamezole (Antisedan, Zoetis)	0.4 mg/kg IM ⁵³ 1 mg/kg SC, IV, IP ⁵²	Dexmedetomidine and medetomidine reversal; give same volume SC, IV, IP as medetomidine or dexmedetomidine (5 × medetomidine or 10 × dexmedetomidine dose in mg)
Atropine	0.04-0.05 mg/kg SC, IM, IV ⁵²	Preanesthetic; bradycardia; hypersalivation
Bupivacaine	1 mg/kg epidurally ⁵² 1-1.5 mg/kg SC infiltrate ²⁷	Epidural anesthesia; analgesia Local anesthesia; lasts several hours

TABLE 11-3 Chemical Restraint/Anesthetic Agents Used in Ferrets. (cont'd)

Agent	Dosage	Comments
Butorphanol	Loading dose 0.05-0.2 mg/kg; maintenance 0.1-0.4 mg/ kg/hr ²¹	Constant-rate infusion (CRI) for perioperative analgesia; see ketamine, midazolam, and tiletamine/zolazepam for combinations
Dexmedetomidine (Dexdomitor, Zoetis)	0.04-0.1 mg/kg IM ⁴⁹	α_2 agonist similar to medetomidine; not commonly used because of bradycardia and other side effects
Diazepam	— 0.5 mg/kg PO, IM, IV q6-8 h ⁵⁹ 0.5-1.5 mg/kg/h constant- rate infusion ³ 1 mg/animal IV ⁵² 2 mg/kg SC, IM ²⁵	See ketamine for combinations; drug is slowly and incompletely absorbed following IM administration Smooth muscle relaxation in urethral obstruction cases Seizure control Seizure control; 1-2 boluses Tranquilization; seizure control
Enflurane	2% maintenance ⁵²	Anesthesia
Etomidate	1 mg/kg IV ²⁷	Induction and intubation of critically ill animal
Fentanyl citrate/fluanisone (Hypnorm, Janssen)	0.3 mg/kg IM ⁵²	Anesthesia; not available in the United States
Fentanyl/droperidol (Innovar-Vet, Schering Plough)	0.15 mL/kg IM ⁵²	Minor surgical procedures; deep sedation
Glycopyrrolate	0.01 mg/kg IM ⁵²	Preanesthetic; bradycardia; hypersalivation
Isoflurane	To effect ³²	Inhalant anesthesia
Ketamine	— 10-20 mg/kg IM ⁵² 30-60 mg/kg IM ⁵²	Ketamine combinations follow Tranquilization; induction Anesthesia; when used alone, high doses cause poor muscle relaxation, rough recoveries, and convulsions; not recommended as a sole agent
Ketamine (K)/acepromazine (A)	(K) 20-35 mg/kg + (A) 0.2-0.35 mg/kg SC, IM ⁵²	Anesthesia
Ketamine (K)/diazepam (D)	(K) 10-20 mg/kg + (D) 1-2 mg/kg IM ⁵² 0.1 mL/kg IV ⁵²	Anesthesia; poor analgesia ⁶¹ Induction; will allow intubation with premedication; use equal volumes of (K) at 100 mg/mL and (D) at 5 mg/mL
Ketamine (K)/dexmedetomidine (D)	(K) 5 mg/kg IM + (D) 0.03 mg/kg IM ⁵²	Medetomidine no longer commercially available; dexmedetomidine at half the dose of medetomidine may be effective
Ketamine (K)/medetomidine (M) or dexmedetomidine (D)/butorphanol (B)	(K) 5 mg/kg + (M) 0.08 mg/kg or (D)	Medetomidine no longer commercially available; induction or total injectable

Continued

TABLE 11-3 Chemical Restraint/Anesthetic Agents Used in Ferrets. (cont'd)

Agent	Dosage	Comments
	0.04 mg/kg + (B) 0.2 mg/kg IM ³²	anesthesia; allows for intubation; 60-80 min of surgical plane of anesthesia
Ketamine (K)/midazolam (M)	(K) 5-10 mg/kg + (M) 0.25-0.5 mg/kg IV ⁵¹ 0.1 mL/kg IV ⁵²	Induction; use equal volumes of (K) at 100 mg/mL and (M) at 5 mg/mL
Ketamine (K)/xylazine (X)	(K) 10-25 mg/kg + (X) 1-2 mg/kg IM ⁵²	Anesthesia; avoid in sick animals; ³⁹ may result in cardiac arrhythmias ⁶¹
Lidocaine	1-2 mg/kg total SC ²⁷ 0.5-1.0 mg/kg IV q12h ⁵²	Local anesthesia; use 1%-2% solution; lasts 15-30 min
Midazolam (Versed, Roche)	— 0.25-0.3 mg/kg SC, IM ²⁵ 0.25-0.5 mg/kg SC, IM, IV ⁵³	See ketamine for combination; can be reversed with flumazenil at same volume Mild sedation; premedication
Midazolam (M)/butorphanol (B)	(M) 0.2 mg/kg + (B) 0.2 mg/kg IM ^{10,58}	Good sedation; premedication for minor procedures (i.e., ultrasonography, endoscopy, etc.); if needed, can follow with gas anesthesia or IV propofol; can reverse midazolam with flumazenil
Naloxone (Narcan, Dupont)	0.01-0.03 mg/kg IM, IV ⁵² 0.04 mg/kg SC, IM, IV ⁵²	Reversal of opioids; up to 1 mg/kg may be used
Propofol	1-3 mg/kg IV ³² 2-10 mg/kg IV ²⁵	Induction when premedicants are used; bradypnea or apnea and hypoxia common; intubation and oxygen insufflation is recommended Induction
Sevoflurane	To effect ⁵¹	Inhalant anesthesia
Tiletamine/zolazepam (Telazol, Fort Dodge)	— 12-22 mg/kg IM ⁵²	Tiletamine/zolazepam combinations follow Minor surgical procedures at 22 mg/kg; recovery may be prolonged at higher doses; poor muscle relaxation; rarely indicated
Tiletamine/zolazepam (T)/xylazine (X)	3 mg/kg (T) + 3 mg/kg (X) IM ³⁴	Small injection volume; rapid and smooth induction; allows for endotracheal intubation
Tiletamine/zolazepam (T)/xylazine (X)/butorphanol (B)	1.5 mg/kg (T) + 1.5 mg/kg (X) + 0.2 mg/kg (B) ³⁴	Small injection volume; rapid and smooth induction; allows for endotracheal intubation; analgesia; profound cardiorespiratory depression necessitates oxygen insufflation
Tiletamine/zolazepam (T)/dexmedetomidine (D)/butorphanol (B)	0.03 mL/kg IM of prepared solution (see comment) ³²	Telazol powder is reconstituted with 2.5 mL of dexmedetomidine and 2.5 mL of butorphanol (10 mg/mL) to form final volume of 5 mL

TABLE 11-3 Chemical Restraint/Anesthetic Agents Used in Ferrets. (cont'd)

Agent	Dosage	Comments
Xylazine	—	See ketamine and tiletamine/zolazepam for combinations
	0.1-0.5 mg/kg SC, IM ⁵³	Tranquilization; may cause hypotension, bradycardia, and arrhythmias; use with care in sick animals
	2 mg/kg IM ³³	Rapid immobilization within 3-5 minutes; associated with arrhythmias, hypotension, bradycardia
Yohimbine (Yobine, Lloyd)	0.2-0.5 mg/kg IV ⁵²	Xylazine reversal
	0.5-1 mg/kg IM ^{52,53}	

TABLE 11-4 Analgesic Agents Used in Ferrets.

Agent	Dosage	Comments
Acetylsalicylic acid (aspirin)	0.5-22 mg/kg PO q8-24h ⁵²	Analgesia; antiinflammatory; antipyretic; cannot be compounded as molecule is unstable in aqueous solution
Amantadine	3-5 mg/kg PO ⁴⁹	May potentiate other analgesics via NMDA antagonist action
Bupivacaine	1-2 mg/kg SC ³²	
Buprenorphine	12 µg/kg epidurally ²¹	Epidural analgesia/anesthesia
	0.04 mg/kg IM q4-6h ²⁹	PK
	0.01-0.05 mg/kg oral transmucosal, SC, IM, IV q6-12h ^{32,52}	Analgesia
Butorphanol	—	See ketamine, midazolam, and tiletamine/zolazepam (see Table 11-3) for anesthetic combinations
	0.05-0.5 mg/kg SC, IM q8-12h ^{32,52}	Analgesia; lower end of dose may be too low for clinical effect; higher end of dose range may cause profound sedation
	0.3 mg/kg SC q2-4h ²⁹	PK
Carprofen (Rimadyl, Zoetis)	1-5 mg/kg PO q12-24h ^{21,52}	Nonsteroidal antiinflammatory; use caution in animals with gastritis or enteritis
	4 mg/kg SC ³²	
Fentanyl citrate	1.25-5 µg/kg/h IV via constant-rate infusion ^{21,49}	Postoperative analgesia
	10-30 µg/kg/h IV via constant-rate infusion ^{21,49}	Perioperative analgesia; administer after loading dose of 5-10 µg/kg IV

Continued

TABLE 11-4 Analgesic Agents Used in Ferrets. (cont'd)

Agent	Dosage	Comments
Flunixin meglumine (Banamine, Schering)	0.3-2 mg/kg IV, PO, SC q12-24h ^{52,53} 2.5 mg IM q12h ¹⁴	Nonsteroidal antiinflammatory; use caution in animals with gastritis or enteritis; use caution in using drug more than 5 days continuously; mix injectable form with palatable syrup for PO
Gabapentin	3-5 mg/kg PO q8-24h ⁵²	Neurotropic pain; may cause sedation at higher doses
Hydromorphone	0.1 mg/kg SC q1-2h ²⁹ 0.1-0.2 mg/kg SC, IM, IV ³⁹	Opioid; PK
Ibuprofen	1 mg/kg PO q12-24h ⁵¹	Nonsteroidal antiinflammatory
Ketamine	0.1-0.4 mg/kg/h IV via constant-rate infusion ²¹ 0.3-1.2 mg/kg/h IV via constant-rate infusion ²¹	Postoperative analgesia Perioperative analgesia; administer after 2-5 mg/kg IV loading dose
Ketoprofen (Ketofen, Fort Dodge)	1-3 mg/kg PO, SC, IM q24h ⁵³	Nonsteroidal antiinflammatory; use caution with gastritis or enteritis or if using >5 days
Meloxicam	0.1-0.3 mg/kg PO, SC, IM q24h ^{24,25,27}	Nonsteroidal antiinflammatory; monitor liver and kidney values
Meperidine (Demerol, Winthrop-Breon)	5-10 mg/kg SC, IM, IV q2-4h ²⁵	Analgesia
Morphine	0.1 mg/kg epidurally ²¹ 0.2-5 mg/kg SC, IM q2-6h ⁵²	Analgesia SC administration of 1 mg/kg associated with emesis, excitability, and ptialism ³⁹
Nalbuphine (Nubain, Endo Labs)	0.5-1.5 mg/kg IM, IV q2-3h ²⁵	Analgesia
Oxymorphone	0.05-0.2 mg/kg SC, IM, IV q8-12 h ^{27,52}	Analgesia
Pentazocine (Talwin, Sanofi Winthrop)	5-10 mg/kg IM q4h ⁵²	Analgesia
Tramadol	5-10 mg/kg PO q12-24 ²⁵	Analgesia; synergistic with NSAIDs

TABLE 11-5 Cardiopulmonary Agents Used in Ferrets.

Agent	Dosage	Comments
Aminophylline	4-6.6 mg/kg PO, IM, IV q12h ⁵²	Bronchodilator
Amlodipine (Norvasc, Pfizer)	0.2-0.4 mg/kg PO q12h ²⁸	Vasodilator
Atenolol (Tenormin, ICI)	3.125-6.25 mg/kg PO q24h ^{35,52} 6.25 mg/animal PO q24h ⁵²	β -adrenergic blocker for hypertrophic cardiomyopathy
Atropine	0.02-0.04 mg/kg SC, IM ⁵² 0.1 mg/kg intratracheal ⁵²	Bradycardia

TABLE 11-5 Cardiopulmonary Agents Used in Ferrets. (cont'd)

Agent	Dosage	Comments
Benazepril	0.25-0.5 mg/kg PO q24h ^{35,68}	Vasodilator; less nephrotoxic than enalapril
Captopril (Capoten, Squibb)	1/6 of 12.5 mg tablet/animal PO q48h ⁵²	Vasodilator; starting dose, gradually increase to q12-24h; can cause lethargy
Digoxin (Cardoxin, Evsco)	0.005-0.01 mg/kg PO q12-24h ⁵²	Positive inotrope for dilated cardiomyopathy; monitor serum levels
Diltiazem (Cardizem, Marion Merrill Dow)	1.5-7.5 mg/kg PO q12h ^{35,52}	Calcium channel blocker for hypertrophic cardiomyopathy
Dobutamine	0.01 mL/animal IV prn ²⁸	Hypotension
Doxapram	1-2 mg/kg IV ⁵² 5-11 mg/kg IV ⁵²	Respiratory stimulant
Enalapril (Enacard, Merck)	0.25-0.5 mg/kg PO q24-48h ^{35,52}	Vasodilator for dilated cardiomyopathy; do not use with concurrent renal disease
Epinephrine	0.02 mg/kg SC, IM, IV, intratracheal ⁴³ 0.2 mg/kg IV, intracardiac, IO ²⁵ 0.2-0.4 mg/kg diluted in 0.9% NaCl ²⁵ intratracheal	Cardiac arrest; anaphylactic reactions (including vaccine reactions) Administer during cardiopulmonary arrest
Furosemide	1-4 mg/kg PO, SC, IM, IV q8-12h ⁵² 2-3 mg/kg IM, IV q8-12h followed by 1-2 mg/kg PO q12h for long-term management ⁶⁹	Diuretic; use high dose in fulminant heart failure Emergency management of fulminant heart failure
Hyperimmune serum	1 mL/animal IV once ⁵⁷	Use serum from a healthy, appropriately vaccinated ferret for treatment of canine distemper virus infection
Isoproterenol	20-25 µg/animal SC, IM q4-6h ⁶⁹ 40-50 µg/animal PO q4-6h ⁶⁹	Positive chronotrope to increase ventricular rate in third-degree AV block
Metaproterenol	0.25-1 mg/kg PO q12h ⁶⁹	Positive chronotrope to increase ventricular rate in third-degree AV block
Nitroglycerin (2%) ointment (Nitrol, Savage)	1/6-1/8 inch/animal q12-24h ⁵²	Vasodilator for cardiomyopathy; apply to shaved inner thigh or pinna
Pimobendan	0.25-1.25 mg/kg PO q12h ²⁵ 0.5 mg/kg PO q12h ⁶⁹ 0.625-1.25 mg/kg q12h ³⁹	Phosphodiesterase inhibitor; increases cardiac contractility with dilated cardiomyopathy or mitral valve disease
Propranolol (Inderal, Wyeth-Ayerst)	0.2-1 mg/kg PO q8-12h ⁵² 2 mg/kg PO, SC q12h ⁵²	β-blocker for hypertrophic cardiomyopathy; may cause lethargy, loss of appetite
Pseudophedrine	5 mg/kg PO q8h ⁶⁹	Positive chronotrope to increase ventricular rate in third-degree AV block
Terbutaline	2.5-5 mg/kg PO q12-24h ²⁷	Bronchodilator
Theophylline	4.25 mg/kg PO q8-12h ¹²	Bronchodilator; use elixir

TABLE 11-6 Adrenal Gland Disease Agents Used in Ferrets.

Agent	Dosage	Comments
Anastrozole (Arimidex, Astrazeneca Pharmaceuticals)	0.1 mg/kg PO q24h ⁵²	Estrogen inhibitor; precursor hormones blocked by inhibition of aromatase enzyme; use until signs resolve, then 7 days on, 7 days off, etc.; pregnant owners should avoid handling agent
Bicalutamide (Casodex, Astrazeneca Pharmaceuticals)	5 mg/kg PO q24h ⁵²	Testosterone inhibitor; competitively inhibits androgen by binding to receptors in target tissues; use until clinical signs resolve, then 7 days on, 7 days off, etc.; pregnant owners should avoid handling agent
Deoxycorticosterone pivalate (DOCP)	2 mg/kg IM q21d ⁵²	Treatment of adrenal insufficiency following bilateral adrenalectomy
Deslorelin (Suprelorin, Virbac Animal Health)	—	Long-acting GnRH analog that may suppress LH and FSH; used to control signs of adrenal disease; given as a subcutaneous implant approximately once yearly; now available in the United States
	2.7 mg implant SC ³⁸	Alternative to spay/neuter; the 2.7 mg implant is not available in the United States
	3 mg or 4.7 mg SC ^{38,71}	The 3 mg implant is not available in the United States
	4.7 mg implant SC ²⁵	Treatment of adrenal disease; lasts 10-18 months
	9.4 mg implant SC ²⁵	Treatment of adrenal disease; lasts 16-48 months; not available in the United States
Finasteride (Proscar, Merck)	5 mg/kg PO q24h ⁵²	Inhibits conversion of testosterone to active form of dihydrotestosterone; also used in treatment of prostatic enlargement
Flutamide (Eulexin, Schering)	5-10 mg/kg PO q12-24h ^{11,52,63}	Androgen inhibitor; reduces enlarged periurethral prostate tissue; lifetime treatment; associated with mammary tumors
Leuprolide acetate (Lupron, AbbVie)	—	Long-acting GnRH analog that may cause an initial stimulation, then suppression of LH and FSH; palliative treatment of adrenal disease (will not resolve tumor); administer q28d until clinical signs regress, then treatment interval can be up to 6-8 wk; lifetime treatment; higher dosage may shrink prostate within 12-48 hr which may improve urine flow in cases of urethral obstruction; must be prepared in aliquots and frozen (although the effects of freezing on drug efficacy are questionable) until used; very expensive
	1 mg IM q60-75d ¹¹ 3 month depot	Adrenal disease
Lupron, Depot 30 day (TAP)	100-150 µg/kg IM q4-8wk ^{1,70}	
	250 µg/kg IM q4-8wk ²⁶	
Lupron, Depot 4 month (TAP)	250 µg/kg IM ⁵⁹	
	2 mg/kg SC, IM q16wk ⁵²	
Melatonin	0.5-1 mg/animal PO q24h ⁵¹ prn	Symptomatic treatment of hyperadrenocorticism; may not affect tumor growth
	5.4 mg implant SC ⁵²	Should last 6-12 mo

TABLE 11-6 Adrenal Gland Disease Agents Used in Ferrets. (cont'd)

Agent	Dosage	Comments
Mitotane (o,p'-DDD) (Lysodren, Bristol-Myers)	—	Hyperadrenocorticism; variable results and not a reliable alternative to adrenalectomy or other drugs mentioned above; results have been largely unsatisfactory and, therefore, use is not recommended
Trilostane (Vetoryl, Dechra)	2 mg/kg PO q12h ⁵²	May be useful for treating pituitary-dependent hyperadrenocorticism or adrenal dependent hyperadrenocorticism; reduces synthesis of adrenal androgens

TABLE 11-7 Miscellaneous Agents Used in Ferrets.^a

Agent	Dosage	Comments
Activated charcoal	1-3 g/kg PO ⁵²	Orally administered adsorbent for gastrointestinal tract toxins/drug overdoses
Amantadine (Symmetrel, Endo Labs)	6 mg/kg as aerosol q12h ^{5,25,52}	Influenza; experimental antiviral
Apomorphine	0.7 mg/kg SC ⁵² 5 mg/kg SC ⁵²	Emetic Emetic; may cause excitation
Atropine	5-10 mg/kg SC, IM ⁵²	Organophosphate toxicity
Azathioprine (Imuran, GlaxoSmithKline)	0.9 mg/kg PO q24-72h ⁹	Immunosuppressive agent; may use in chronic hepatitis
Barium (30%)	8-13 mL/kg PO ⁵²	Gastrointestinal contrast study
Barium (60%)	17 mL/kg PO ⁶⁶	Followed 30 minutes later by 42 mL/kg of air for a double contrast gastrointestinal study
Bismuth subcitrate, colloidal	6 mg/kg PO q12h ⁵²	In combination with enrofloxacin at 4.25 mg/kg q12h for <i>Helicobacter</i>
Bismuth subsalicylate (Pepto-Bismol, Procter & Gamble)	0.25-1 mL/kg PO q4-8h ⁵² 17.5 mg/kg PO q8-12h ⁵²	Gastrointestinal ulcers; may help prevent <i>Helicobacter</i> colonization
Bleomycin (Blenoxane, BristolMyersSquibb)	10 U/m ² SC ⁵²	Treatment of squamous cell carcinoma
Budesonide (Entocort, AstraZenca)	Up to 1 mg/ferret PO q24h ⁴⁹	Novel steroid may have use as single agent treatment for inflammatory bowel disease
Cabergoline	5 µg/kg PO q24h × 5 days ²⁷	Pseudopregnancy
Calcium EDTA	20-30 mg/kg SC q12h ⁶²	Treatment of heavy metal toxicosis
Chitosan	0.5 mg/kg on food q12h ⁴⁹	Intestinal phosphorus and uremic toxin absorbent; cellulose-like biopolymer from exoskeletons of marine invertebrates
Chlorambucil (Leukeran, Glaxo)	1 mg/kg PO ⁴ 20 mg/m ² PO ⁵²	Antineoplastic; in chemotherapy protocols for lymphoma ³

Continued

TABLE 11-7 Miscellaneous Agents Used in Ferrets. (cont'd)

Agent	Dosage	Comments
Chlorpheniramine (Chlor-Trimeton, Squibb)	1-2 mg/kg PO q8-12h ⁵²	Antihistamine; control sneezing and coughing when they interfere with eating or sleeping
Cimetidine (Tagamet, SmithKline)	5-10 mg/kg PO, SC, IM q8h ⁵² 10 mg/kg PO, IV q8h ²⁵	H ₂ blocker; inhibits acid secretion; gastrointestinal ulcers; unpalatable; give IV (slow)
Ciproheptadine (Periactin, Merck)	0.5 mg/kg PO q12h ⁴⁹	Appetite stimulation
Cisapride (Propulsid, Janssen)	0.5 mg/kg PO q8-12h ⁵²	Antiemetic; motility enhancer; not currently available in the United States; must be compounded
Cobalamin	25 µg/kg SC q7d × 6 wk, then q14d × 6 wk, then q30d ²⁴	Chronic diarrhea; with cobalamin malabsorption
Cyclophosphamide	10 mg/kg PO, SC ⁵² 200 mg/m ² PO, SC ⁴ 250 mg/m ² PO q4-5wk ⁴⁷	Antineoplastic; use at higher dose for salvage treatment of lymphoma ^a Part of a noninvasive protocol for treatment of lymphoma ^a
Cyclosporine	4-6 mg/kg PO q12h ⁴²	Pure red cell aplasia
Cytarabine (Cytosar-U, Zoetis)	300 mg/m ² q8wk ⁴⁷	Part of a noninvasive protocol for treatment of lymphoma ^a
Dexamethasone	0.5 mg/kg SC, IM, IV ⁵² 1 mg/kg IM ⁵²	Post-adrenalectomy; follow with prednisone
Dexamethasone sodium phosphate	1-2 mg/kg IV ³ 2 mg/kg IM, IV ¹⁹ 4-8 mg/kg IM, IV ⁵²	Cerebral edema therapy Anaphylactic reaction to vaccine Shock therapy
Dextrose 50%	0.25-2 mL IV ⁴⁰ 1.25%-5% IV ⁴⁰	Bolus for hypoglycemia; give to effect Infusion for hypoglycemic or inappetent animal
Diazoxide (Proglycem, Medical Market Specialties)	5-30 mg/kg PO q12h ^{45,52} 10 mg/kg PO q24h or divided q8-12h ⁵²	Insulinoma; insulin-blocker; can cause hypertension, lethargy, depression, nausea
Diphenhydramine	0.5-2 mg/kg PO, IM, IV q8-12h ^{43,52}	Antihistamine; controls sneezing and coughing when they interfere with eating or sleeping; give at high dose IM prevaccination when previous reaction occurred or for treatment of vaccine reaction
Doxapram	1-2 mg/kg IV ⁵² 2-5 mg/kg IV ⁵³	Respiratory stimulant
Doxorubicin	1 mg/kg IV q21d × 4 treatments ⁴	Antineoplastic agent; lymphoma; ^a salvage treatment
Epinephrine	0.02 mg/kg SC, IM, IV, IT ⁵²	Severe vaccine reaction; cardiac arrest
Epoetin alfa (Epoen, Amgen)	50-150 U/kg PO, IM q48h ⁵²	Stimulates erythropoiesis; after desired PCV is reached, administer q7d for maintenance

TABLE 11-7 Miscellaneous Agents Used in Ferrets. (cont'd)

Agent	Dosage	Comments
Famotidine (Pepcid, Merck)	0.25-0.5 mg/kg PO, SC, IV q24h ⁵² 2.5 mg PO, SC, IV q24h ²⁵	Inhibits acid secretion; gastrointestinal ulcers
Fludrocortisone (Florinef, SquibbMark)	0.05-0.1 mg/kg PO q24h or divided q12h ⁵²	Mineralocorticoid replacement after adrenal gland removal
Flunixin meglumine (Banamine, Schering)	1 mg/kg SC, IM ⁵² 2.5 mg/animal SC, IM q12h prn ¹⁴	Prevention of prostaglandin-mediated hypotension of endotoxemia Reduce inflammation in mastitis
Flurbiprofen sodium	1-2 drops q12-24h ²⁵	Ophthalmic inflammation
Gadolinium-diethylenetriamine pentaacetic acid (Gd-DPTA) (Omniscan, GE Healthcare)	0.2 mL/kg ³	MRI contrast agent for neurological studies
Glucagon	15 ng/kg/min IV constant-rate infusion ⁸	Emergency management of hypoglycemia secondary to insulinoma
Glutamine	— 0.5 g/kg PO divided daily ⁴⁹	Amino acid; L form available OTC as a nutritional supplement; improves immune system, digestive health, and enhances muscle production Enterocyte supplementation with starvation
Gonadotropin-releasing hormone (GnRH) (Cystorelin, Sanofi)	20 µg/animal IM ¹⁴	Termination of estrus after day 10 of estrus; repeat in 2 wk prn
Hairball laxative, feline	1-2 mL/animal PO q48h ⁵²	Trichobezoar prophylaxis
Heparin	100 U/animal (0.45-1.35 kg) SC q24h × 21 days ³⁵ 200 U/kg SC, IM q12h × 5 days ⁵²	May be used in some heartworm treatments Decreases thromboembolism; start day prior to some heartworm adulticide treatments
Human chorionic gonadotropin (hCG) (Pregnyl, Organon)	— 50-100 U/animal IM ¹⁴ 200-1000 U/animal IM ⁵²	Use 10 or more days after onset of estrus to induce ovulation and prevent hyperestrogenemia; repeat in 1-2 wk prn
Hydrocortisone sodium succinate	25-40 mg/kg IV ⁵²	Shock
Hydrogen peroxide (3%)	2.2 mL/kg PO ⁵²	Emetic
Hydroxyzine (Atarax, Roerig)	2 mg/kg PO q8h ⁵²	Antihistamine; pruritus; may cause drowsiness
Insulin, glargine	0.5 U SC q12h ²³	
Insulin, NPH	0.1 U/animal SC q12h ⁵² 0.5-1 U/kg (or to effect) SC ⁴⁹	Diabetes mellitus; diabetic ketoacidosis; monitor blood glucose

Continued

TABLE 11-7 Miscellaneous Agents Used in Ferrets. (cont'd)

Agent	Dosage	Comments
Insulin, ultralente	0.1 U/animal SC q24h ⁵²	Diabetes mellitus; monitor blood glucose
Interferon- α	107 units IV or intranasal q24h for several days ³¹	Adjunctive therapy for influenza
Iohexol	0.25-0.5 mL injected epidurally at the L5-L6 intervertebral disc space/kg ³ 10 mL/kg PO ⁵² 2.3 mL/kg IV ⁶⁶	Myelography Gastrointestinal contrast study; can dilute 1:1 with water Excretory urography
Ipecac (7%)	2.2-6.6 mL/animal PO ⁵²	Emetic
Iron dextran	10 mg/animal IM once ⁴⁹	Iron deficiency anemia; hemorrhage
Isotretinoin	2 mg/kg PO q24h ⁴	Cutaneous epitheliotropic lymphoma
Kaolin/pectin	1-2 mL/kg PO q2-6h prn ⁵²	Gastrointestinal protectant
Lactulose syrup (Cephulac, Merrill Dow)	0.15-0.75 mL/kg PO q12h ⁵² 150-175 mg/kg PO q8-12h ²⁵	Absorption of blood ammonia in hepatic disease; may cause soft stools at higher dose
L-asparaginase	400 U/kg SC, IM ⁴ 10,000 U/m ² SC q7d \times 3 treatments ⁴⁷	Antineoplastic Part of a noninvasive chemotherapy protocol
Levothyroxine	50-100 μ g/animal q12h ⁷²	Hypothyroidism
Loperamide	0.2 mg/kg PO q12h ⁵²	Antidiarrheal
Mannitol	0.5-1 g/kg IV ³	Give over 20 min
Methotrexate	0.5 mg/kg IV ⁴ 0.8 mg/kg IM ⁴⁷	Antineoplastic Part of noninvasive protocol for treatment of lymphoma ⁴
Metoclopramide	0.2-1 mg/kg PO, SC, IM q6-8h ⁵³	Antiemetic; motility enhancer
Milk thistle (<i>Silybum marianum</i>)	4-15 mg/kg PO q8-12h ²⁵	Hepatoprotective
Misoprostol (Cytotech, Searle)	1-5 μ g/kg PO q8h ⁵²	Gastric ulcers
Nandrolone decanoate	1-5 mg/kg IM q7d ⁵²	Anabolic steroid
Nutri-Cal (EVSCO)	1-3 mL/animal PO q6-8h ⁵²	Nutritional supplement
Octreotide (Sandostatin, Novartis)	1-2 μ g/kg SC q8-12h ⁴⁹	Somatostatin analogue; potential treatment for insulinomas
Omeprazole (Prilosec, Astra Merck)	0.7 mg/kg PO q24h ¹⁷ 4 mg/kg PO q24h ²⁵	Proton-pump inhibitor; decreases gastric secretion of HCl <i>Helicobacter</i> ; use with clarithromycin and metronidazole
Ondansetron	1 mg/kg PO q12-24h ⁴⁹	Antiemetic
Oseltamivir phosphate (Tamiflu, Genentech)	5-10 mg/kg PO q12h \times 10 days ³¹	Antiviral for influenza treatment
Oxytocin	0.2-3 U/kg SC, IM ⁵²	Expels retained fetuses; stimulates lactation
Penicillamine	10 mg/kg PO q24h ²⁵	Copper toxicity

TABLE 11-7 Miscellaneous Agents Used in Ferrets. (cont'd)

Agent	Dosage	Comments
Pentoxifylline (Pentoxil, Upsher-Smith)	20 mg/kg PO q12h ³⁷	Improves perfusion to hypoperfused tissue by increasing deformability of erythrocytes; supportive treatment for ferret systemic coronavirus
Pet-Tinic (SmithKline)	0.2 mL/kg PO q24h ⁵²	Nutritional/iron supplement for anemia
Phenobarbital	1-2 mg/kg PO q8-12h ^{39,52} 2-10 mg/kg/h IV constant-rate infusion ³	Seizure control Seizure control if diazepam is not effective
Phenoxybenzamine (Dibenzylamine, SmithKline Beecham)	3.75-7.5 mg/animal PO q24-72h ⁵⁹	α -Adrenergic antagonist; smooth muscle relaxation for urethral obstruction; potential gastrointestinal or cardiovascular side effects
Polyprenol (Vetimmune, Sass & Sass)	3 mg/kg PO 3 \times /wk ³⁷	Antioxidant and immunostimulant; supportive treatment for ferret systemic coronavirus
Potassium bromide	— 22-30 mg/kg q24h PO ³ 70-80 mg/kg q24h PO ³	Seizure control Dose if used with phenobarbital Dose if used alone
Prazosin (Minipress, Zoetis)	0.05-0.1 mg/kg PO q8h ⁵⁹	α -Adrenergic antagonist; smooth muscle relaxation for urethral obstruction; potential for gastrointestinal and cardiovascular side effects
Prednisone	0.25 mg/kg PO q12h \times 5 days, then 0.1 mg/kg q12h \times 10 days ⁵² 0.25-1 mg/kg PO divided q12h ⁵² 0.5 mg/kg PO q12h \times 7-10 days, then q24h \times 7-10 days, then q48h \times 7-10 days ⁵² 1 mg/kg PO q24h \times 7-14 days ⁵² 1.25-2.5 mg/kg PO q24h ⁵² 1.5 mg/kg PO q24h \times 7 days, then taper to 0.8 mg/kg PO q24h ⁴⁶ 2 mg/kg PO q24h ⁵²	Postoperative adrenalectomy; after initial dose of dexamethasone Insulinoma; gradually increase to 4 mg/kg/day prn; up to 2 mg/kg/day when given with diazoxide Postoperative adrenalectomy Use following heartworm adulticide treatment; thromboembolism Eosinophilic gastroenteritis; treat until clinical signs abate; gradually decrease to q48h Management of eosinophilic gastroenteritis Palliative therapy for lymphosarcoma ^a or chronic inflammatory bowel disease; taper dose as able
Procarbazine	50 mg/m ² PO q24h \times 14 days ⁴	Part of a noninvasive protocol for treatment of lymphoma ^a
Proligestone	50 mg SC ⁵⁹	Induce ovulation when jill has been in estrus for 10 days; not available in the United States

Continued

TABLE 11-7 Miscellaneous Agents Used in Ferrets. (cont'd)

Agent	Dosage	Comments
Prostaglandin F ₂ -α (Lutalyse, Upjohn)	0.1-0.5 mg/animal IM prn ⁷ 0.5 mg/animal IM ⁷	Metritis; expels necrotic debris Can induce delivery on day 41 if only one kit; follow with 6 U oxytocin 1-4 hr later
Pyridostigmine (Mestinon, Valeant)	1 mg/kg PO q8h ¹³ 1 mg/kg PO q8-12h ²	Oral cholinesterase inhibitor for potential treatment of myasthenia gravis Myasthenia gravis; overdose possible with long-term use
Ranitidine bismuth citrate (Pylorid, Glaxo Wellcome)	24 mg/kg PO q8h ⁴⁴	<i>Helicobacter</i> ; use in combination with clarithromycin; not available in the United States
Ranitidine HCl (Zantac, Glaxo Wellcome)	3.5 mg/kg PO q12h ^{25,66}	Inhibits acid secretion; gastrointestinal ulcers
S-adenosylmethionine (SAME) (Vetri-SAME, Vetriscience Labs)	20-100 mg/kg PO q24h ⁴⁹	Adjunctive treatment for liver disease; hepatoprotectant; improves synthesis of glutathione and other compounds important for liver function
Saw palmetto	0.15 mL/animal PO q12h ⁵²	Homeopathic remedy used for dysuria associated with prostatic enlargement
Stanozolol (Winstrol, Upjohn)	0.5 mg/kg PO, SC q12h ⁵²	Anemia; anabolic steroid; use with caution in hepatic disease
Sucralfate (Carafate, Hoechst Marion Roussel)	25-125 mg/kg PO q8-12h ⁵²	Gastrointestinal ulcers; give before meals; requires acidic pH
Sulfasalazine	62.5-125 mg PO q8-24h ⁴⁹	Management of colitis
Theophylline elixir	4.25 mg/kg PO q8-12h ⁵²	Bronchodilator
Thyroid-stimulating hormone (TSH)	1 U IV ³⁰	Blood for T ₄ measurement taken 120 min later
Thyroxine	0.2-0.4 mg/kg q12h ⁵²	Hypothyroidism; adjust and taper as needed
Trientine (Syprine, Valeant)	10 mg/kg PO q12h ²⁵	Chelating agent used for copper toxicosis
Ursodiol (Actigall, Ciba)	15 mg/kg PO q12h ⁹	Treatment of chronic hepatopathies
Vincristine	0.12-0.2 mg/kg IV ⁴ 0.75 mg/m ² IV ⁴	Minimal myelosuppression
Vitamin A (retinol palmitate)	50,000 U IM q24h × 2 treatments ⁶²	Reduced mortality secondary to canine distemper virus infection
Vitamin B complex	1-2 mg/kg IM prn ⁵²	Dose based on thiamine content
Vitamin C	50-100 mg/kg PO q12h ²⁵	Adjunct therapy for lymphoma
Vitamin K	2.5 mg/kg SC, then 1-2.5 mg/kg PO divided q8-12h × 5-7 days ⁴⁹ 5 mg/kg SC, then 2.5 mg/kg PO divided q8-12h × 3 wk ⁴⁹ 2.5-5 mg/kg SC, then 2.5 mg/kg PO divided q8-12h × 3-4 wk ⁴⁹	First generation rodenticide toxicity (e.g., warfarin class) Second generation rodenticide toxicity (e.g., brodifacoum class) Inandione or unknown anticoagulant toxicity

TABLE 11-7 Miscellaneous Agents Used in Ferrets. (cont'd)

Agent	Dosage	Comments
Yeast, brewer's	1/6-1/4 tsp PO q12h ⁵²	Source of chromium to stabilize glucose and insulin for animals with insulinomas
Zanamivir (Relenza, GlaxoSmithKline)	12.5 mg/kg intranasal only ⁵ 0.3-1 mg/kg via inhalation q12h ³¹	Antiviral for influenza treatment; greater effect if used with amantadine

^aSee Table 11-13 for chemotherapy protocols for lymphoma.

TABLE 11-8 Hematologic and Biochemical Values of Ferrets.^{22,43,52}

Measurements	Female	Male
Hematology^a		
PCV (%)	34.6-55	33.6-61
RBC (10 ⁶ /μL)	6.77-9.76	7.1-13.2
Hgb (g/dL)	11.9-17.4	12-18.5
MCV (fL)	44.4-53.7	42.6-52.5
MCH (pg)	16.4-19.4	13.7-19.7
MCHC (g/dL)	33.2-42.2	30.3-34.9
WBC (10 ³ /μL)	2.5-18.2	4.4-19.1
Neutrophils (%)	12-84	11-82
Band cells (%)	0-4.2	0-2.2
Lymphocytes (%)	12-95	12-73
Monocytes (%)	1-8	0-9
Eosinophils (%)	0-9	0-8.5
Basophils (%)	0-2.9	0-2.7
Platelets (10 ³ /μL)	264-910	297-730
Reticulocytes (%)	2-14	1-12
Biochemistries		
ALP (U/L)	3-62	11-120
ALT (U/L)	54-280	54-289
AST (U/L)	40-120	28-248
Bilirubin, total (mg/dL)	0-1	0-0.1
Bile acids (μmol/L)	0.0-28.9	0.0-28.9
BUN (mg/dL)	10-45	11-42
Calcium (mg/dL)	8-10.2	8.3-11.8
Carbon dioxide (mEq/L)	16.5-27.8	12.2-28
Chloride (mEq/L)	112-124	102-126
Cholesterol (mg/dL)	122-296	64-221
Creatinine (mg/dL)	0.2-1	0.2-1
GGT (U/L)	0-5	0-5

Continued

TABLE 11-8 Hematologic and Biochemical Values of Ferrets. (cont'd)

Measurements	Female	Male
Glucose (mg/dL)	85-207	62.5-198
LDH (U/L)	—	241-752
Lipase (U/L)	—	0-200
Phosphorus (mg/dL)	4.2-10.1	4-8.7
Potassium (mEq/L)	4.2-7.7	4.1-7.3
Protein, total (g/dL)	5.1-7.2	5.3-7.4
Albumin (g/dL)	3.2-4.1	2.8-4.2
Globulin (g/dL)	2.2-3.2	2-4
Albumin:globulin	1-1.6	0.8-2.1
Sodium (mEq/L)	142-156	137-162
Triglycerides (mg/dL)	—	10-32

^aSeveral of these hematology values were obtained from ferrets under isoflurane anesthesia. This can artificially lower red cell indices and may be responsible for the wide ranges in some values.

TABLE 11-9 Protein Electrophoresis Values for Ferrets.⁴⁸

Parameter	Normal Values
Total protein (g/dL)	5.6-7.2
Albumin (g/dL)	3.3-4.1
Alpha ₁ globulins (g/dL)	0.33-0.56
Alpha ₂ globulins (g/dL)	0.36-0.60
Beta globulins (g/dL)	0.83-1.2
Gamma globulins (g/dL)	0.3-0.8
A/G	1.3-2.1

TABLE 11-10 Biologic and Physiologic Data of Ferrets.^{43,52,64}

Parameter	Normal Values
Adult body weight, male	1-2 kg
Adult body weight, female	0.65-0.95 kg
Birth weight	6-12 g
Weight at 7 days	30 g average
Weight at 14 days	60-70 g
Sexual maturity	6-12 mo (usually 1st spring after birth)
Reproductive cycle	Induced ovulator
Gestation period	42 ± 2 days
Litter size	1-18 (average 8, primiparous jill 10)
Weaning age	6-8 wk
Eyes open	34 days

TABLE 11-10 Biologic and Physiologic Data of Ferrets. (cont'd)

Parameter	Normal Values
Hearing	32 days
Life span	5-9 yr (average in United States)
Food consumption	43 g/kg/day
Water consumption	75-100 mL/day
Gastrointestinal transit time	3-4 hr
Enteral feeding requirements	2000-3000 kcal/kg/day
Dental formula	2(I 3/3 C 1/1 P 3/3 M 1/2) = 34
Deciduous teeth erupt	20-28 days
Permanent teeth erupt	50-74 days
Canines erupt	50 days
Molars erupt (first to fourth)	53-74 days
Heart rate	200-400 beats/min
Mean systolic blood pressure	133-161 mmHg
Respiratory rate	33-36 breaths/min
Rectal temperature	37.8-40°C (100-104°F)
Blood volume	60-80 mL (5%-7% body weight)
Intraocular pressure	22.8 ± 5.5 mmHg
Endotracheal tube size	2-4 mm ID
Prothrombin time (PT)	8-16.5 sec
Partial thromboplastin time (PTT)	16-25 sec

TABLE 11-11 Urinalysis Values of Ferrets.⁵²

Parameter	Male	Female
Volume (mL/24 hr)	26 (8-48)	28 (8-140)
Sodium (mmol/24 hr)	1.9 (0.4-6.7)	1.5 (0.2-5.6)
Potassium (mmol/24 hr)	2.9 (1-9.6)	2.1 (0.9-5.4)
Chloride (mmol/24 hr)	2.4 (0.7-8.5)	1.9 (0.3-7.8)
pH	6.5-7.5 ^a	6.5-7.5 ^a
Protein (mg/dL)	7-33	0-32
Exogenous creatinine clearance (mL/min/kg) ^b	—	3.32 ± 2.16
Insulin clearance (mL/min/kg)	—	3.02 ± 1.78
Specific gravity	1.040-1.052	—

^aUrine pH can vary according to diet; normal urine pH in ferrets on a high-quality, meat-based diet is approximately 6.^bEndogenous creatinine clearance (mL/min/kg) = 2.5 ± 0.93.

TABLE 11-12 Proposed Schedule of Vaccinations and Routine Prophylactic Care for Ferrets.^{43,52}

Age	Recommendation
4-6 wk	CDV ^a vaccination if dam is unvaccinated
6-8 wk	CDV ^{a,b} vaccination if dam was vaccinated; physical examination; fecal examination
10-11 wk	CDV ^{a,c} vaccination; physical examination; fecal examination
12-14 wk	CDV ^{a,c} vaccination; rabies vaccination; ^d physical examination; fecal examination (optional)
4-8 mo	Spay/castrate; fecal examination; remove musk glands (optional); start heartworm and flea prevention (endemic areas)
1 yr	CDV ^{a,e} booster; rabies booster; ^d physical examination; dental prophylaxis and fecal examination if indicated; CBC; heartworm and flea prevention
2 yr	CDV ^{a,e,f} booster; rabies booster; ^d physical examination; dental prophylaxis and fecal examination if indicated; CBC; heartworm and flea prevention
3 yr and older (every 6 mo)	CDV ^{a,e,f} booster (annual); rabies booster ^d (annual); physical examination; dental prophylaxis and fecal examination if indicated; CBC; serum chemistries, including fasting blood glucose; heartworm and flea prevention

^aCDV, canine distemper vaccine; Purevax (Merial) is the only CDV approved for use in ferrets; if Purevax is unavailable, other vaccines which have been used include Novibac DPv (Merck) and Recombitek (Merial).

^bPurevax is recommended to be administered at 8 wk, then every 3 wk for 3 doses.

^cVaccinations are generally administered at 2-3 wk intervals until the ferret is 12-14 wk of age.

^dOnly a killed virus vaccine (Imrab 3, Rhône Merieux) should be used. Vaccines should be separated by several days to reduce vaccine reactions.

^eIn previously unvaccinated adults, an initial series of two vaccinations given 14-28 days apart should be given.

^fRabies and distemper titers are under evaluation and may alter the revaccination schedule of older animals.

TABLE 11-13 Chemotherapy Protocols for Lymphoma in Ferrets.^a

Protocol I ^{47,52}			
Week	Day	Agent	Dosage
1	1	Prednisone	1-2 mg/kg PO q12h and continued throughout therapy
	1	Vincristine	0.025 mg/kg IV
	3	Cyclophosphamide	10 mg/kg PO, SC
2	8	Vincristine	0.025 mg/kg IV
3	15	Vincristine	0.025 mg/kg IV
4	22	Vincristine	0.025 mg/kg IV
	24	Cyclophosphamide	10 mg/kg PO, SC
7	46	Cyclophosphamide	10 mg/kg PO, SC
9	63	Prednisone	Gradually decrease dose to 0 over the next 4 wk

TABLE 11-13 Chemotherapy Protocols for Lymphoma in Ferrets. (cont'd)

Protocol II ^{b,52}		
Week	Agent	Dosage
1	Vincristine	0.025 mg/kg IV
	L-asparaginase	400 U/kg IP
	Prednisone	1 mg/kg PO q24h and continued throughout therapy
2	Cyclophosphamide	10 mg/kg SC
3	Doxorubicin	1 mg/kg IV
4-6	As weeks 1-3 above, but discontinue L-asparaginase	—
8	Vincristine	0.025 mg/kg IV
10	Cyclophosphamide	10 mg/kg SC
12	Vincristine	0.025 mg/kg IV
14	Methotrexate	0.5 mg/kg IV

Protocol III ⁴⁷		
Week	Agent	Dosage
1	L-asparaginase	10,000 U/m ² SC
	Cytosin	250 mg/m ² PO, SC (in 50 mL/kg of NaCl SC)
	Prednisone	2 mg/kg PO daily for 7 days, then q48h throughout therapy
2	L-asparaginase	10,000 U/m ² SC
	Perform CBC ^c	
3	L-asparaginase	10,000 U/m ² SC
	Cytosar	300 mg/m ² SC × 2 days (dilute 100 mg with 1 mL H ₂ O)
4	Perform CBC ^c	
5	Cytosin	250 mg/m ² PO, SC (in 50 mL/kg of NaCl SC)
7	Methotrexate Perform CBC ^c	0.8 mg/kg IM
8	Perform CBC ^c	
9	Cytosin	250 mg/m ² PO, SC (in 50 mL/kg of NaCl SC)
11	Cytosar	300 mg/m ² SC × 2 days (dilute 100 mg with 1 mL H ₂ O)
	Leukeran	1 tablet/animal PO or ½ tablet/animal PO × 2 days
12	Perform CBC ^c	
13	Cytosin	250 mg/m ² PO, SC (in 50 mL/kg of NaCl SC)
15	Procarbazine	50 mg/m ² PO q24h × 14 days
16	Perform CBC ^c	
17	Perform CBC ^c	
18	Cytosin	250 mg/m ² PO, SC (in 50 mL/kg of NaCl SC)
20	Cytosar	300 mg/m ² SC × 2 days (dilute 100 mg with 1 mL H ₂ O)
	Leukeran	1 tablet/animal PO or ½ tablet/animal PO × 2 days
23	Cytosin	250 mg/m ² PO, SC (in 50 mL/kg of NaCl SC)
26	Procarbazine	50 mg/m ² PO q24h × 14 days
27	Perform CBC ^c and chemistry panel	If not in remission, continue weeks 20-26 for 3 cycles

Continued

TABLE 11-13 Chemotherapy Protocols for Lymphoma in Ferrets. (cont'd)

Protocol IV ^a		
Week	Agent	Dosage
3 days	L-asparaginase	400 U/kg SC (premedicate with diphenhydramine)
1	Vincristine	0.12 mg/kg IV
	Prednisone	1 mg/kg PO q24h continue throughout therapy
	Cyclophosphamide	10 mg/kg PO
2	Vincristine	0.12 mg/kg IV
3	Vincristine	0.12 mg/kg IV
4	Vincristine	0.12 mg/kg IV
	Cyclophosphamide	10 mg/kg PO
7, 10, 13, etc.	Vincristine	0.12 mg/kg IV
	Cyclophosphamide	10 mg/kg PO
		Continue therapy every 3 wk for 1 yr, then decrease to every 4-6 wk
Rescue treatment	Doxorubicin	1-2 mg/kg IV (over 20 min)

^aCBC should be checked weekly during therapy; after therapy is discontinued, continue to monitor CBC and do physical examination at 3-mo intervals.

^bProtocol is continued in sequence biweekly after week 14, making the therapy protocol less intensive.

^cIf CBC shows severe myelosuppression, reduce dosage by 25% for all subsequent treatments of the previously used myelosuppressive drug.

TABLE 11-14 Conversion of Body Weight (kg) to Body Surface Area (m²).⁴⁷

Body Weight (kg)	Body Surface Area (m ²)
0.5	0.063
0.6	0.071
0.7	0.079
0.8	0.086
0.9	0.093
1.0	0.100
1.1	0.107
1.2	0.113
1.3	0.119
1.4	0.125
1.5	0.131
1.6	0.137
1.7	0.142
1.8	0.148
1.9	0.153
2.0	0.159
2.1	0.164
2.2	0.169
2.3	0.174
2.4	0.179
2.5	0.184

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