FORMULARY FOR LABORATORY ANIMALS

THIRD EDITION

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PREFACE TO THE FIRST EDITION

SEVERAL YEARS AGO while we were at the University of Alabama at Birmingham, it became evident that a formulary for use in laboratory animal medicine would be extremely useful. While there are many excellent references available, few contain a comprehensive list of drugs. This formulary grew out of the need to make drug dosages available in a single publication that can be carried in the coat pocket by the laboratory animal veterinarian, and to also serve as a resource for the private practitioner and the scientific investigator. It is our hope that we have succeeded in our effort. Our intent is to constantly collect drug dosages and other useful information to include in subsequent editions. With this in mind we solicit our reader's input. All comments and suggestions to improve this book will be appreciated. Send your comments to Dr. C. T. Hawk, Division of Laboratory Animal Resources, Duke University Medical Center, Box 3180, Durham, NC 27710-3180, or you may send comments via electronic mail to Dr. Hawk: thawk@acpub.duke.edu.

The drug dosages listed in this formulary were derived from hundreds of journals and textbooks. We recommend that the references be consulted to determine the circumstances under which the stated dosages were used. We believe that professional judgment is necessary to select the proper dose.

PREFACE TO THE SECOND EDITION

SINCE THE PUBLICATION of the first edition, several new drugs have been approved for use in the United States that are a welcome addition to the laboratory animal care profession, especially analgesics, anesthetics, and anti-infectives. This new edition includes a new chapter describing how to estimate drug dosages between species using allometric scaling methodology. Dr. Tim Morris was kind enough to author the scaling chapter and we greatly appreciate his effort. We thank Dr. Stan Lindstedt for reviewing the chapter and making helpful suggestions. Finally, we thank many of our readers who made suggestions on how we could improve upon the first edition. As we stated in the first edition, it is our intent that this formulary continuously evolve and, for this reason, we continue to solicit our reader's input. Send comments to Dr. C. T. Hawk, Division of Laboratory Animal Resources, Duke University Medical Center, Box 3180, Durham, NC 27710-3180.

PREFACE TO THE THIRD EDITION

THE FIELDS OF laboratory animal science and medicine are international disciplines. The most notable aspect of this third edition is its international involvement. It is produced in association with not only the American but also the European Colleges of Laboratory Animal Medicine. We thank the following people for their contributions to this new edition: Dr. Margarete Arras (Switzerland), Dr. Nati Ezov (Israel), Dr. Dolores García-Olmo (Spain), Dr. Yona Grunfeld (Israel), Professor Adrian Smith (Norway), and Dr. Octavio Villanueva (Mexico). We have updated not only drugs and dosages, but also several tables and the chapter on dose estimation by Dr. Tim Morris. Finally, we thank our readers for sending us their comments, which help improve each new edition. As before, we continue to solicit your input. Send comments to Dr. C. T. Hawk, GlaxoSmithKline Pharmaceuticals, 709 Swedeland Rd. UW 2630, King of Prussia, PA 19406.

ABBREVIATIONS

Species

Am	Amphibians	Fi	Fish	N	Nonhuman primates
Bi	Birds	G	Gerbils	R	Rats
Bo	Bovine	Go	Goats	Rb	Rabbits
C	Cats	Gp	Guinea pigs	Rc	Raccoons
Ch	Chinchillas	H	Hamsters	Re	Reptiles
D	Dogs	M	Mice	Sh	Sheep
F	Ferrets	Mi	Mink	Sw	Swine

Dosages, Measures, and Methods

bid	twice daily
BW	body weight
cu ft	cubic feet
d	day
g	grams
G	gauge
gal	gallons
h	hours
IA	intaarterially
IC	intracoelomically
IM	intramuscularly
in.	inches
IP	intraperitoneally
IPP	intrapleuroperitoneally
IT	intratracheally
IU	international units
IV	intravenously
kcal	kilocalories
kg	kilograms
l	liters
lb	pounds
m	meters
mg	milligrams
min	minutes
ml	milliliters
mm	millimeters
ng	nanograms
O/D	outside diameter
PO	by mouth (per os)
ppm	parts per million
ppt	parts per trillion
prn	as needed
pt	pints
q	every
qid	four times daily
qod	every other day
s	seconds
SC	subcutaneously
sid	once daily
t	tons
Tbs	tablespoons (approximately 15 ml)
tid	three times daily
tsp	teaspoons (approximately 5 ml)
U	Units
%	g/100 ml

DOSE ESTIMATION AMONG SPECIES

Timothy H. Morris

VETERINARIANS TREATING common farm and companion species can use a wide range of drugs with regulatory approval. These drugs are specifically formulated and supplied with information on indications, dose, dose frequency, routes of administration, and safety. In many clinical situations, laboratory animal veterinarians do not have available approved drugs with this information. In addition, they may be asked to assist investigators in the dose selection of experimental drugs. This need for "off-label" drugs is recognized in legislation (European Commission, 1990; Federal Register, 1996). Even with clinical experience and information such as that supplied in this formulary, knowledge of the principles of dose extrapolation among species is needed both to assess published doses and to estimate doses when no information is available. A simple introduction to dose extrapolation is presented, with relevant citations to aid further understanding.

Although it may be possible to predict drug dosage on a milligram/kilogram basis in closely related species of similar body size, when there are large differences in size, this assumption has quite literally been described as an "elephantine fallacy" (Harwood, 1963). This comment was prompted by the dramatic and tragic consequences in a behavioral study (West and Pierce, 1962) that estimated the dose for an elephant of the psychotomimetic drug LSD, using the milligram/kilogram dose

from a study in cats. The error was to fail to appreciate that the much slower metabolic rate of the elephant would result in gross overdosage. The scientific and animal welfare concerns that such errors raise are clear, and by more accurately calculating clinical doses, laboratory animal veterinarians can also assist investigators in planning effective studies.

Understanding dose estimation across species first requires knowledge of how doses are calculated and how species differ.

In producing a commercially available drug, the mechanism of action is investigated; the pharmacokinetics are measured; the mechanisms of disposition, metabolism, and excretion (ADME) are understood; it is safety tested; and its efficacy is assessed in clinical trials (Martinez, 1998a,b,c,d,e). For a particular species, the calculated milligram/kilogram dose is influenced by all these factors and also by drug formulation.

Differences between species relative to drugs can be size independent or size dependent. Species differences in biotransformation do occur (Morris, 2000a), and are size independent. For example, dogs are deficient acetylators, pigs are deficient in sulphation capacity, only birds and reptiles form ornithurate conjugates, cats are deficient in glucuronidation, and N-acetylglucosamine is an uncommon conjugate in rabbits (Morris 2000a; Riviere et al., 1997; Van Miert, 1989).

To understand the effect of size, some background is required. Studies have shown that many anatomical and physiological factors are mathematical functions of body weight. The history of such studies has been described by Calabrese (1991). Adolph (1949), and Soviet scientists after him in an even wider manner, found that in species spanning a wide weight range, over a hundred diverse biological parameters are linearly related to body weight. The equation that describes this relationship is $\log P = \log a + b \log W$, where P is the parameter of interest, W is the body weight, a is the intercept fixing P when body weight equals 1 kg, and b is the exponents (the slope of the line) (illustrated

by Kirkwood, 1983). This equation can be simplified to $P = aW^b$ Morris, 1995). The exponent varies with the parameter, but Lindstedt and Calder (1981) provided a useful classification. The exponent for volumes of organs (heart, lung, etc.) is about 1, because relative to each other and the body as a whole they are indispensable; thus, they increase in proportion directly to increased size. The skeleton, by contrast, is required to be stronger in larger animals; thus, the exponent is greater than 1. However, returning to the issue of drug dosage, the principal sized-dependent species difference is metabolic rate, of which the exponent is 0.75. To understand this, one first accepts the generalization that as anatomical features and biochemical reactions are similar across the same order such as mammals (Davidson et al., 1986), there are consequences as organisms increase in size. The body surface area in relation to body weight falls as animals get larger, and thus the ability to lose heat also falls. Metabolic processes are optimized for a particular temperature. Evolutionary pressure, with increasing size, is to choose between controlling this inability to lose heat by a fundamental change in metabolic processes, or reducing metabolic rate. The selected adaptation, reducing metabolic rate, explains the observations made by Huxley (1932) and Adolph (1949), and has been confirmed by many studies since then (e.g., Bartels, 1982; Riviere et al., 1997), that in species spanning a wide weight range, physiological parameters such as oxygen consumption, ventilation rate, renal clearance, and nitrogen output only correlate linearly when plotted across body weight on a log:log scale with an exponent of about 0.75. Interestingly, the mechanisms behind biological scaling may be better described and understood from a perspective of the impact of fractal patterns in biology (Morris 2000b; Wolfram 1994), rather than using mathematical equations (Banavar et al., 2003). Hence, as body size increases, these physiological parameters are relatively reduced; for example, 1g of shrew tissue has a metabolic rate 1000 times greater than 1g of blue whale tissue (Kirkwood, 1983). Durations of processes such as cardiac cycle, life span, and drug half-life, when plotted against body weight, also correlate linearly when a log:log scale is used, with the exponent being

0.25. As body size increases durations increase; for example, compare the life span of the shrew and blue whale. A general model for the origin of scaling in biology has been proposed and suggests that these adaptations are based on fractal geometry (West et al., 1997; Willis, 1997).

A simple summary would be that since time parameters are related to weight to the power of about 0.25, and volumes are related linearly to the power of about 1.0, volume-rates (volume divided by time, e.g., cardiac output) must be related to weight to the power of about 0.75 (see Lindstedt and Calder, 1981, equation 7):

$$\frac{\text{Volume}}{\text{Time}} \propto \frac{M^{1.0}}{M^{0.25}} = M\,0.75$$

With an understanding of the effect of size on metabolic rate, dose estimation across species can then be considered. It is actually less accurate to compare the actual doses across species because doses are derived from pharmacokinetic modeling (Riviere, 1997). It is better to compare a drug's pharmacokinetic parameters, since these depend on physiological parameters that vary according to $P = aWb$ (Ritschel et al., 1992). This can be demonstrated using the straightforward explanation of pharmacokinetics from Riviere (1997), which explains the importance of knowing the clearance and half-life of a drug. Clearance is calculated as follows:

$$Cl = \mathrm{K} \times V_d$$

Where clearance (Cl) = slope of the semi-log drug concentration/time plot (K) ;TS volume of distribution (V_d). Thus, as the slope of the semi-log drug concentration/time plot (K) depends on the ADME of the particular drug, and as described previously these metabolic processes scale to $W^{0.75}$, and volumes scale to W^1, it follows that drug clearance scales to $W^{0.75}$. (A broader mathematical explanation is given by Weiss et al., 1977, equations 2–7.)

By contrast, for half-life ($T_{1/2}$):

$$T_{1/2} = \frac{\ln 2}{K} \text{ and as } K = \frac{Cl}{V_d} \text{ thus } T_{1/2} = \ln 2 \times \frac{V_d}{Cl}$$

(ln 2 is the natural logarithm of 2.) This explains why (as noted previously) the half-life scales to $W^{0.25}$, as it is related to the reciprocal of Cl (which scales to $W^{0.75}$). (A broader mathematical explanation is given by Boxenbaum, 1984, equation 17.)

Thus, a major source of error in extrapolation of dose across species on a milligram/kilogram basis is that it fails to take into account the effect of differences in metabolic rate on drug pharmacokinetics.

How can metabolic rate be taken into consideration? Dose can be solely extrapolated on a milligram/kilogram$^{0.75}$ basis (Kirkwood, 1983; Mahmood and Balian, 1996a; Morris, 1995). Reports that assess this approach have shown variable efficacy (Mahmood and Balian, 1996a; Mizen and Woodnutt, 1988; Riviere et al., 1997), supporting anecdotal concerns of clinicians who use this method regularly. What detailed methods have been used, and what are their accuracy and limitations?

Scaling describes methods used to increase or decrease the size of any operation. It has its roots in engineering, and an example is moving synthesis of a chemical from the laboratory to an industrial plant. When used in engineering, four generic types of scaling are recognized: (1) increasing the numbers of units working in parallel, (2) maintaining design and function while increasing size, (3) altering the flow scheme of the basic system, and (4) choosing another type of equipment (Boxenbaum, 1984). From a biological perspective, the kidneys can be used as an example of scaling. When body size increases, they increase in size (type 2); glomerular capillary length remains similar (type 1); blood supply per unit time decreases (type 3); and although methothrexate is excreted via the kidney in most species, the biliary system is used in the rat (type 4).

Allometry is the study of size and its consequences (Boxenbaum, 1984); thus, it concentrates on scaling factors related to the influence of size on metabolism, and excludes type 4 factors such as different metabolic routes. The basic allometric principle is expressed in the equation $P = aW^b$ (described previously), and has been used to extrapolate pharmacokinetic parameters across a wide range of species (Mordenti, 1986; Riviere et al., 1997; Travis and Bowers, 1991; Weiss et al., 1977). Variable applicability has already been noted above and in other studies (Van Miert 1989). Most recently when 44 compounds were assessed, only 11 showed significant allometric correlations (many of these were antibiotics) and 13 showed less-robust correlations (Riviere et al., 1997).

The principal reason for this lack of universal applicability is that allometry deals only with size; specifically, it does not address metabolic differences among species. As well as the qualitative differences among species described above in general, those drugs with hepatic metabolism, especially those with low extraction (Riviere et al., 1997) rather than renal clearance, those drugs in which protein binding varies among species, and those drugs that do not have first-order pharmacokinetics are less applicable to allometric scaling. The accuracy of allometric scaling for compounds with hepatic metabolism has been improved by incorporating in vitro data from liver microsomes and hepatocytes (Lave et al., 1995).

There have been a number of variations to this basic allometric approach. Although dosage based on body surface area can be inaccurate, the formulae can be modified to incorporate a scaled size factor (Van Miert, 1989). More complex allometric equations that incorporate brain weight or maximum life span (Mahmood and Balian, 1996a, b) or add secondary analysis (Mahmood et al., 2003) have shown promise in increasing the range of drugs in which clearance can be better predicted across species. Another approach is to normalize the time in pharmacokinetic calculations to equivalent pharmacokinetic time

or "biological time" as compared to "chronological time" (Lindstedt and Calder, 1981; Mordenti, 1986).

A fundamentally different approach to pharmacokinetic scaling, and thus dose prediction, across species is physiological modeling (Mordenti and Chappel, 1989). A flow scheme of body compartments and their associated processes (e.g., protein binding, enzyme kinetics, etc.) is drawn up for each drug on a particular species and described mathematically. Then physiological data from another species are substituted to obtain the drug information for that species. These methods can be quite accurate, can account for metabolic differences, and are well within the capabilities of modern computers. The two main limitations are the need for much physiological data and the fact that, even with a powerful computer and user-friendly interface, a detailed understanding of pharmacokinetics is required.

What are the consequences of all this information for the laboratory animal veterinarian?

1. When determining dose extrapolations among species of widely varying body weights, metabolic rate should be taken into account; hence, calculations based on milligram/kilogram dose may be less accurate than those based on milligram/kilogram$^{0.75}$.
2. If a drug is formulated for a large species, the dose volume will be relatively much larger when this formulation is used in a smaller species.
3. Dose frequency will increase in smaller species, even becoming impractical in very small species.
4. Simple allometric scaling does not account for metabolic differences, which can override the effects of size on metabolic rate. In vitro hepatic metabolism data may aid analysis.

In practical terms, if the literature suggests that metabolic differences will not confound your estimation, it is prudent to calculate drug

dosages with a consideration of metabolic rate. This method has been illustrated (Morris, 1995; Timm et al., 1994) and is used in a commercially available electronic formulary (Vetbase, Hajeka Informatie & Advies, Graafschap 7, 3524 TL Utrecht, The Netherlands, http://vetinfo.demon.nl). It can be calculated from the worksheet in Figure 1.1 (worked example is shown in Fig. 1.2), or the calculations can be transferred to a computer spreadsheet. In some cases, it may be best to alter the dose; in other cases, it may be best to alter the dose frequency; and, in still other cases, if the dose frequency or dose volume is too high, it may be best to compromise, by estimation, between both changes.

Figure 1.1. Allometric dose and interval scaling worksheet

1) Convert reference drug dose into **total dose** and **interval** format (use a calculator for x^y/x^{-y}):
Control animal species name$_{cont}$ _____ Body weight$_{cont}$ _____ kg
Dosage rate$_{cont}$ _____ mg/kg (Route: PO SC IM IV)
Frequency _____ times/day

Treatment dose$_{cont}$ (W_{kg} × dosage rate) = _____ mg
Dosing interval$_{cont}$ (24h/frequency) = _____ h

2) Now calculate parameters that express metabolic size (MEC) and metabolic rate (SMEC) in a format that can be compared between animals of very different body sizes using allometric scaling to compare dose quantity.

Minimum energy cost$_{cont}$ (MEC$_{cont}$) = $k(W_{kg}^{0.75})$ = _____
or dose frequency.

Specific minimum energy cost$_{cont}$ (SMEC$_{cont}$) = $k(W_{kg}^{-0.25})$ = _____

W = body weight, k = factors: passerines 129, nonpasserines 78, placentals 70, marsupials 49, reptiles (at 37°C ambient) 10 (It is preferable to only scale *within* groups.)

3) Then calculate the dose and interval in terms that can be used for conversion between species, using the data from (1) and (2) above:

MEC DOSE (Treatment dose$_{cont}$/MEC$_{cont}$) = _____

SMEC INTERVAL (SMEC$_{cont}$ × Dosing interval$_{cont}$) = _____

4) Now you can use this *MEC dose* and *SMEC interval* for this drug to derive an allometrically scaled dose for subject animal species, with a very different body weight.

Species of subject animal$_{(subj)}$ _____ Body weight$_{subj}$ = _____ kg

Minimum energy cost$_{subj}$(MEC$_{subj}$) = $k(W_{kg}^{0.75})$ = _____

Specific minimum energy cost$_{subj}$ (SMEC$_{subj}$) = $k(W_{kg}^{-0.25})$ = _____

5) Treatment dose$_{subj}$ = (*MEC DOSE* × MEC$_{subj}$) = _____ mg

mg/kg dose = treatment dose/subject weight = _____ mg/kg

Treatment interval$_{subj}$ = (*SMEC INTERVAL*/SMEC$_{subj}$) = _____ h

Frequency (24 h/interval) = _____

Source: Developed from a worksheet, produced by Charles Sedgwick, and modified by Karen Timm, Oregon State University.

Figure 1.2. Example of use of allometric dose and interval scaling worksheet for dose or dose frequency for oxytetracycline injection administration to a rat, using data from cattle dosage

1) Convert reference drug dose into **total dose** and **interval** format
   Control animal species name($_{cont}$):Cow Body weight$_{cont}$: 500 kg
   Dosage rate$_{cont}$: 10 mg/kg (Route: IM) Frequency: 1 time/day

   Treatment dose$_{cont}$ (W_{kg} × dosage rate) = 5000 mg
   Dosing interval$_{cont}$ (24 h/frequency) = 24 h

2) Minimum energy cost$_{cont}$ (MEC$_{cont}$) = $k(W_{kg}^{0.75})$ = 7402

   Specific minimum energy cost$_{cont}$(SMEC$_{cont}$) = $k(W_{kg}^{-0.25})$ = 14.8

   w = body weight, k = factors: placentals 70

3) Dose and interval in terms for conversion between species

   MEC DOSE (Treatment dose$_{cont}$/MEC$_{cont}$) = 0.675
   SMEC INTERVAL (SMEC$_{cont}$ × dosing interval$_{cont}$) = 355

4) Subject animal species
   Species of subject animal$_{subj}$: rat Body weight$_{subj}$: 0.3 kg

   Minimum energy cost$_{subj}$(MEC$_{subj}$) = $k(W_{kg}^{0.75})$ = 28.4

   Specific minimum energy cost$_{subj}$ (SMEC$_{subj}$) = $k(W_{kg}^{-0.25})$ = 94

5) Treatment dose$_{subj}$ = (*MEC DOSE* × MEC$_{subj}$) = 19.17 mg

   mg/kg dose = treatment dose/subject weight = 63.9 mg/kg

   Treatment interval$_{subj}$ = (*SMEC INTERVAL*/SMEC$_{subj}$) = 3.7 h

   Frequency (24 h/interval) = 6

Note: Either the relative dose needs to be increased from 10 mg/kg in the cow to 63.9 mg/kg in the rat, or the cow dose needs to be given 6 times a day to the rat. Note also that the dose volume, using a 100 mg/ml presentation, is 0.19 ml/rat (0.63 ml/kg), relatively much higher than for the cow: 50 ml/cow, 0.1 ml/kg.

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ANALGESICS AND SEDATIVES

Acepromazine

Bo 0.02–0.05 mg/kg BW IV (Dunlop and Hoyt, 1997)
0.05–0.2 mg/kg BW IM, SC (Dunlop and Hoyt, 1997)

C 0.1–0.2 mg/kg BW IM, SC (Kinsell, 1986)
0.5–1.0 mg/lb BW PO prn (Kinsell, 1986)

Ch 0.5 mg/kg BW IM (Johnson-Delaney, 1996)

D 0.1–0.5 mg/kg BW IV, IM, SC (Kinsell, 1986)
0.25–1.0 mg/lb BW PO prn (Kinsell, 1986)
0.15–0.35 mg/kg BW IM, IV (Arnemo et al., 2002)

F 0.2 mg/kg BW IM (Flecknell, 1987)
0.2–0.5 mg/kg BW IM, SC (Morrisey et al., 1996)
0.1–0.3 mg/kg BW IM, IV (Cantwell, 2001)

G May precipitate seizures (Harkness and Wagner, 1983)

Go 0.05–0.5 mg/kg BW IM (Swindle and Adams, 1988)
0.55 mg/kg BW IV (Swindle and Adams, 1988)
0.05–0.1 mg/kg BW IM (NCSU, 1987)
0.02–0.05 mg/kg BW IV (Dunlop and Hoyt, 1997)
0.05–0.2 mg/kg BW IM SC (Dunlop and Hoyt, 1997)

M 1–2 mg/kg BW IM (Harkness and Wagner, 1983)
2–5 mg/kg BW IP (Flecknell, 1987)

N 0.5–1.0 mg/kg BW IM, SC (Melby and Altman, 1976)
0.2 mg/kg BW IM (Flecknell, 1987)

R 1–2 mg/kg BW IM (Harkness and Wagner, 1983)
Rb 1–2 mg/kg BW IM (Harkness and Wagner, 1983)
5 mg/kg BW IM (Flecknell, 1987)
2 mg/kg BW IM (Bauck, 1989)
Rc 2–2.5 mg/kg BW (Evans and Evans, 1986)
Re 0.125–0.5 mg/kg BW IM (Frye, 1981)
Sh 0.05–0.5 mg/kg BW IM (Swindle and Adams, 1988)
0.55 mg/kg BW IV (Swindle and Adams, 1988)
0.02–0.05 mg/kg BW IV (Dunlop and Hoyt, 1997)
0.05–0.2 mg/kg BW IM, SC (Dunlop and Hoyt, 1997)
Sw 0.11–0.22 mg/kg BW SC, IM, IV (Swindle and Adams, 1988)
0.05–0.1 mg/kg BW IM (NCSU, 1987)
0.03–0.22 mg/kg BW IM not to exceed 15 mg total (NCSU, 1987)
0.5–1 mg/kg BW IM, IV (Arnemo et al., 2002)
1–1.5 mg/kg BW PO (Arnemo et al., 2002)

Acepromazine and buprenorphine (respectively)

D 0.07 mg/kg BW IM and 0.009 mg/kg BW IM (Flecknell, 1996)

Acetaminophen

C Toxic
D 15 mg/kg BW PO q8h (Jenkins, 1987)
M 300 mg/kg BW PO (Jenkins, 1987)
N 5–10 mg/kg BW PO (Johnson et al., 1981)
R 110–300 mg/kg BW PO (Jenkins, 1987)
100–300 mg/kg BW PO q4h (Flecknell, 1991)
6 mg/ml in drinking water (Bauer et al., 2003)

Acetaminophen/codeine

Rb 1 ml elixer/100 ml drinking water (Wixson, 1994)

Alphaxalone/alphadolone

C 9 mg/kg BW IM (Flecknell, 1987)
Gp 40 mg/kg BW IM (Flecknell, 1987)
N 12–18 mg/kg BW IM (Flecknell, 1987)
R 9–12 mg/kg BW IP (Flecknell, 1987)
Rb 9–12 mg/kg BW IM (Flecknell, 1987)
Sw 6 mg/kg BW IM (Flecknell, 1987)

Aminopyrine

D 265 mg total PO (Borchard et al., 1990)
Gp 130 mg/kg BW PO (Jenkins, 1987)
H 130 mg/kg BW PO (Jenkins, 1987)
M 150 mg/kg BW IP (Borchard et al., 1990)
300 mg/kg BW PO (Borchard et al., 1990)
R 200 mg/kg BW SC (Borchard et al., 1990)
650 mg total PO (Borchard et al., 1990)
Rb 50 mg/kg BW PO (Jenkins, 1987)

Antipyrine

C 100 mg/kg BW IM, IP, SC (Borchard et al., 1990)
500 mg/kg BW PO (Borchard et al., 1990)
D 1000 mg total PO (Borchard et al., 1990)
M 197 mg/kg BW IP (Borchard et al., 1990)
R 600 mg/kg BW SC (Borchard et al., 1990)
220 mg/kg BW SC (Borchard et al., 1990)
Rb 100 mg/kg BW PO (Jenkins, 1987)
100 mg/kg BW IM, IP, SC (Borchard et al., 1990)
500 mg/kg BW PO (Borchard et al., 1990)

Aspirin

Bi 5 mg/kg BW PO tid (Ritchie and Harrison, 1997)

C 10 mg/kg BW PO q48h (Jenkins, 1987)
1 children's aspirin (1.25 grains) PO q36h (Kinsell, 1986)

Ch 100–200 mg/kg BW PO q6–8h (Johnson-Delaney, 1996)

D 10–20 mg/kg BW PO q12h (Jenkins, 1987)

Note: Use buffered tabs: analgesic dosage 10 mg/kg BW PO q12h (Kinsell, 1986)
Antirheumatic maximum dosage 40 mg/kg BW q18h (Kinsell, 1986)

F 10–20 mg/kg BW PO sid (Johnson-Delaney, 1996)

Go 10–20 mg/kg BW PO (Swindle and Adams, 1988)

Gp 270 mg/kg BW IP sid (CCAC, 1984)
86 mg/kg BW PO, try q4h (Flecknell, 1987)

H 240 mg/kg BW IP sid (CCAC, 1984)

M 120–300 mg/kg BW PO (Jenkins, 1987)
120 mg/kg BW PO q4h (Flecknell, 1987)
400 mg/kg BW SC sid (CCAC, 1984)
25 mg/kg BW IP (Borchard et al., 1990)

N 100 mg/kg BW PO sid (CCAC, 1984)
20 mg/kg BW PO q6–8h (Flecknell, 1987)

R 100 mg/kg BW PO q4h (Flecknell, 1987; Jenkins, 1987)
400 mg/kg BW SC, PO (Harkness and Wagner, 1983)

Rb 400 mg/kg BW SC, PO sid (Harkness and Wagner, 1983)
100 mg/kg BW PO, try q4h (Flecknell, 1991)
20 mg/kg BW PO sid (equivalent to 600-mg dose in humans) (Marangos et al., 1994)

Sh 10–20 mg/kg BW PO (Swindle and Adams, 1988)

Sw 10–20 mg/kg BW PO q4h (Swindle and Adams, 1988)

Azaperone

Sw 0.5–2.2 mg/kg BW IM (Riebold et al., 1995)
1–8 mg/kg BW IM (Arnemo et al., 2002)

Bupivacaine

D 1 ml/4.5 kg BW of 0.25% or 0.5% solution given epidurally (Carroll, 1996)

Buprenorphine

Bi 0.01–0.05 mg/kg BW IM (Bennett, 1997)

Bo 0.01 mg/kg BW IM, IV (Ranheim et al., 2002)

C 0.005–0.01 mg/kg BW SC, IM q12h (Flecknell, 1985; Jenkins, 1987)
0.005–0.01 mg/kg BW IV, SC q8–12h (Flecknell, 1996)

D 0.01–0.02 mg/kg BW SC q12h (Flecknell, 1985; Jenkins, 1987)
0.003–0.005 mg/kg of preservative-free solution (in 0.9% saline) given epidurally; give 0.3 ml/kg BW not to exceed 6 ml (Carroll, 1996)
0.005–0.02 mg/kg BW IM, IV, SC q6–12h (Flecknell, 1996)

F 0.01–0.03 mg/kg BW IM, IV, SC q8–12h (Flecknell, 1996)
0.01–0.5 mg/kg BW IV, SC q8–12h (Johnson-Delaney, 1996)

G 0.1–0.2 mg/kg BW SC q8h (Flecknell, 1987)

Go 0.005 mg/kg BW IM bid (Ranheim et al., 2002)

Gp 0.05 mg/kg BW SC q8–12h (Flecknell, 1985; Jenkins, 1987)
0.05 mg/kg BW SC q6–12h (Flecknell, 1991)

H 0.05 mg/kg BW SC q8–12h (Jenkins, 1987)
0.5 mg/kg BW SC q8h (Flecknell, 1987)

M 2 mg/kg BW SC q12h (Flecknell, 1985; Jenkins, 1987)
2 mg/kg BW SC q3–5h (Gaddes et al., 2000)
2.5 mg/kg BW IP q6–8h (Jenkins, 1987)
0.05–0.1 mg/kg BW SC q6–12h (Flecknell, 1991)
0.05–0.1 mg/kg BW SC bid (Flecknell, 1996)

N 0.01 mg/kg BW IM, IV q12h (Flecknell, 1985; Jenkins, 1987)
0.005–0.01 mg/kg BW IM, IV q6–12h (Flecknell, 1996)

0.01–0.02 mg/kg BW IM, IV bid, tid (Horne, 2001)

R 0.006 mg/ml drinking water (Deeb et al., 1989)
0.01–0.05 mg/kg BW IV, SC q8–12h (Flecknell, 1996)
0.1–0.25 mg/kg BW PO q8–12h (Flecknell, 1996)
5–10 mg/kg BW PO by gavage [Yes, the dose is this high.—Eds.] (Martin et al., 2001)
0.5 mg/kg BW SC tid, qid (Gades et al., 2000)

Rb 0.02–0.05 mg/kg BW SC, IM, IV q8–12h (Flecknell, 1985; Jenkins, 1987)
0.02–0.1 mg/kg BW IV, SC q12h (Carpenter et al., 1995)
0.01–0.05 mg/kg BW SC, IV q6–12h (Flecknell, 1991)

Sh 0.005–0.01 mg/kg BW IM q4–6h (Flecknell, 1989)

Sw 0.005–0.01 mg/kg BW IM, IV (Swindle and Adams, 1988)
0.005–0.02 mg/kg BW IM, IV q6–12h (Flecknell, 1996)
Up to 0.1 mg/kg BW can be used for major surgical procedures (Farris, 1990)

Butorphanol

Bi 1–4 mg/kg BW IV, PO prn not to exceed q4h (Ritchie and Harrison, 1997)
African grey: 1 mg/kg BW IM (Paul-Murphy et al., 1999)

Bo 0.5 mg/kg BW SC (Dunlop and Hoyt, 1997)
0.5 mg/kg BW IV (Ranheim et al., 2002)

C 0.4 mg/kg BW SC q6h (Jenkins, 1987)
0.22 mg/kg BW IM (Short, 1997)
0.4–1.5 mg/kg BW PO q4–8h (Hansen, 1996)
0.4 mg/kg BW SC q3–4h (Flecknell, 1996)
0.2–0.6 mg/kg BW IM, IV (Jaffe et al., 2003)
0.2–0.4 mg/kg BW SC (Jaffe et al., 2003)

D 0.2–0.4 mg/kg BW SC, IM, IV q2–5h (Jenkins, 1987)
0.2–0.4 mg/kg BW IM, SC q3–4h (Flecknell, 1996)
1–3 mg/kg BW PO (Raffe, 1995)
0.1–0.6 mg/kg BW IM, IV (Jaffe et al., 2003)

0.1 mg.kg BW IV, followed by 0.1 mg/kg BW IM, SC (Jaffe et al., 2003)

F 0.4 mg/kg BW IM q4–6h (Flecknell, 1996)
0.05–0.1 mg/kg BW SC q8–12h (Johnson-Delaney, 1996)

Go 0.5 mg/kg BW SC (Dunlop and Hoyt, 1997)
0.5 mg/kg BW IM, SC (Ranheim et al., 2002)

M 0.05–5.0 mg/kg BW SC q4h (Jenkins, 1987)
5.4 mg/kg BW SC (Wright et al., 1985)
1–5 mg/kg BW SC q4h (Flecknell, 1991)
5 mg/kg BW SC q1–2h (Gades et al., 2000)

N 0.01 mg/kg BW IV q3–4h(?) (Flecknell, 1996)
0.1–0.2 mg/kg BW IM, IV q3–4h (Horne, 2001)

R 0.05–2.0 mg/kg BW SC q4h (Jenkins, 1987)
2 mg/kg BW SC q4h (Flecknell, 1991)
2 mg/kg BW SC q1–2h (Gades et al., 2000)

Rb 0.1–0.5 mg/kg BW IV q4h (Flecknell, 1989)
0.1–0.5 mg/kg BW IM, IV, SC q4h (Carpenter et al., 1995)

Sh 0.5 mg/kg BW SC q2–3h (Flecknell, 1989)

Sw 0.1–0.3 mg/kg BW IM (Swindle and Adams, 1988)

Butorphanol and acepromazine (respectively)

C 0.1–0.4 mg/kg BW IM, IV and 0.02–0.05 mg/kg BW IM, IV (Raffe, 1995)

D 0.2–0.4 mg/kg BW IM, IV and 0.02–0.05 mg/kg BW IM, IV (Raffe, 1995)

Rb 1 mg/kg BW IM and 1 mg/kg BW IM (Flecknell, 1996)

Butorphanol and diazepam (respectively)

D 0.05–0.25 mg/lb BW IM and 0.1–0.2 mg/lb (maximum 10 mg) BW IM for induction (Ko et al., 1994)

Carprofen

Bi 5–10 mg/kg BW IM, IV, PO (Joint Working Group, 2001a)
Bo 1.4 mg/kg BW IV, SC once (Ranheim et al., 2002)
C 4 mg/kg BW IV, SC (Flecknell, 1996)
D 2.2 mg/kg BW PO bid (Michels and Carr, 1997)
4 mg/kg BW IV, SC sid (Flecknell, 1996)
1–2 mg/kg BW PO bid for 7 days (Flecknell, 1996)
R 5 mg/kg BW SC (Flecknell, 1996)
Rb 1.5 mg/kg BW PO bid (Flecknell, 1996)
Sw 2–4 mg/kg BW IV, SC sid (Flecknell, 1996)

Chlorpromazine

C 1–2 mg/kg BW IV, IM q12h (Kinsell, 1986)
2–3 mg/kg BW PO (Arnemo et al., 2002)
D 0.5 mg/kg BW IM tid (Hoskins, 1997)
1.1–6.6 mg/kg BW IM q6–24h (Kinsell, 1986)
0.55–4.4 mg/kg BW IV q6–12h (Kinsell, 1986)
2–3 mg/kg BW PO (Arnemo et al., 2002)
G 0.5 mg/kg BW IM (CCAC, 1984)
Go 2.2 mg/kg BW PO (Swindle and Adams, 1988)
1.0–4.4 mg/kg BW IM (Swindle and Adams, 1988)
0.22–1.10 mg/kg BW IV (Swindle and Adams, 1988)
0.55–4.4 mg/kg BW IV (Short, 1986)
2.2–6.6 mg/kg BW IM (Short, 1986)
Gp 0.5 mg/kg BW IM (CCAC, 1984)
0.2 mg/kg BW SC (Lumb and Jones, 1984)
H 0.5 mg/kg BW IM (Melby and Altman, 1976)
M 5–10 mg/kg BW SC (Taber and Irwin, 1969)
25–50 mg/kg BW IM (Dolowy et al., 1960)
3–5 mg/kg BW IV (Harkness and Wagner, 1983)
3–35 mg/kg BW IM (Harkness and Wagner, 1983)
N 1–3 mg/kg BW IM (Melby and Altman, 1976)
2–5 mg/kg BW PO (CCAC, 1984)

3–6 mg/kg BW IM (USAF, 1976)

R 3–5 mg/kg BW IV or 3–35 mg/kg BW IM (Harkness and Wagner, 1983)
1–2 mg/kg BW IM (Clifford, 1984)

Rb 1–10 mg/kg BW IM (Carpenter et al., 1995)
25 mg/kg BW IM (Produces myositis; CCAC, 1984)

Sh 2.2 mg/kg BW PO (Swindle and Adams, 1988)
1–4.4 mg/kg BW IM (Swindle and Adams, 1988)
0.22–1.10 mg/kg BW IV (Swindle and Adams, 1988)
0.55–4.4 mg/kg BW IV (Short, 1986)
2.2–6.6 mg/kg BW IM (Short, 1986)

Sw 0.5–4.0 mg/kg BW IM (Swindle and Adams, 1988)
0.55–3.3 mg/kg BW IV (Swindle and Adams, 1988)
1.1 mg/kg BW IM (Boothe, 1988)

Clonidine

Bo 0.015 mg/kg IV (Dunlop and Hoyt, 1997)

Go 0.015 mg/kg IV (Dunlop and Hoyt, 1997)

Sh 0.015 mg/kg IV (Dunlop and Hoyt, 1997)

Codeine

D 2.2 mg/kg BW SC (Jenkins, 1987)

M 20 mg/kg BW SC (Jenkins, 1987)
60–90 mg/kg BW PO (Jenkins, 1987)
20 mg/kg BW SC q4h (Flecknell, 1987)

R 25–60 mg/kg BW SC q4h (Jenkins, 1987)
60–90 mg/kg BW SC q4h (Flecknell, 1991)

Codeine and acetaminophen (suspension)

D 1–2 mg/kg BW PO (based on codeine) q4–6h (Watson and Lucroy, 2002)

Detomidine

Bo 0.03 mg/kg BW IV (Dunlop and Hoyt, 1997)
0.01–0.04 mg/kg BW IM, IV (Arnemo et al., 2002)
Go 0.03 mg/kg BW IV (Dunlop and Hoyt, 1997)
0.01–0.04 mg/kg BW IM, IV (Arnemo et al., 2002)
Sh 0.03 mg/kg BW IV (Dunlop and Hoyt, 1997)
0.01–0.04 mg/kg BW IM, IV (Arnemo et al., 2002)

Diazepam

Bi 0.5–1 mg/kg BW IM, IV q8–12h (Ritchie and Harrison, 1997)
1–1.5 mg/kg IV, IM (McDonald, 1989)
2.5–4 mg/kg BW PO prn (Ritchie and Harrison, 1997)
2–5 mg/kg BW IM (Cooper, 1984)
Bo 0.2–0.4 mg/kg BW IV (Dunlop and Hoyt, 1997)
C 1 mg/kg BW IV to a maximum of 5 mg (Kinsell, 1986)
1 mg/kg BW IM, IV, PO (Arnemo et al., 2002)
Ch 2.5 mg/kg BW IP (Green, 1982)
D 1 mg/kg BW IV to a maximum of 20 mg (Kinsell, 1986)
1 mg/kg BW IM, IV, PO (Arnemo et al., 2002)
F 2 mg/kg BW IM (CCAC, 1984; Flecknell, 1987)
0.5–3 mg/kg BW IM, SC (Cantwell, 2001)
G 5 mg/kg BW IP (CCAC, 1984; Flecknell, 1987)
Go 0.5–1.5 mg/kg BW IM, IV (Swindle and Adams, 1988)
15 mg/kg BW PO mixed in feed (NCSU, 1987)
0.2–0.4 mg/kg BW IV (Dunlop and Hoyt, 1997)
Gp 5 mg/kg BW IP (Flecknell, 1987)
2.5 mg/kg BW IP, IM (Green, 1982)
H 5 mg/kg BW IP (CCAC, 1984; Flecknell, 1987)
M 5 mg/kg BW IP (Flecknell, 1987)
N 1 mg/kg BW IM (Flecknell, 1987)
1 mg/kg BW IV (Green, 1982)
R 2 mg/kg BW IV (Flecknell, 1987)

4 mg/kg BW IM, IP (Flecknell, 1987)
2.5 mg/kg BW IM, IP (Weihe, 1987)

Rb 2 mg/kg BW IV (Flecknell, 1987)
4 mg/kg BW IM, IP (Flecknell, 1987)
5–10 mg/kg BW IM (Harkness and Wagner, 1983)
5–10 mg/kg BW IM, IP (Green, 1982)

Rc 66–110 mg/kg BW PO (Balser, 1965)

Sh 0.5–1.5 mg/kg BW IM, IV (Swindle and Adams, 1988)
15 mg/kg BW mixed in feed (NCSU, 1987)
0.2–0.4 mg/kg BW IV (Dunlop and Hoyt, 1997)

Sw 0.5–10 mg/kg BW IM (Swindle and Adams, 1988)
0.5–1.5 mg/kg BW IV (Swindle and Adams, 1988)

Diazepam and xylazine (respectively)

Rb 1 mg/kg BW IV and 3 mg/kg BW IV as a bolus for induction (Hatch and Wilson, 1988)

Diazepam, xylazine, and atropine (respectively)

D 1 mg/kg BW IV, 1.1 mg/kg BW IV, and 0.05 mg/kg BW IV as a bolus for induction (Hatch and Wilson, 1988)

Diclofenac

Gp 2.1 mg/kg BW PO (Albengres et al., 1988)

M 8 mg/kg BW PO (Liles and Flecknell, 1992)

R 10 mg/kg BW PO (Liles and Flecknell, 1992)

Dipyrone

Bo 40 mg/kg BW IV slowly (Ranheim et al., 2002)

D 20–50 mg/kg BW IV slowly (Ranheim et al., 2002)

Go 20–50 mg/kg BW IV slowly (Ranheim et al., 2002)

Sh 20–50 mg/kg BW IV slowly (Ranheim et al., 2002)
Sw 20–50 mg/kg BW IV slowly (Ranheim et al., 2002)

Fenoprofen

D 0.5–1 mg/kg BW PO q24h (Jenkins, 1987)

Fentanyl

C 25 µg patch for cats >7 lb (Hansen, 1996)
D 0.04–0.08 mg/kg BW SC, IM, IV q1–2h (Jenkins, 1987)
0.001–0.003 mg/lb BW IM or slow IV (Kinsell, 1986)
25 µg patch for dogs <15 lb; 50 µg patch for dogs 15–40 lb; 75 µg patch for dogs 40–60 lb, and 100 µg patch for dogs >60 lb (Hansen, 1996)
N 0.05–0.10 mg/kg BW SC, IM (Jenkins, 1987)
0.005–0.01 mg/kg BW IV (Horne, 2001)
Rb 25 µg patch for up to 72h (Foley et al., 2001)
Sw 0.02–0.05 mg/kg BW IM, IV (Swindle and Adams, 1988)
50 µg/h patch per 25–30 kg BW pig for up to 72h (Harvey-Clark et al., 2000)

Fentanyl/droperidol (Innovar-Vet) (a preanesthetic dose of atropine may be necessary)

D 1 ml/7–10 kg BW IM (Kinsell, 1986)
1 ml/12–30 kg BW IV (Kinsell, 1986)
F 0.15 ml/kg BW IM (Flecknell, 1987)
Gp 0.5–1.0 ml/kg BW IM (CCAC, 1984)
0.08–0.66 ml/kg BW IM (Hughes, 1981)
0.22 ml/kg BW IM (Sander, 1992)
H 0.01 ml/kg BW IP (CCAC, 1984) (central nervous system stimulation may occur) (Hughes, 1981)
M 0.005 ml/kg BW IM (Jenkins, 1987)

0.02–0.03 ml/g BW IM (Hughes, 1981)
0.5 ml/kg BW IM (Flecknell, 1996)

N 0.1–0.2 ml/kg BW IM (CCAC, 1984)
0.3 ml/kg BW IM (Flecknell, 1987)

R 0.13 ml/kg BW IM (Jenkins, 1987)
0.5 ml/kg BW IM (Flecknell, 1996)

Rb 0.17 ml/kg BW IM (CCAC, 1984)
0.15–0.17 ml/kg BW IM (Lewis and Jennings, 1972)

Sw 0.07 ml/kg BW IM (Swindle and Adams, 1988)

Fentanyl/fluanisone

F 0.5 ml/kg BW IM (Flecknell, 1987)

G 1 ml/kg BW IM, IP (Jenkins, 1987)

Gp 1 ml/kg BW IM (Flecknell, 1987; Jenkins, 1987)
0.65–1 ml/kg BW SC (Arnemo et al., 2002)

H 1 ml/kg BW IM, IP (Jenkins, 1987)
0.5 ml/kg BW IM, SC (Arnemo et al., 2002)

M 0.01 ml/30 g BW IP (Jenkins, 1987)
0.1–0.3 ml/kg BW IP (Flecknell, 1996)
0.01 ml/10g BW SC of a 1:10 dilution with sterile water (Arnemo et al., 2002)

N 0.3 ml/kg BW IM (Flecknell, 1996)

R 0.4 ml/kg BW IM, IP (Jenkins, 1987)
0.3–0.6 ml/kg BW IP (Flecknell, 1996)
0.3–0.5 ml/kg BW IP, SC (Arnemo et al., 2002)

Rb 0.5 ml/kg BW IM (Jenkins, 1987)

Flunixin

Bi 1–10 mg/kg IM; can be repeated (Harrison and Harrison, 1986)
1–10 mg/kg BW IM, IV (Ritchie and Harrison, 1997)

Bo 2.2 mg/kg BW IM, IV sid for up to 3 days (Ranheim et al., 2002)
C 1 mg/kg BW PO, IV q24h (Haskins, 1987)
0.3 mg/kg BW IM (Kinsell, 1986)
D 0.5–2.2 mg/kg BW IM, IV; no repeat (Jenkins, 1987)
1 mg/kg BW PO, IV q24h (Haskins, 1987)
1 mg/kg BW IV sid for 3 days maximum (Boulay et al., 1995)
F 0.03 mg/kg BW IM tid prn (Johnson-Delaney, 1996)
0.3 mg/kg BW PO, SC sid (Johnson-Delaney, 1996)
Go 1 mg/kg BW IM, IV once (Ranheim et al., 2002)
M 2.5 mg/kg BW SC, IM, try q12h (Flecknell, 1991)
N 0.5 mg/kg BW IM sid (Feeser and White, 1992)
1 mg/kg BW IV bid (Fraser, 1991)
Prosimians: 0.5 mg/kg BW IM sid (Feeser and White, 1992)
10 mg/kg BW IM (Borchard et al., 1990)
R 1.1 mg/kg BW SC, IM q12h (Flecknell, 1991)
2.5 mg/kg BW SC, IM (Liles and Flecknell, 1992)
Rb 1.1 mg/kg BW SC, IM, try q12h (Liles and Flecknell, 1992)
Sh 1 mg/kg BW IM, IV sid for up to 3 days (Ranheim et al., 2002)
Sw 2–2.2 mg/kg BW IV, SC up to bid (Laval, 1992)

Haloperidol

Bi 0.2 mg/kg BW (less than 1 kg) PO bid (Rupley, 1997)
0.15 mg/kg BW (greater than 1 kg) PO sid, bid (Rupley, 1997)
1–2 mg/kg BW IM q2-3wk (Rupley, 1997)
Rb 0.2–0.4 mg/kg BW IM bid (Iglauer et al., 1995)

Hypnorm—*See* Fentanyl/fluanisone

Ibuprofen

C 5 mg/kg BW PO q24h (Haskins, 1987)
D 10 mg/kg BW PO q24–48h (Jenkins, 1987)
5 mg/kg BW PO q24h (Haskins, 1987)
Gp 10 mg/kg BW IM, try q4h (Flecknell, 1991)
M 7.5 mg/kg BW PO (Jenkins, 1987)
7.5 mg/kg BW PO, try q4h (Flecknell, 1991)
30 mg/kg BW PO (Liles and Flecknell, 1992)
40 mg/kg BW PO as 0.2 mg/ml drinking water (Hayes et al., 2000)
R 10–30 mg/kg BW PO (Jenkins, 1987)
10–30 mg/kg BW PO, try q4h (Flecknell, 1991)
15 mg/kg BW PO (Flecknell, 1996)
Rb 10–20 mg/kg BW IV, try q4h (Flecknell, 1991)

Indomethacin

Gp 8.8 mg/kg BW PO (Albengres et al., 1988)
M 1 mg/kg BW PO (Liles and Flecknell, 1992)
R 2 mg/kg BW PO (Liles and Flecknell, 1992)
Rb 12.5 mg/kg BW PO (Keller et al., 1988)

Ketamine

Bi *See under* Anesthetics
C 10–30 mg/kg BW IM, IV (Kinsell, 1986)
D 2 μg/kg BW/min constant infusion for 18h (Wagner et al., 2002)
F 10–20 mg/kg BW IM (Morrisey et al., 1996)
20–30 mg/kg BW IM (Flecknell, 1996)
Gp 25–30 mg/kg BW IM (Bauck, 1989)
22–64 mg/kg BW IP (Sander, 1992)
H 60 mg/kg BW IM (Bauck, 1989)
N 5–40 mg/kg BW IM (Holmes, 1984)
Rb 30 mg/kg BW IM (Bauck, 1989)

Ketamine and medetomidine (respectively)

Bi 1.5–2 mg/kg BW IM and 60–85 μg/kg BW IM (Joint Working Group, 2001a)

Gp 40 mg/kg BW IM, SC and 500 μg/kg BW IM, SC (Arnemo et al., 2002)

Ketoprofen

Bi 5–10 mg/kg BW IM (Joint Working Group, 2001a)

Bo 3 mg/kg BW IM, IV sid for up to 3 days (Ranheim et al., 2002)

C 1–2 mg/kg BW IM, IV, SC sid (Hellyer and Gaynor, 1998)
1 mg/kg BW PO after first 24 h following injection (Hellyer and Gaynor, 1998)
2 mg/kg BW PO initially, then 1 mg/kg BW/d maintenance (Powell and Lappin, 2001)

D 2 mg/kg BW IM (Pibarot et al., 1997)

Go 3 mg/kg BW IM, IV for up to 3 days (Ranheim et al., 2002)

R 5 mg/kg BW SC (Roughan and Flecknell, 2001)

Rb 1 mg/kg BW IM (Perrin et al., 1990)
3 mg/kg BW IM (Flecknell, 1996)

Sh 1 mg/kg BW IM, IV sid for up to 3 days (Ranheim et al., 2002)

Sw 3 mg/kg BW IM sid for up to 3 days (Ranheim et al., 2002)

Ketoprofen and oxymorphone (respectively)

D 2 mg/kg BW IM and 0.05 mg/kg BW IM (Pibarot et al., 1997)

Ketorolac

N 1 mg/kg BW IM load, then 0.75 mg/kg qid (Platt)

Meclofenamic acid

C 2.2 mg/kg BW PO q24h (Haskins, 1987)

D 0.5–1 mg/kg BW PO sid in food, then qod for maintenance (Boulay et al., 1995)
2.2 mg/kg BW PO q24h (Haskins, 1987)

Note: Test dosage: 0.5 mg/lb sid for 5 days. If therapeutic results achieved, wait until signs exacerbate. Then drop dosage to 0.5 mg/lb qod until achieve signs of remission. Then drop to 0.5 mg/lb every third day for 1 week. If signs still remissed, drop dosage to 0.5 mg/lb every fourth day. If signs still remissed, drop dosage to 0.5 mg/lb every fifth day. When signs show exacerbation, back up one step and maintain that dosage level (Kinsell, 1986).

Medetomidine

Bo 10 μg/kg BW IV (Dunlop and Hoyt, 1997)
5–30 μg/kg BW IM (Arnemo et al., 2002)

C 10–40 μg/kg BW IV (Ko et al., 1997)
40–80 μg/kg BW IM (Ko et al., 1997)
50–150 μg/kg BW IM (Arnemo et al., 2002)

D 10–20 μg/kg BW IV (Ko et al., 1997)
30–40 μg/kg BW IM (Ko et al., 1997)
100–800 μg/kg BW IM, IV, SC (Flecknell, 1996)
10–80 μg/kg IM, IV (Arnemo et al., 2002)

F 80 μg/kg BW IM (Ko et al., 1997)
80–200 μg/kg BW IM, SC (Cantwell, 2001)

G 100–200 μg/kg BW IP, SC (Cantwell, 2001)

Go 25 μg/kg BW IM (Flecknell, 1996)
10 μg/kg BW IV (Dunlop and Hoyt, 1997)
5–20 μg/kg BW IM (Arnemo et al., 2002)

Gp 500 μg/kg BW SC (Cantwell, 2001)

H 100 μg/kg BW IP, SC (Cantwell, 2001)

M 30–100 µg/kg BW SC (Flecknell, 1996)
N 50–100 µg/kg BW IM (Horne, 2001)
R 30–100 µg/kg BW IP, SC (Flecknell, 1996)
100–300 µg/kg BW SC (Arnemo et al., 2002)
Rb 100–500 µg/kg BW IM, SC (Flecknell, 1996)
300–500 µg/kg BW SC (Aeschbacher, 1995)
250 µg/kg BW IM (Ko et al., 1992)
Sh 25 µg/kg BW IM (Flecknell, 1996)
10 µg/kg BW IV (Dunlop and Hoyt, 1997)
5–30 µg/kg BW IM (Arnemo et al., 2002)
Sw 80 µg/kg BW IM (Arnemo et al., 2002)

Medetomidine and butorphanol (respectively)

C 40–50 µg/kg BW IM and 400 µg/kg BW IM (Arnemo et al., 2002)
D 10–25 µg/kg BW IM and 100 µg/kg BW IM (Arnemo et al., 2002)
Sw 40 µg/kg BW IM and 100 µg/kg BW IM (Arnemo et al., 2002)

Meloxikam

Bo 0.5 mg/kg BW IV, SC once (Ranheim et al., 2002)
C 0.2 mg/kg BW SC once (Ranheim et al., 2002)
D 0.2 mg/kg BW IV, SC first day, then 0.1 mg/kg BW IV SC sid (Ranheim et al., 2002)

Meperidine

C 2–10 mg/kg BW SC, IM q2h (Jenkins, 1987)
2–4 mg/kg BW IM, SC (Kinsell, 1986)
Ch 1–2 mg/kg BW IM, SC (Johnson-Delaney, 1996)
D 2–10 mg/kg BW SC, IM q2–3h (Jenkins, 1987)
6–10 mg/kg BW IM, SC (Kinsell, 1986)

F 5–10 mg/kg BW IM, SC q2–4h (Flecknell, 1996)
Go 2–10 mg/kg BW SC, IM (Swindle and Adams, 1988)
Gp 20 mg/kg BW SC, IM q2–3h (Jenkins, 1987)
10–20 mg/kg BW SC, IM q2–3h (Flecknell, 1991)
H 20 mg/kg BW SC, IM q2–3h (Jenkins, 1987)
M 20 mg/kg BW SC, IM q2–3h (Jenkins, 1987)
10–20 mg/kg BW SC, IM q2–3h (Flecknell, 1991)
20–40 mg/kg BW IP (Clifford, 1984)
60 mg/kg BW IM (Hughes, 1981)
N 2–4 mg/kg BW IM q3–4h (Jenkins, 1987)
11 mg/kg BW IM (CCAC, 1984)
R 20 mg/kg BW SC, IM q2–3h (Jenkins, 1987)
10–20 mg/kg BW SC, IM q2–3h (Flecknell, 1991)
Rb 10 mg/kg BW SC, IM q2–3h (Jenkins, 1987)
10–20 mg/kg BW SC, IM q2–3h (Flecknell, 1991)
Sh 2–10 mg/kg BW SC, IM (Swindle and Adams, 1988)
2 mg/kg BW IM, IV q2–4h (Flecknell, 1996)
Sw 2 mg/kg BW IM, IV q2–4h (Flecknell, 1996)
4–10 mg/kg BW IM (Swindle and Adams, 1988)

Metamizole—*See* Dipyrone

Methadone

D 0.1–0.4 mg/kg BW IM q3–6h (Ranheim et al., 2002)
Gp 3–6 mg/kg BW SC (Jenkins, 1987)
H 3–6 mg/kg BW SC (Jenkins, 1987)

Midazolam

Bi Quail: 6 mg/kg BW IM (Day and Boge, 1996)
Bo 0.4–1.3 mg/kg BW IV (Dunlop and Hoyt, 1997)
F 0.5–3 mg/kg BW IM, SC (Cantwell, 2001)

Go 0.5 mg/kg BW IV (Flecknell, 1996)
0.4–1.3 mg/kg BW IV (Dunlop and Hoyt, 1997)
M 5 mg/kg BW IM, IP (Flecknell, 1996)
N 0.05–0.15 mg/kg BW IM, IV (Horne, 2001)
R 2 mg/kg BW IV (Flecknell, 1987)
4 mg/kg BW IM, IP (Flecknell, 1987)
5 mg/kg BW IP (Flecknell, 1996)
Rb 2 mg/kg BW IV (Flecknell, 1987)
2 mg/kg BW intranasally (Robertson and Eberhart, 1994)
4 mg/kg BW IM, IP (Flecknell, 1987)
0.5–2 mg/kg BW IM, IP, IV (Flecknell, 1996)
Sh 0.4–1.3 mg/kg BW IV (Dunlop and Hoyt, 1997)
Sw 0.5 mg/kg BW IM (Goodrich et al., 2001)

Midazolam and ketamine (respectively)

C 5–10 mg/kg BW IM and 0.2 mg/kg BW IM (Mama, 1998)

Midazolam and oxymorphone (respectively)

D 0.05 mg/lb BW IM and 0.025–0.1 mg/lb BW IM for induction (Ko et al., 1994)

Morphine

C 0.1 mg/kg BW SC, IM q4–6h (Flecknell, 1985; Jenkins, 1987)
0.1 mg/kg BW IM, SC q6–7h; use with caution (Kinsell, 1986)
D 0.25–5.0 mg/kg BW IM, SC q4–6h (Flecknell, 1985; Jenkins, 1987)
0.1 mg/kg BW of preservative-free solution (in 0.9% saline) given epidurally; give 0.3 ml/kg BW not to exceed 6 ml (Carroll, 1996)

0.3–3 mg/kg BW q8–12h PO of sustained release preparation (Watson and Lucroy, 2002)

F 0.5–5 mg/kg BW IM, SC qid (Flecknell, 1996)

Gp 10 mg/kg BW SC, IM q2–4h (Flecknell, 1985; Jenkins, 1987)
2–5 mg/kg BW SC, IM q4h (Flecknell, 1991)

H 10 mg/kg BW SC, IM q2–4h (Jenkins, 1987)

M 10 mg/kg BW SC q2–4h (Flecknell, 1985; Jenkins, 1987)
2–5 mg/kg BW SC, hourly (Flecknell, 1991)

N 1–2 mg/kg BW SC q4h (Flecknell, 1985; Jenkins, 1987)
3 mg/kg BW SC (Domino et al., 1969)

R 10 mg/kg BW SC q2–4h (Flecknell, 1985; Jenkins, 1987)
2–5 mg/kg BW SC, hourly (Flecknell, 1991)

Rb 5 mg/kg BW SC, IM q2–4h (Flecknell, 1985; Jenkins, 1987)
2–5 mg/kg BW SC, IM q2–4h (Flecknell, 1991)

Sh 0.2–0.5 mg/kg BW IM q4h (Flecknell, 1996)

Sw 0.2–0.9 mg/kg BW SC (Swindle and Adams, 1988)

Morphine and acepromazine (respectively)

C 0.2–0.5 mg/kg BW IM and 0.02–0.05 mg/kg BW IM, IV (Raffe, 1995)

D 0.05–1 mg/lb BW IM and 0.025–0.1 mg/lb (maximum 3 mg) BW IM for induction (Ko et al., 1994)
0.5–1.5 mg/kg BW IM and 0.02–0.1 mg/kg BW IM, IV (Raffe, 1995)

Nalbuphine

C 1.5–3 mg/kg BW IV q3h (Flecknell, 1996)

D 0.5–2.0 mg/kg BW SC, IM, IV q3–8h (Jenkins, 1987)

G 4 mg/kg BW IP, SC (Flecknell, 1996)

Gp 1–2 mg/kg BW IM, IP, IV (Flecknell, 1996)
1 mg/kg BW IP, SC (Flecknell, 1996)

H 2 mg/kg BW SC (Flecknell, 1996)
M 4–8 mg/kg BW IM q4h (Flecknell, 1989)
4 mg/kg BW IP, SC (Flecknell, 1996)
R 2–5 mg/kg BW IM q4h (Flecknell, 1989)
1–2 mg/kg BW IM q3h (Flecknell, 1991)
0.1 mg/kg BW IV (Flecknell, 1996)
1 mg/kg BW IP, SC (Flecknell, 1996)
Rb 1–2 mg/kg BW IV q4–5h (Flecknell, 1989)
1 mg/kg BW IP, SC (Flecknell, 1996)
0.1 mg/kg BW IV (Flecknell, 1996)
Sh 1 mg/kg SC q2–3h (Flecknell, 1989)

Nalbuphine and xylazine (respectively)

D 0.5 mg/kg BW SC and 0.5 mg/kg BW SC (Lester et al., 2003)

Naproxen

D 5 mg/kg BW loading dose, then 1.2–2.8 mg/kg BW PO q24h (Jenkins, 1987)
5 mg/kg BW PO sid, then 2 mg/kg BW PO qod are common but not recommended (high ulcerogenic potential and narrow margin of safety) (Boulay et al., 1995)
Gp 14.9 mg/kg BW PO (Albengres et al., 1988)
N 10 mg/kg BW PO q12h (Junge et al., 1992)
R 14.5 mg/kg BW PO (Borchard et al., 1990)

Oxymorphone

C 0.4–1.5 mg/kg BW SC, IM, IV (Jenkins, 1987)
0.2 mg/kg BW IM, IV, SC (Short, 1997)
D 0.22 mg/kg BW SC, IM, IV (Jenkins, 1987)
0.1 mg/kg of preservative-free solution (in 0.9% saline) given epidurally; give 0.3 ml/kg BW not to exceed 6 ml (Carroll, 1996)

F 0.05–0.2 mg/kg BW IM, IV, SC (Cantwell, 2001)
G 0.15 mg/kg BW IM (Trim et al., 1987)
H 0.15 mg/kg BW IM (Trim et al., 1987)
M 0.15 mg/kg BW IM (Trim et al., 1987)
N 0.15 mg/kg BW SC, IM, IV in Old World monkeys (Rosenberg, 1991)
0.075 mg/kg BW SC, IM, IV in New World monkeys (Rosenberg, 1991)
0.03–0.2 mg/kg BW IM, IV, SC q3–4h (Horne, 2001)
R 0.15 mg/kg BW IM (Trim et al., 1987)
Rb 0.1–0.2 mg/kg BW IM, IV (Cantwell, 2001)
Sw 0.15 mg/kg BW IM (Swindle and Adams, 1988)

Oxymorphone and acepromazine (respectively)

C 0.05–0.15 mg/kg BW IM, IV and 0.02–0.05 mg/kg BW IM, IV (Raffe, 1995)
D 0.1–0.2 mg/kg BW IM, IV and 0.02–0.1 mg/kg BW IM, IV (Raffe, 1995)

Pentazocine

C 2–3 mg/kg BW SC, IM, IV q4h (Jenkins, 1987)
8 mg/kg BW IP q4h (Flecknell, 1985)
1–3 mg/kg BW SC, IM, IV; IV duration 2–4 h (Kinsell, 1986)
D 2–3 mg/kg BW IM q4h (Flecknell, 1985; Jenkins, 1987)
15 mg/kg BW PO q8h (Jenkins, 1987)
1–3 mg/kg BW SC, IM, IV; IV duration 2–4 h (Kinsell, 1986)
M 10 mg/kg BW SC q3–4h (Flecknell, 1985; Jenkins, 1987)
10 mg/kg BW SC, hourly (Flecknell, 1991)
N 2–5 mg/kg BW IM q4h (Flecknell, 1985; Jenkins, 1987)
R 10 mg/kg BW SC q4h (Flecknell, 1985; Jenkins, 1987)
10 mg/kg BW SC, hourly (Flecknell, 1991)

Rb 10–20 mg/kg BW SC, IM q4h (Flecknell, 1985; Jenkins, 1987)
5 mg/kg BW IV q2–4h (Flecknell, 1991)
Sw 2–5 mg/kg BW IM q4h (Swindle and Adams, 1988)

Pentobarbital sodium

C 2–4 mg/kg BW IV for sedation (Kinsell, 1986)
D 2–4 mg/kg BW IV for sedation (Kinsell, 1986)

Perphenazine

M 2–4 mg/kg BW PO in drinking water (Carter et al., 2002)

Pethidine

C 2–4 mg/kg BW q2h (route not stated) (Ranheim et al., 2002)
D 2–10 mg/kg BW IM q2h (Ranheim et al., 2002)
Gp 20 mg/kg BW SC, IM q2–3h (Flecknell, 1987)
M 20 mg/kg BW SC, IM q2–3h (Flecknell, 1987)
N 2–4 mg/kg BW IM q3–4h (Flecknell, 1987)
R 20 mg/kg BW SC, IM q2–3h (Flecknell, 1987)
Rb 10 mg/kg BW SC, IM q2–3h (Flecknell, 1987)
Sh 2 mg/kg BW IM, IV (Ranheim et al., 2002)
Sw 2 mg/kg BW IM, IV (Ranheim et al., 2002)

Phenacetin

M 200 mg/kg BW PO q4h (Flecknell, 1987)
R 100 mg/kg BW PO q4h (Flecknell, 1987)

Phenylbutazone

C 15 mg/kg BW IV q8h (Haskins, 1987)
10–14 mg/kg BW PO q12h (Kinsell, 1986)

D 15 mg/kg BW IV q8h (Haskins, 1987)
22 mg/kg BW PO q8h (Haskins, 1987)
6–7 mg/lb BW PO q8h with maximum dosage of 800 mg per day, regardless of weight (Kinsell, 1986)
Gp 40 mg/kg BW PO (Wilhelmi, 1974)
M 30 mg/kg BW PO (Liles and Flecknell, 1992)
R 20 mg/kg BW PO (Liles and Flecknell, 1992)

Piroxicam

D 0.3 mg/kg BW PO sid in food, then qod for maintenance (Boulay et al., 1995)
Gp 5.7 mg/kg BW PO (Albengres et al., 1988)
M 3 mg/kg BW PO (Liles and Flecknell, 1992)
R 3 mg/kg BW PO (Liles and Flecknell, 1992)
Rb 0.3 mg/kg BW PO q48h (Flecknell, 1996)

Romifidine

D 0.08 mg/kg BW IV (Martin et al., 2001)
Sh 0.05 mg/kg BW IV (Arnemo et al., 2002)

Telazol—*See* Tiletamine/zolazepam

Tepoxaline (also known as Tepoxalin)

D 10 mg/kg BW PO sid (Ranheim et al., 2002)

Tiletamine/zolazepam (Telazol)

Note: We recommend that users obtain the reference by Schobert, 1987, for the use of Telazol in 52 primate species, 21 cat species, 10 bear species, 8 dog species, 13 members of the Vierridae family, 9 reptile species, 10 species of the

Bovidae family, 33 species of the Cervidae family, 36 bird species, and a table of various miscellaneous species. Not recommended in rabbits.

F 12 mg/kg BW IM (Morrisey et al., 1996)

Tiletamine/zolazepam and xylazine (respectively)

H 20 mg/kg BW IP and 10 mg/kg BW IP (Forsythe et al., 1992)

Tramadol

D 1–3 mg/kg BW PO bid (Editor, Vet Forum, 2003)

Vedaprofen

D 0.5 mg/kg BW PO sid for at least 3 days (Ranheim et al., 2002)

Xylazine

Bi Used in combination with ketamine

Bo 0.02–0.15 mg/kg BW IV (Dunlop and Hoyt, 1997)
0.05–0.3 mg/kg BW IM, SC (Dunlop and Hoyt, 1997)

C 0.5 mg/lb BW IV (Kinsell, 1986)
1 mg/lb BW IM, SC (Kinsell, 1986)
1–3 mg/kg BW IM (Arnemo et al., 2002)
0.5–1.5 mg/kg BW IV (Arnemo et al., 2002)

D 0.5 mg/lb BW IV (Kinsell, 1986)
1 mg/lb BW IM, SC (Kinsell, 1986)
1–3 mg/kg BW IM (Arnemo et al., 2002)
0.5–1.5 mg/kg BW IV (Arnemo et al., 2002)

F 1–2 mg/kg BW IM, SC (Cantwell, 2001)
4–6 mg/kg BW SC (Arnemo et al., 2002)

Go 0.05–1 mg/kg BW IM (Swindle and Adams, 1988); however, this is considered unpredictable when given IM
0.01 mg/kg BW IV (NCSU, 1987)
0.02–0.15 mg/kg BW IV (Dunlop and Hoyt, 1997)
0.05–0.3 mg/kg BW IM, SC (Dunlop and Hoyt, 1997)

Gp 3–5 mg/kg BW IM (Harkness and Wagner, 1983)
5 mg/kg BW IP (Arnemo et al., 2002)

H 4 mg/kg BW IM (Bauck, 1989)
10 mg/kg BW IP (Arnemo et al., 2002)

M 4–8 mg/kg BW IM (Harkness and Wagner, 1983)
10 mg/kg BW IP (Flecknell, 1987)

N 1–2 mg/kg BW IM (Green, 1982; CCAC, 1984)

R 4–8 mg/kg BW IM (Harkness and Wagner, 1983)
1–3 mg/kg BW IM (Flecknell, 1987)
10 mg/kg BW IP (Arnemo et al., 2002)

Rb 3–5 mg/kg BW IM (Harkness and Wagner, 1983)
5 mg/kg BW IM (Hughes, 1981)
1–3 mg/kg BW IM (Flecknell, 1987)
1–5 mg/kg BW IM, SC (Arnemo et al., 2002)

Sh 0.05–1 mg/kg BW IM (Swindle and Adams, 1988)
0.1–0.15 mg/kg BW slow IV (NCSU, 1987)
0.02–0.15 mg/kg BW IV (Dunlop and Hoyt, 1997)
0.05–0.3 mg/kg BW IM, SC (Dunlop and Hoyt, 1997)
5 mg total dose IM followed by 2 mg/hr infusion (Grant et al., 2001)
0.1–0.3 mg/kg BW IM (Arnemo et al., 2002)

Sw 10 mg/kg BW IM (Swindle and Adams, 1988)

Xylazine and butorphanol (respectively)

D 0.25–0.5 mg/lb BW IM and 0.05–0.25 mg/lb BW IM for induction (Ko et al., 1994)

Xylazine and methadone (respectively)

D 0.4 mg/kg BW IM, SC and 0.4 mg/kg BW IM, SC (Arnemo et al., 2002)

Xylazine and morphine (respectively)

D 0.25–0.5 mg/lb BW IM and 0.05–1 mg/lb BW IM for induction (Ko et al., 1994)

Xylazine and oxymorphone (respectively)

D 0.25–0.5 mg/lb BW IM and 0.025–0.1 mg/lb BW IM for induction (Ko et al., 1994)

ANESTHETICS

Alphadolone/alphaxalone—*See* Saffan

Avertin—*See* Tribromoethanol/amylene hydrate

Azaperone and ketamine (respectively)

M 75 mg/kg BW IM and 100 mg/kg BW IM (duration of anesthesia approximately 1½ h) (Olson and Renchko, 1988)

R 50 mg/kg BW IM and 87 mg/kg BW IM; give ¼ to 1½ times this dose depending on the length of anesthesia required (approximately 1–6 h) (Olson and Renchko, 1988)

Benzocaine

Am Larvae: 50 mg/l bath (dissolve in ethanol first) (Crawshaw, 1993)

Frogs and salamanders: 200–300 mg/l bath (Crawshaw, 1993)

Fi 20–50 ppm in water (Green, 1982)

5–10 ml per 10 liters water for induction; 2 ml per 10 liters water for maintenance (Horsberg, 2002)

Carbon dioxide

M Mix 1:1 CO_2:O_2 (Green, 1979)

Chloral hydrate

Am 1–2 ml of a 10% solution injected into dorsal lymph sac (Kaplan, 1969)
C 300 mg/kg BW IV (Borchard et al., 1990)
D 125 mg/kg BW IV (Borchard et al., 1990)
Go 50–300 mg/kg BW IV (Swindle and Adams, 1988)
Gp 200–300 mg/kg BW IP of 10% solution (Green, 1982)
H 270–360 mg/kg BW IP (Hughes, 1981)
M 400 mg/kg BW IP (Borchard et al., 1990)
R 200–300 mg/kg BW IP of 10% solution (Green, 1982)
Sh 50–300 mg/kg BW IV (Swindle and Adams, 1988)
Sw 100–300 mg/kg BW IV (Swindle and Adams, 1988)

Chloralose

C 75 mg/kg IV (Borchard et al., 1990)
D 80 mg/kg BW IV with 5 mg/kg BW IV thiopental sodium initially, then maintain anesthesia with additional chloralose (1 ml/s IV); respirator required at this dose of chloralose (Grad et al., 1988)
Go 45–62 mg/kg BW IV (Swindle and Adams, 1988)
M 114 mg/kg BW IP (Hughes, 1981)
R 55 mg/kg BW IP (Borchard et al., 1990)
Rb 80–100 mg/kg BW IV of 1% solution (Green, 1982)
Sh 45–62 mg/kg BW IV (Swindle and Adams, 1988)
Sw 55–86 mg/kg BW IV (Swindle and Adams, 1988)

Equithesin

Note: Combine 0.85 g chloral hydrate with 0.21 g sodium pentobarbital (4.2 ml Nembutal), 8.6 ml propylene glycol (4.2 ml Nembutal provides 1.68 ml of this amount), 2.2 ml 100% ethanol, and 6.7 ml water (for a total of 20 ml). Add ethanol and propylene glycol together, then add chloral hydrate, and last add Nembutal.

Ethyl alcohol

Am Frogs and toads: immerse in 10% solution (Kaplan, 1969)

Etomidate

M 30 mg/kg BW IP (Green et al., 1981)
5–10 mg/kg BW IV (Jurd et al., 2003)

N 1 mg/kg BW IV followed by 100 µg/kg BW/min continuous infusion (for nonpainful procedures only) (Fanton et al., 2000)
0.5–2 mg/kg BW IV (Horne, 2001)

Etomidate and carfentanil (respectively)

M 15 mg/kg BW IM and 3 µg/kg BW IM (Erhardt et al., 1984)

Etorphine (M-99)

Re Turtles: 0.5–5.0 mg total dose (for approximately 1.8-kg animal) (Marcus, 1981)
Snakes: 2–15 mg total dose IPP (Marcus, 1981)

Fentanyl and etomidate (respectively)

M 80 µg/kg BW IP and 18 mg/kg IP (Bertens et al., 1995)

Fentanyl and medetomidine (respectively)

R 300 µg/kg BW IP and 300 µg/kg BW IP (Flecknell, 1996)
Rb 8 µg/kg BW IV and 330 µg/kg BW IV (Flecknell, 1996)

Fentanyl and metomidate (respectively)

C 20 µg/kg BW IM and 20 mg/kg BW IM (Flecknell, 1996)
G 50 µg/kg BW SC and 50 mg/kg BW SC (Flecknell, 1996)
H 50 µg/kg BW IP and 50 mg/kg BW IP (Bertens et al., 1995)
M 2–6 µg/kg BW SC and 60 mg/kg BW SC (Green et al., 1981)
80 µg/kg BW IP and 60 mg/kg BW IP (Bertens et al., 1995)

Fentanyl/droperidol (Innovar-Vet)

Ch 0.20 ml/kg BW IM (Green, 1982)
F 0.5 ml/kg BW IM (Green, 1982)
Gp 0.66–0.88 ml/kg BW IM (Hughes, 1981)
0.5–1.0 ml/kg BW IM (CCAC, 1984)
H Not recommended (Thayer et al., 1972)
M 0.05 ml/g BW IM (Hughes, 1981)
N 1.0 ml/9 kg BW IM (Melby and Altman, 1976)
R 0.02–0.06 ml/100 g BW IP (Wixson et al., 1987)
0.3 ml/kg BW IM (Hughes, 1981)
Rb 0.10–0.50 ml/kg BW IM (Green, 1982)
0.4 ml/kg BW SC (González-Gil et al., 2003)
Sw 0.10 ml/kg BW IM (Swindle and Adams, 1988)

Fentanyl/droperidol (Innovar-Vet) and diazepam (respectively)

H 1 ml/kg BW IP and 5 mg/kg BW IP (Green, 1982)

Fentanyl/fluanisone (Hypnorm)

Gp 0.5 ml/kg BW IM
Note: Addition of 1–2 mg/kg BW IP or IM diazepam is advisable (Cooper, 1984).

M 0.5 ml/kg BW IM
Note: Addition of 1–2 mg/kg BW IP or IM diazepam is advisable (Cooper, 1984).

R 0.5 ml/kg BW IM (Cooper, 1984)

Fentanyl/fluanisone and diazepam (respectively)

G 0.3 ml/kg BW IM, IP and 5 mg/kg BW IP (Flecknell, 1996)

Gp 1 ml/kg BW IM, IP and 2.5 mg/kg BW IP (Flecknell, 1996)
1 mg/kg BW IM, SC and 2.5 mg/kg BW IM, IP (Arnemo et al., 2002)

H 1 ml/kg BW IM, IP and 5 mg/kg BW IP (Flecknell, 1996)
1 mg/kg BW IM, SC and 2.5 mg/kg BW IP (Arnemo et al., 2002)

M 0.4 ml/kg BW IP and 5 mg/kg BW IP (Flecknell, 1996)

R 0.6 ml/kg BW IP and 2.5 mg/kg BW IP (Flecknell, 1996)

Rb 0.3 ml/kg BW IM and 1–2 mg/kg BW IM, IP, IV (Flecknell, 1996)

Fentanyl/fluanisone and midazolam (respectively)

M 0.53 mg/kg, 17.5 mg/kg, and 8.75 mg/kg IP respectively (Jong et al., 2002)

Rb 0.3 ml/kg IM and 1–2 mg/kg BW IP, IV (Flecknell, 1996)
0.3 ml/kg IM, SC and 2 mg/kg BW IM, SC (Arnemo et al., 2002)

Halothane

Am Terrestrial species: 4–5% in anesthetic chamber to effect (Crawshaw, 1993)

Hexobarbital

Am 120 mg/kg BW intravascularly (Kaplan, 1969)
M 100 mg/kg BW IP (Taber and Irwin, 1969)
R 100 mg/kg BW IP (Ben et al., 1969)

Hypnorm—*See* Fentanyl/fluanisone

Inactin

R 80 mg/kg BW IP (Flecknell, 1987)
100–110 mg/kg BW IP (Ellison et al., 1987)

Isoflurane

Am Terrestrial species: 4–5% in anesthetic chamber to effect (Crawshaw, 1993)

Ketamine (We have found that ketamine used alone in mammals is not usually adequate for deep anesthesia.—Eds.)

Am 50–150 mg/kg SC, IM (Crawshaw, 1993)
Bi 10–50 mg/kg BW IM (Cooper, 1984; Fowler, 1978)

Note: Rarely used alone (Sinn, 1997)

Bo 10 mg/kg BW IV (Dunlop and Hoyt, 1997)

Ch 44 mg/kg BW IM (Johnson-Delaney, 1996)

F 20–30 mg/kg BW IM (Green, 1982)
20–30 mg/kg BW IM for immobilization (Flecknell, 1987)
20–35 mg/kg BW IM (Andrews and Illman, 1987)

G 200 mg/kg BW IM for immobilization (Flecknell, 1987)

Go 22–44 mg/kg BW IM (Swindle and Adams, 1988)
10 mg/kg BW IV (Dunlop and Hoyt, 1997)

Gp 44 mg/kg BW IM, atropine recommended (Weisbroth and Fudens, 1972)
100–200 mg/kg BW IM for immobilization (Flecknell,1987)

H 10–30 mg/100 g BW IP (Strittmatter, 1972)
200 mg/kg BW IP for immobilization (Flecknell, 1987)

M 44 mg/kg BW IM for sedation (Weisbroth and Fudens, 1972)
100–200 mg/kg BW IP (Hughes, 1981)
200 mg/kg BW IM for immobilization (Flecknell, 1987)
50 mg/kg BW IV (Hughes, 1981)

N 10–30 mg/kg BW IM (Welshman, 1985)
African green (*Cercopithecus* spp.): 25–30 mg/kg BW IM (Cramlet and Jones, 1976)
Baboon (*Papio* spp.): 7.5–10 mg/kg BW IM (Cramlet and Jones, 1976)
Chimpanzee (*Pan troglodytes*): 10–15 mg/kg BW IM (Cramlet and Jones, 1976)
Cynomolgus macaque (*Macaca fascicularis*): 20–25 mg/kg BW IM (Cramlet and Jones, 1976)
Gorilla (*Gorilla gorilla*): 12–15 mg/kg BW IM (Cramlet and Jones, 1976)
Patas (*Erythrocebus patas*): 5–7.5 mg/kg BW IM (Cramlet and Jones, 1976)
Rhesus macaque (*Macaca mulatta*): 20–25 mg/kg BW IM (Cramlet and Jones, 1976)
Squirrel monkey (*Saimiri sciureus*): 25–30 mg/kg BW IM (Cramlet and Jones, 1976)

R 44 mg/kg BW IM (Weisbroth and Fudens, 1972)
100 mg/kg BW IM for immobilization (Flecknell, 1987)
75 mg/kg BW IP (Waterman and Livingston, 1978)

Rb 44 mg/kg BW IM (Weisbroth and Fudens, 1972)
50 mg/kg BW IM for immobilization (Flecknell, 1987)
25 mg/kg BW intranasally for light surgical anesthesia (Robertson and Eberhart, 1994)

Rc 5–27 mg/kg BW IM (use higher doses for longer anesthetic duration) (Evans and Evans, 1986)

Re Snakes: 88–110 mg/kg BW IM (for 3.6- to 4.5-kg animals) (Marcus, 1981)
22–44 mg/kg BW IM (for <0.9-kg animals) (Marcus, 1981)
50–130 mg/kg BW IM (Page, 1993)
Tortoises and turtles: 15–60 mg/kg BW IM (Fowler, 1978)
Tortoises: 20–80 mg/kg BW IM (Page and Mautino, 1990)
Chelonians: 20–60 mg/kg BW IM (Page, 1993)

Sh 22–44 mg/kg BW IM (Swindle and Adams, 1988)
10 mg/kg BW IV (Dunlop and Hoyt, 1997)

Sw 15–25 mg/kg BW IM (Swindle and Adams, 1988)
15–20 mg/kg BW IV (Swindle and Adams, 1988)

Ketamine and acepromazine (respectively)

Bi 10–25 mg/kg BW IM and 0.5–1 mg/kg BW IM (high-end dose for <250-g bird) (Curro, 1998)

C 20 mg/kg BW IM and 0.11 mg/kg BW IM (Flecknell, 1996)

Ch 40 mg/kg BW IM and 0.5 mg/kg BW IM (Morgan et al., 1981)

F 20–35 mg/kg BW IM, SC and 0.2–0.35 mg/kg BW IM, SC (Morrisey et al., 1996)

G 75 mg/kg BW IM and 3 mg/kg BW IM (Flecknell, 1987)

Gp 125 mg/kg BW IM and 5 mg/kg BW IM (Flecknell, 1987)

H 150 mg/kg BW IM and 5 mg/kg BW IM (Flecknell, 1987)

M 100 mg/kg BW IM and 2.5 mg/kg BW IM (Flecknell, 1987)

N *Varecia* and *Propithecus* (not *Lemur*): 4 mg/kg BW IM and 0.4 mg/kg BW IM (Feeser and White, 1992)

R 75 mg/kg BW IM and 2.5 mg/kg BW IM (Flecknell, 1987)
30 mg/kg BW IM and 3 mg/kg BW IM (Roman and Osborn, 1987)

Rb 75 mg/kg BW IM and 5 mg/kg BW IM (Flecknell, 1987)
50 mg/kg BW IM and 1 mg/kg BW IM (Flecknell, 1996)

Rc 8–10 mg/kg BW IM and 2.2 mg/kg BW IM (Evans and Evans, 1986)

Ketamine and azaperone—*See* Azaperone and ketamine

Ketamine and butorphanol (respectively)

C 15 mg/kg BW IM, SC and 0.2–0.5 mg/kg BW IM, IV (Jaffe et al., 2003)
6 mg/kg BW IV and 0.2–0.5 mg/kg BW IM, IV (Jaffe et al., 2003)

Ketamine and detomidine (respectively)

R 60 mg/kg BW IM and 10 mg/kg BW IM in males (Cox et al., 1994)
40 mg/kg BW IM and 5 mg/kg BW IM in females (Cox et al., 1994)

Ketamine and diazepam (respectively)

Bi 10–50 mg/kg BW IM and 0.5–2 mg/kg BW IM (high-end dose for <250-g bird) (Curro, 1998)
5–30 mg/kg BW IM and 0.5–2 mg/kg BW IM, IV (Sinn, 1997)
2.5–5 mg/kg BW IV and 0.5–2 mg/kg BW IM, IV (Sinn, 1997)

10–30 mg/kg BW IV and 1–1.5 mg/kg BW IM (Joint Working Group, 2001a)

Bo 2.2–7.5 mg/kg BW IV and 0.1–0.375 mg/kg BW IV (Dunlop and Hoyt, 1997)

Ch 20 mg/kg BW IM, IP and 5 mg/kg BW IM, IP (Flecknell, 1987)

20–40 mg/kg BW IM and 1–2 mg/kg BW IM (Johnson-Delaney, 1996)

F 25 mg/kg BW IM and 2 mg/kg BW IM (Flecknell, 1987)

25–35 mg/kg BW IM and 2–3 mg/kg BW IM (Morrisey et al., 1996)

G 50 mg/kg BW IM and 5 mg/kg BW IP (Flecknell, 1987)

Go 2.2–7.5 mg/kg BW IV and 0.1–0.375 mg/kg BW IV (Dunlop and Hoyt, 1997)

Gp 100 mg/kg BW IM and 5 mg/kg BW IM (Flecknell, 1987)

H 70 mg/kg BW IP and 2 mg/kg BW IP (Flecknell, 1996)

M 200 mg/kg BW IM and 5 mg/kg BW IP (Flecknell, 1987)

N 15 mg/kg BW IM and 1 mg/kg BW IM (Flecknell, 1996)

R 40–80 mg/kg BW IP and 5–10 mg/kg BW IP (Wixson et al., 1987)

Rb 25 mg/kg BW IM and 5 mg/kg BW IM (Flecknell, 1987)

30–40 mg/kg BW IM and 2–5 mg/kg BW IM (Carpenter et al., 1995)

20–30 mg/kg BW IM and 1–3 mg/kg BW IM when used with isoflurane (Carpenter et al., 1995)

10 mg/kg BW IV and 2 mg/kg BW IV (González-Gil et al., 2003)

Sh 2.2–7.5 mg/kg BW IV and 0.1–0.375 mg/kg BW IV (Dunlop and Hoyt, 1997)

4–7 mg/kg BW IV and 0.1–0.5 mg/kg BW IV (Arnemo et al., 2002)

Ketamine and medetomidine (respectively) (not for major surgical procedures)

Bi 10–30 mg/kg BW IV and 20 µg/kg BW IM, SC (Joint Working Group, 2001a)

Bo 0.5 mg/kg BW IV and 20 µg/kg BW IV (Dunlop and Hoyt, 1997)

C 7 mg/kg BW IM and 80 µg/kg BW IM (Flecknell, 1996)
2–3 mg/kg BW IV and 30–50 µg/kg BW IV (Ko et al., 1997)
3–5 mg/kg BW IM and 40–80 µg/kg BW IM (Ko et al., 1997)
5–7.5 mg/kg BW IM and 80 µg/kg BW IM (Arnemo et al., 2002)

D 1–3 mg/kg BW IV and 10–20 µg/kg BW IV (Ko et al., 1997)
3–5 mg/kg BW IM and 30–40 µg/kg BW IM (Ko et al., 1997)
2.5–7.5 mg/kg BW IM and 40 µg/kg BW IM (Flecknell, 1996)
5 mg/kg BW IM and 40 µg/kg BW IM (Arnemo et al., 2002)

F 5 mg/kg BW IM and 80 µg/kg BW IM (Ko et al., 1997)
4–8 mg/kg BW IM and 50–100 µg/kg BW IM (Wolfensohn and Lloyd, 1994)
2.5–5 mg/kg BW IM and 60–100 µg/kg BW IM (Arnemo et al., 2002)

G 75 mg/kg BW IP and 500 µg/kg BW IP (Flecknell, 1996)

Go 1 mg/kg BW IM and 25 µg/kg BW IM (Flecknell, 1996)
0.5 mg/kg BW IV and 20 µg/kg BW IV (Dunlop and Hoyt, 1997)
1 mg/kg BW IM and 20 µg/kg BW IM (Arnemo et al., 2002)

Gp 40 mg/kg BW IP and 500 µg/kg BW IP (Flecknell, 1996)

H 100 mg/kg BW IP and 250 µg/kg BW IP (Flecknell, 1996)

M 50 mg/kg BW IP and 1 mg/kg BW IP in males (Cruz et al., 1998)
75 mg/kg BW IP and 1 mg/kg BW IP in females (Cruz et al., 1998)

100 mg/kg BW IP and 1 mg/kg BW IP (Arras et al., 2001)

Mi 5–7.5 mg/kg BW SC and 100 µg/kg BW SC (Arnemo et al., 2002)

N Callithricidae: 5–7.5 mg/kg BW IM and 100–150 µg/kg BW IM (Jalanka, 1993)

Pongidae: 3–5 mg/kg BW IM and 70 µg/kg BW IM (Jalanka, 1993)

Rhesus: 3 mg/kg BW IM and 150 µg/kg BW IM (Sun et al., 2003)

2 mg/kg BW IM, IV and 50–10 µg/kg BW IM (Horne, 2001)

R 75 mg/kg BW IP and 0.5 mg/kg BW IP (Flecknell, 1996)

60–75 mg/kg BW IP and 250–500 µg/kg BW IP (Arnemo et al., 2002)

Rb 5 mg/kg BW IV and 350 µg/kg BW IM; use with supplemental oxygen (Hellebrekers et al., 1996)

25 mg/kg BW IM and 500 µg/kg BW IM (Flecknell, 1996)

Re 5 mg/kg BW IM and 100 µg/kg BW IM for minor procedures (Greer et al., 2001)

10 mg/kg BW IM and 200 µg/kg BW IM for minor surgery (Greer et al., 2001)

Sh 1 mg/kg BW IM and 25 µg/kg BW IM (Flecknell, 1996)

0.5 mg/kg BW IV and 20 µg/kg BW IV (Dunlop and Hoyt, 1997)

1–1.5 mg/kg BW IM and 25–50 µg/kg BW IM (Arnemo et al., 2002)

Sw 10 mg/kg BW IM and 80 µg/kg BW IM (Flecknell, 1996)

Ketamine and midazolam (respectively)

Bi 10–40 mg/kg BW IM and 0.5–1.5 mg/kg BW IM (high-end dose for <250-g bird) (Curro, 1998)

C 10 mg/kg BW IM and 0.2 mg/kg BW IM (Flecknell, 1996)

Mi 50 mg/kg BW/h IV and 2 mg/kg BW/h IV (4 mmol/(kg·h) sodium bicarbonate also required) (Wamberg et al., 1996)

R 75 mg/kg BW IP and 5 mg/kg BW IP (Flecknell, 1996)

Rb 30 mg/kg BW IM and 0.2 mg/kg BW IM (Vachon et al., 1999)

Sw 10–15 mg/kg BW IM and 0.5–2 mg/kg BW IM (Flecknell, 1996)

Ketamine and xylazine (respectively)

Bi 10–50 mg/kg BW IM and 1–10 mg/kg BW IM (high-end dose for <250-g bird) (Curro, 1998)

40 mg/kg BW IM and 10 mg/kg BW IM (Heaton and Brauth, 1992)

5–30 mg/kg BW IM and 1–4 mg/kg BW IM (Sinn, 1997)

2.5–5 mg/kg BW IV and 0.25–0.5 mg/kg BW IV (Sinn, 1997)

Bo 2.2–7.5 mg/kg BW IV and 0.1 mg/kg BW IV (Dunlop and Hoyt, 1997)

Calves: 5–10 mg/kg BW IM and 0.1–0.2 mg/kg BW IM (Arnemo et al., 2002)

C 10 mg/kg BW IM and 1 mg/kg BW IM (Arnemo et al., 2002)

Ch 35 mg/kg BW IP and 5 mg/kg BW IP (Johnson-Delaney, 1996)

D 10 mg/kg BW IM and 2 mg/kg BW IM (Arnemo et al., 2002)

F 25 mg/kg BW IM and 2 mg/kg BW IM (Moreland and Glaser, 1985)

20–30 mg/kg BW IM and 4–6 mg/kg BW IM (Arnemo et al., 2002)

G 50 mg/kg BW IM and 2 mg/kg BW IM (Flecknell, 1987)

Go 2.2–7.5 mg/kg BW IV and 0.1 mg/kg BW IV (Dunlop and Hoyt, 1997)

5–10 mg/kg BW IM and 0.1–0.2 mg/kg BW IM (Arnemo et al., 2002)

Gp 40 mg/kg BW IM and 5 mg/kg BW SC (Flecknell, 1987)
50 mg/kg BW IP and 5 mg/kg BW IP (Strother and Stokes, 1989)
25–40 mg/kg BW IM, SC and 5 mg/kg BW IM, SC (Arnemo et al., 2002)

H 200 mg/kg BW IP and 10 mg/kg BW IP (Flecknell, 1987)
50–150 mg/kg BW IM, SC and 10 mg/kg BW IM, SC (Arnemo et al., 2002)

M 200 mg/kg BW IM and 10 mg/kg BW IP (Flecknell, 1987)

Note: High mortality possible

90–120 mg/kg BW IM and 10 mg/kg BW IM (Harkness and Wagner, 1989)
50 mg/kg BW IM and 50 mg/kg BW IM (Arnemo et al., 2002)
100–150 mg/kg BW IP and 50–100 mg/kg BW IP (Arras et al., 2001)

Mi 5–7.5 mg/kg BW IM and 2 mg/kg BW IM (Arnemo et al., 2002)

N 10 mg/kg BW IM and 0.5 mg/kg BW IM (Flecknell, 1996)

R 40–80 mg/kg BW IP and 5–10 mg/kg BW IP (Wixson et al., 1987)
37 mg/kg BW IM and 7 mg/kg BW IM followed by 1–1¼ mg/kg BW/min IV and 32–40 µg/kg BW/min IV for up to 12 h (Simpson, 1997)
90 mg/kg BW IM and 10 mg/kg BW IM (Flecknell, 1987)
30–80 mg/kg BW IM and 10–15 mg/kg BW IM (Arnemo et al., 2002)

Rb 50 mg/kg BW IM and 10 mg/kg BW IM (Lipman et al., 1987)
10 mg/kg BW IV and 3 mg/kg BW IV (Flecknell, 1987)
10 mg/kg BW intranasally and 3 mg/kg BW intranasally (Robertson and Eberhart, 1994)
35 mg/kg BW IM and 5 mg/kg BW IM (Flecknell, 1996)

20–40 mg/kg BW IM, SC and 3–5 mg/kg BW IM, SC (Arnemo et al., 2002)

Rc 5–8 mg/kg BW IM and 1.5–3 mg/kg BW IM (Evans and Evans, 1986)

5.5 mg/kg BW IM and 5.5 mg/kg BW IM (Evans and Evans, 1986)

Sh 2.2–7.5 mg/kg BW IV and 0.1 mg/kg BW IV (Dunlop and Hoyt, 1997)

5–10 mg/kg BW IM and 0.2 mg/kg BW IM (Arnemo et al., 2002)

Ketamine, butorphanol, and diazepam (respectively)

Bo 5 mg/kg BW IV (given 5 min after the other two drugs), 0.1–0.2 mg/kg BW IV, and 0.2mg/kg BW IV (Arnemo et al., 2002)

Sw 10–15 mg/kg BW IM, 0.1–0.2 mg/kg BW IM, and 1–2 mg/kg BW IM (Arnemo et al., 2002)

Ketamine, medetomidine, and buprenorphine (respectively)

Rb 35 mg/kg BW IM, 0.5 mg/kg BW IM, and 0.03 mg/kg BW IM for induction (Difilippo et al., 2004)

Ketamine, medetomidine, and butorphanol (respectively)

C 5 mg/kg BW IM, 80 μg/kg BW IM, and 400 μg/kg BW IM (Arnemo et al., 2002)

D 5 mg/kg BW IM (15 min after giving the other two drugs), 25 μg/kg BW IM, and 100 μg/kg BW IM (Arnemo et al., 2002)

Sw 10 mg/kg BW IM (15 min after giving the other two drugs), 80 μg/kg BW IM, and 200 μg/kg BW IM (Arnemo et al., 2002)

Ketamine, medetomidine, and diazepam (respectively)

Rb 20 mg/kg BW IM, 300 μg/kg BW IM, and 0.75–1.5 mg/kg BW IM (Ko et al., 1997)

Ketamine, midazolam, and xylazine (respectively)

Rb 30 mg/kg BW IM, 0.2 mg/kg BW IM and 3 mg/kg BW IM (Vachon et al., 1999)

Ketamine, tiletamine/lorazepam, and xylazine (respectively)

Sw 2.2 mg/kg BW IM, 4.4 mg/kg BW IM, and 2.2 mg/kg BW IM (Ko et al., 1993)

Ketamine, xylazine, and acepromazine (respectively)

M 30 mg/kg BW IM, 6 mg/kg BW IM, and 1 mg/kg BW IM (O'Rourke et al., 1994)

65 mg/kg BW IP, 13 mg/kg BW IP, and 2 mg/kg BW IP (Arras et al., 2001)

Rb 35 mg/kg BW IM, 5 mg/kg BW IM, and 0.75 mg/kg BW IM (Marini et al., 1989).

Note: This provides approximately 30% longer anesthesia and recovery than ketamine-xylazine alone. 35 mg/kg BW IM, 5 mg/kg BW IM, and 1 mg/kg BW IM, SC (Flecknell, 1996)

Ketamine, xylazine, and azaperone (respectively)

M 100 mg/kg BW IP, 20 mg/kg BW IP, and 3 mg/kg BW IP (considered high-end dose) (Arras et al., 2001)

Ketamine, xylazine, and butorphanol (respectively)

Rb 35 mg/kg BW IM, 5 mg/kg BW IM, and 0.1 mg/kg BW IM (Marini et al., 1992)

Ketamine, xylazine, and guaifenesin (respectively)

Sh 1 mg/ml, 0.1 mg/ml, and 50 mg/ml in 5% dextrose IV; induction use 1.2 ml/kg; maintenance use 2.6 ml/(kg·h) (Lin et al., 1993)

Ketamine, xylazine, and oxymorphone (respectively)

Sw 2 mg/kg BW IV, 2 mg/kg BW IV, and 0.075 mg/kg BW IV for minor surgery (Breese and Dodman, 1984)

M-99—*See* Etorphine

Medetomidine and butorphanol (respectively) (not for major surgical procedures)

C 30–50 µg/kg BW IV and 0.1–0.2 mg/kg BW IV (Ko et al., 1997)

40–80 µg/kg BW IM and 0.1–0.2 mg/kg BW IM (Ko et al., 1997)

D 10–20 µg/kg BW IV and 0.1–0.2 mg/kg BW IV (Ko et al., 1997)

30–40 µg/kg BW IM and 0.1–0.2 mg/kg BW IM (Ko et al., 1997)

F 80 µg/kg BW IM and 0.1–0.2 mg/kg BW IM (Ko et al., 1997)

Medetomidine and morphine (respectively) (not for major surgical procedures)

D 10–20 µg/kg BW IV and 0.07–0.1 mg/kg BW IV (Ko et al., 1997)
30–40 µg/kg BW IM and 0.2–0.3 mg/kg BW IM (Ko et al., 1997)

Medetomidine and oxymorphone (respectively)(not for major surgical procedures)

D 10–20 µg/kg BW IV and 0.01–0.02 mg/kg BW IV (Ko et al., 1997)
30–40 µg/kg BW IM and 0.05–0.1 mg/kg BW IM (Ko et al., 1997)

Medetomidine and propofol (respectively)

Rb 350 µg/kg BW IM and 3 mg/kg BW IV (Hellebrekers et al., 1996)
250 µg/kg BW IM and 4 mg/kg BW IV (Ko et al., 1992)

Medetomidine, midazolam, and propofol (respectively)

Rb 0.25 mg/kg BW IM, 0.5 mg/kg BW IM, and 2 mg/kg BW IV (Ko et al., 1992)

Metacaine

Fi 0.5–0.8 g per 10 liters water (Horsberg, 2002)

Methohexital (methohexitone)

Gp 31 mg/kg BW IP (Flecknell, 1987)
M 6 mg/kg BW IV (Flecknell, 1987)
44 mg/kg BW IP (Dorr and Weber-Frisch, 1999)
N 10 mg/kg BW IV (Flecknell, 1987)
R 7–10 mg/kg BW IV (Flecknell, 1987)
10–15 mg/kg BW IV (Flecknell, 1996)
Rb 10 mg/kg BW IV (Flecknell, 1987)

Methoxyflurane

C 3% for induction; 0.5% by inhalation for maintenance (Kinsell, 1986)
D 3% for induction; 0.5% by inhalation for maintenance (Kinsell, 1986)

Metomidate

M 30–50 mg/kg BW IP (Green et al., 1981)

Pentobarbital and chlorpromazine (respectively)

M 40–60 mg/kg BW IP and 25–50 mg/kg IM (Harkness and Wagner, 1989)

Pentobarbital and xylazine

Gp 45 mg/kg BW pentobarbital IP followed by 7 mg/kg BW xylazine IM. Supplement with pentobarbital at 3.25–6.5 mg/kg BW IP or IV as needed (Rhodes et al., 2001)

Pentobarbital sodium

Am Frogs and toads: 60 mg/kg in dorsal lymph sac (Kaplan, 1969; Marcus, 1981)

Bo 12–28 mg/kg BW IV (Schultz, 1989)
20–30 mg/kg BW IV (Dunlop and Hoyt, 1997)

C 30 mg/kg IV to effect for anesthesia (Kinsell, 1986)

Ch 40 mg/kg BW IP (Mason, 1997)
30 mg/kg BW IV (Mason, 1997)

D 30 mg/kg IV to effect for anesthesia (Kinsell, 1986)

F 36 mg/kg BW IP (Andrews and Illman, 1987)
30 mg/kg BW IV (Green, 1982)

G 6 mg/100 g BW IP up to 6 mg maximum (Norris, 1987)

Go 25–30 mg/kg BW IV (Swindle and Adams, 1988)
20–30 mg/kg BW IV (Dunlop and Hoyt, 1997)

Gp 28 mg/kg BW IP (Croft, 1964)

H 9 mg/100 g BW IP, boost with 1.2 mg/100 g BW (Whitney, 1963)

M 40–85 mg/kg BW IP (Cunliffe-Beamer, 1981)
50 mg/kg BW IP followed by a dose of 25 mg/kg BW SC for longer procedures (45–50 min) (Taber and Irwin, 1969)
Neonates (1–4 days): 5 mg/kg BW IP (Taber and Irwin, 1969)
40–70 mg/kg BW IV (Hughes, 1981)

N 5–15 mg/kg BW IV (Flecknell, 1987)

R 30–40 mg/kg BW IP (Wixson et al., 1987)
40–50 mg/kg BW IP (Flecknell, 1996)

Rb 28 mg/kg BW IV, IP (Croft, 1964)

Rc 30 mg/kg BW IP (Evans and Evans, 1986)

Re Turtles: 16 mg/kg BW IC, IP (Marcus, 1981)
Snakes: 15–30 mg/kg BW IPP (Marcus, 1981)

Sh 25–30 mg/kg BW IV (Swindle and Adams, 1988)
15–30 mg/kg BW IV, lower dose for castrated animals (NCSU, 1987)
20–30 mg/kg BW IV (Dunlop and Hoyt, 1997)

Sw 25–35 mg/kg BW PO (Swindle and Adams, 1988)
30 mg/kg BW IP (Swindle and Adams, 1988)
20–30 mg/kg BW IV (Swindle and Adams, 1988)

Propofol

Bi 1.33–14 mg/kg BW IV (Joint Working Group, 2001a)

Bo 4–6 mg/kg BW IV (Dunlop and Hoyt, 1997)

C 8 mg/kg BW IV (Arnemo et al., 2002)

D 6–7 mg/kg BW IV (Arnemo et al., 2002)
1 mg/kg BW IV for induction (Martin et al., 2001)

F 5–8 mg/kg BW IV (Cantwell, 2001)

Go 4–6 mg/kg BW IV (Dunlop and Hoyt, 1997)
3–7 mg/kg BW IV (Arnemo et al., 2002)

M 20–30 mg/kg BW IV (Mason, 1997)

N 7.5–12.5 mg/kg BW IV (Flecknell, 1996)
2 mg/kg BW IV followed by 200 µg/kg BW/min continuous infusion (for nonpainful procedures only)(Fanton et al., 2000)
2–6 mg/kg BW IV followed by 200–600 µg/kg BW/min continuous infusion (Horne, 2001)

R 10 mg/kg BW IV (Flecknell, 1996)

Rb 7.5–15 mg/kg BW IV (Adam et al., 1990)
1.5 mg/kg BW IV bolus followed by 0.2–0.6 mg/(kg·min) continuous infusion (Blake et al., 1988)

Re 5–15 mg/kg BW IV (Boyer, 1998)

Sh 4–6 mg/kg BW IV (Dunlop and Hoyt, 1997)
3–7 mg/kg BW IV (Arnemo et al., 2002)

Saffan (alphadolone and alphaxalone)

Bi 8.0 mg/kg BW IV, with incremental doses up to 25 mg/kg BW maximum (Cooper, 1984)

C 9 mg/kg BW IV initially, followed by multiple 3 mg/kg BW IV doses as needed to maintain anesthesia (from product information)
18 mg/kg BW IM initially, followed by multiple 3 mg/kg BW IV doses as needed to maintain anesthesia (from product information)

Ch 20–30 mg/kg BW IM (Green, 1982)

D Not suitable for use in dogs (Glaxovet guide to Saffan)

F 12–15 mg/kg BW IM initially, followed by multiple 6–8 mg/kg BW IV doses as needed to maintain anesthesia (Green, 1982)

G 80–120 mg/kg BW IP (Flecknell, 1987)

Gp 10–20 mg/kg BW IV (Green, 1982)
40 mg/kg BW IP (Flecknell, 1987)

H 150 mg/kg BW IP (Flecknell, 1987)

M 5 mg/kg BW IV, with incremental doses up to 20 mg/kg maximum (Cooper, 1984)
90 mg/kg BW IP (Green, 1982)
8–20 mg/kg BW IV (Jurd et al., 2003)

N 6–9 mg/kg BW IV initially, followed by supplemental doses to effect as needed to maintain anesthesia (from product information)
12–18 mg/kg BW IM initially, followed by multiple 6–9 mg/kg BW IV doses as needed to maintain anesthesia from product information)

R 5 mg/kg BW IV, with incremental doses up to 20 mg/kg maximum (Cooper, 1984); has been given by slow IV drip for periods up to 10 h without tolerance or cumulation developing (Green, 1982)
10–12 mg/kg BW IV (Flecknell, 1996)

Rb 6–9 mg/kg BW IV (Green, 1982); high mortality possible (Flecknell, 1987)

Re 9 mg/kg BW IV (Frye, 1981)
12–18 mg/kg BW IM (Cooper, 1984)
Chelonians: 9–18 mg/kg BW IM (Page, 1993)
Lizards: 9–18 mg/kg BW IM (Page, 1993)

Sw 12 mg/kg BW IM, then 6–8 mg/kg BW IV every 30 min (Tong et al., 1995)

Telazol—*See* Tiletamine and zolazepam

Thiamylal

N 25 mg/kg BW IV (Hughes et al., 1975)

Thiopental

Bo 25 mg/kg BW IV (Dunlop and Hoyt, 1997)
D 6–12 mg/lb BW IV; lower dose with preanesthetic tranquilization (Kinsell, 1986)
Go 20–25 mg/kg BW IV (Swindle and Adams, 1988)
M 25–50 mg/kg BW IV (Taber and Irwin, 1969)
25 mg/kg BW IV (Hughes, 1981)
50 mg/kg BW IP (Williams, 1976)
N 15–20 mg/kg BW IV (Flecknell, 1987)
22–25 mg/kg BW (Hatch, 1966)
R 30 mg/kg BW IV (Flecknell, 1987)
Rb 28 mg/kg BW IV, IP (Croft, 1964)
Re Snakes: 15–25 mg/kg BW IPP (Marcus, 1981)
Sh 20–25 mg/kg BW IV (Swindle and Adams, 1988)
Sw 24–30 mg/kg BW IP (Swindle and Adams, 1988)
5–19 mg/kg BW IV (Swindle and Adams, 1988)

Tiletamine

Rc 10–12 mg/kg BW IM (Evans and Evans, 1986)

Tiletamine/zolazepam (Telazol)

Note: We recommend that users obtain the reference by Schobert, 1987, for the use of Telazol in 52 primate species, 21 cat species, 10 bear species, 8 dog species, 13 members of the Vierridae family, 9 reptile species, 10 species of the Bovidae

family, 33 species of the Cervidae family, 36 bird species, and a table of various miscellaneous species.

Bi 7.7–26 mg/kg BW IM (Curro, 1998)
5–10 mg/kg BW IM (Joint Working Group, 2001a)

Bo 4 mg/kg BW IV (Dunlop and Hoyt, 1997)

C 7.5 mg/kg BW IM and 7.5 mg/kg BW IM (Flecknell, 1996)
5–7.5 mg/kg BW IV (Arnemo et al., 2002)
10–15 mg/kg BW IM (Arnemo et al., 2002)

D 4–10 mg/kg BW IV (Arnemo et al., 2002)
7.5–25 mg/kg BW IM (Arnemo et al., 2002)

F 22 mg/kg BW IM (Payton and Pick, 1989)
12–22 mg/kg BW IM (Morrisey et al., 1996)

G 60 mg/kg BW IM (Hrapkiewicz et al., 1989)

Go 4 mg/kg BW IV (Dunlop and Hoyt, 1997)

Gp 10–30 mg/kg IM (Fowler, 1978)

H Not recommended (Silverman et al., 1983)

M Not recommended (Silverman et al., 1983)

Mi 5–10 mg/kg BW IM (Arnemo et al., 2002)

N 2–6 mg/kg BW IM (Ialeggio, 1989)
Lemurs: 20 mg/kg BW IM (immobilization by dart) (Glander et al., 1992)

R 20–40 mg/kg BW IP (Silverman et al., 1983)

Rb Not generally recommended (except intranasally); nephrotoxicity (Doerning et al., 1990, 1992)
10–25 mg/kg BW IM (Fowler, 1978)
10 mg/kg BW intranasally (no renal compromise) (Robertson and Eberhart, 1994)

Re Chelonians: 10–20 mg/kg BW IM (Page, 1993)
Snakes: 22 mg/kg BW IM (Marcus, 1981)
Snakes: 10–20 mg/kg BW IM (Page, 1993)
Lizards: 30 mg/kg BW IM (Page, 1993)

Sh 2.2 mg/kg BW IM (Schultz, 1989)
4 mg/kg BW IV (Dunlop and Hoyt, 1997)

Sw 6.6–11 mg/kg BW IM following xylazine 2 mg/kg BW IM (Schultz, 1989)
6–8 mg/kg BW IM (Flecknell, 1996)

Tiletamine/zolazepam and detomidine (respectively)

Gp 40 mg/kg BW IM and 5 mg/kg BW IM (Buchanan et al., 1999)

Tiletamine/zolazepam and medetomidine (respectively)

Rb 2.5–5 mg/kg BW IM, SC and 500 µg/kg BW IM, SC (Arnemo et al., 2002)

Tiletamine/zolazepam and xylazine (respectively)

Bo 4 mg/kg BW IM and 0.1 mg/kg BW IM (Arnemo et al., 2002)

C 10 mg/kg BW IM and 1 mg/kg BW IM (Arnemo et al., 2002)

D 10 mg/kg BW IM and 1 mg/kg BW IM (Arnemo et al., 2002)

Go 4 mg/kg BW IM and 0.1 mg/kg BW IM (Arnemo et al., 2002)

Gp 40 mg/kg BW IM and 5 mg/kg BW IM (Buchanan et al., 1999)

H 30 mg/kg BW IP and 10 mg/kg BW IP (Forsythe et al., 1992)

M 80 mg/kg BW IP and 20 mg/kg BW IP (considered high-end dose) (Arras et al., 2001)

Rb 15 mg/kg BW IM and 5 mg/kg BW IM (Popilskis et al., 1991)
15 mg/kg BW IM, SC and 5 mg/kg BW IM, SC (Arnemo et al., 2002)
20 mg/kg BW IM and 3 mg/kg BW IM (Vachon, et al., 1999)

Sh 4 mg/kg BW IM and 0.1 mg/kg BW IM (Arnemo et al., 2002)

Sw 4.4 mg/kg BW IM and 2.2 mg/kg BW IM (Ko et al., 1993)
6 mg/kg BW IM and 2.2 mg/kg BW IM (Braun, 1993)
2–7 mg/kg BW IM and 0.2–1 mg/kg BW IM (Flecknell, 1996)

Tiletamine/zolazepam, butorphanol, and xylazine (respectively)

C Make the following cocktail: To 250 mg powder tiletamine/zolazepam (125 mg each), add 0.5 ml (10 mg/ml) butorphanol, and add 10 ml (20 mg/ml) xylazine. Dose at 0.05–0.1 ml total dose IM. Can be redosed at 1/4–1/3 the initial dose. Cat must not be premedicated. Keep cold and protected from light for up to 8 weeks (Arnemo et al., 2002)

Gp 60 mg/kg BW IP, 0.1 mg/kg BW IM, and 5 mg/kg BW IP (Jacobson, 2001)

Tiletamine/zolazepam, ketamine, and xylazine (respectively)

F 3 mg/kg BW IM, 2.4 mg/kg BW IM, and 0.6 mg/kg BW IM (Ko et al., 1996)

Tribromoethanol

G 250–300 mg/kg BW IP (1.25% solution) (Flecknell, 1987)

M 125 mg/kg BW IP (0.25% solution) (Flecknell, 1987)
250 mg/kg BW IP (Taber and Irwin, 1969)
0.2 ml/10 g BW IP (1.2% solution) (Papaioannou and Fox, 1993)

R 300 mg/kg BW IP (Flecknell, 1987)

Tribromoethanol/amylene hydrate (Avertin)

Note: No longer available commercially but can be made. For concentrated solution (66⅔%), dissolve 1 g 2,2,2-tribromoethanol in 0.5 g amylene hydrate. Take 0.5 ml concentrate and mix with 39.5 ml sterile saline (this is now a 1.25% solution). If solution falls below pH 5.0, discard. **Warning:** Stored solutions are known to be unstable and potentially hepatotoxic. Frequent use may induce chemical peritonitis.

G 250–300 mg/kg BW IP of 1.25% solution (Flecknell, 1987)

M 0.2 ml/10 g BW IP of 1.25% solution (The Jackson Laboratory)

R 300 mg/kg BW IP (Flecknell, 1987)

Tricaine methanesulfonate (MS 222)

Am Immerse in 0.1% solution (Kaplan, 1969)
50–150 mg/kg BW SC, IM (Crawshaw, 1993)
Tadpoles and newts: 200–500 mg/l bath to effect (Crawshaw, 1993)
Frogs, salamanders: 500–2000 mg/l bath (buffer with $NaHCO_3$) (Crawshaw, 1993)
Toads: 1–3 g/l bath (buffer with $NaHCO_3$) (Crawshaw, 1993)

Fi Immerse in 25–100 mg/l water (Klontz, 1964)

Re Snakes: 200–300 mg/kg BW IPP (Marcus, 1981)

Urethane

Am Frogs and toads: Immerse in 1–2% solution (Kaplan, 1969)
Frogs and toads: Inject 0.04–0.12 ml/g BW of 5% solution into dorsal lymph sac (Kaplan, 1969)

F 1500 mg/kg BW IP for acute use only (Andrews and Illman, 1987)

Fi Immerse in 5–40 mg/l water (Klontz, 1964)
Gp 1500 mg/kg BW IV, IP (Flecknell, 1987)
H 1–2 g/kg BW IP (Flecknell, 1996)
R 1000 mg/kg BW IP (Flecknell, 1987)
Rb 1000 mg/kg BW IV, IP (Flecknell, 1987)
Re Turtles: 2.8 g/kg PO (Marcus, 1981)
2.4 g/kg IV (Marcus, 1981)
1.7 g/kg IC (Marcus, 1981)
2.8 g/kg IP (Marcus, 1981)

ANTI-INFECTIVES

Acyclovir

Bi 80 mg/kg BW IM, IV, PO tid (Ritchie and Harrison, 1997)
20 mg/kg BW PO bid for 7 days (Ritchie and Harrison, 1997)

Amantadine

F 6 mg/kg BW as an aerosol bid (Cross, 1995)

Amikacin

Bi 40 mg/kg BW IM sid or bid (Burke, 1986)
22 mg/kg BW q12h (Schultz, 1989)
10–15 mg/kg BW IM, IV, SC q8–12h (Ritchie and Harrison, 1997)
Cockatiels: 15–20 mg/kg BW IM, IV, SC q8–12h (Ritchie and Harrison, 1997)
Psittacines: 30 mg/kg BW total daily dose (Van der Heyden, 1994)
Pigeons: 15–20 mg/kg BW IM, IV bid (Johnson-Delaney, 1996)
Ratites: 10 mg/kg BW PO bid (Welsh et al., 1997)

C 5–7 mg/kg BW IM, IV bid (Boothe, 1996)
15 mg/kg BW IM, IV sid (Boothe, 1996)
Ch 2 mg/kg BW IM, IV, SC tid (Jenkins, 1992)
D 7–10 mg/kg BW IM, IV bid (Boothe, 1996)
20 mg/kg BW IM, IV sid (Boothe, 1996)
N 2.3 mg/kg BW IM sid (Wissman and Parsons, 1992)
Rb 10 mg/kg BW IM, SC q8–12h (Carpenter et al., 1995)
Re Tortoises: 5 mg/kg BW IM q48h for 7–14 days (Page and Mautino, 1990)

Amoxicillin

Bi 150 mg/kg BW IM q6–8h (Ritchie and Harrison, 1997)
Canaries: 300–500 mg/kg BW PO in soft food (Ritchie and Harrison, 1997)
Ratites: 20 mg/kg BW PO bid (Welsh et al., 1997)
Bo 10 mg/kg BW PO q8–12h (Schultz, 1989)
3–5 mg/lb BW IM, SC sid (Kinsell, 1986)
400 mg/100 lb BW PO bid (Sundlof et al., 1991)
62.5 mg (contents of one prepackaged syringe) into each affected quarter q12h for a maximum of 3 treatments (Sundlof et al., 1991)
C 5–10 mg/lb BW PO q12h (Kinsell, 1986)
5 mg/lb BW IM, SC sid (Kinsell, 1986)
11–22 mg/kg BW IM, PO, SC q8–12h (Boothe, 1996)
7 mg/kg BW SC sid (Flecknell, 1996)
D 5 mg/lb BW PO q12h (Kinsell, 1986)
5 mg/lb BW SC, IM sid (Kinsell, 1986)
20 mg/kg BW PO bid (Carr, 1997)
7 mg/kg BW SC sid (Flecknell, 1996)
F 11–22 mg/kg BW PO, SC (Messonnier, 1996)
7 mg/kg BW SC sid (Flecknell, 1996)
25–35 mg/kg BW PO bid (Johnson-Delaney, 1996)
Gp Toxic (Flecknell, 1987)

H Toxic (Flecknell, 1987)
M 100 mg/kg BW SC, IM bid (Flecknell, 1987)
50 mg/kg BW/day in water for 14 days (Russell et al., 1995)
N 7 mg/kg BW SC (Flecknell, 1987)
10 mg/kg BW PO (Flecknell, 1987)
11 mg/kg BW PO bid (Fraser, 1991)
11 mg/kg BW SC, IM sid (Fraser, 1991)
R 150 mg/kg BW SC, IM bid (Flecknell, 1987)
Sh 7 mg/kg BW SC sid (Flecknell, 1996)
Sw 7 mg/kg BW SC sid (Flecknell, 1996)

Amoxicillin/clavulanate

Bi 125 mg/kg BW PO bid (Ritchie and Harrison, 1997)
Ratites: 10 mg/kg BW PO bid (Welsh et al., 1997)
C 13.75–20 mg/kg BW PO bid, tid (Boothe, 1996)
D 13.75–20 mg/kg BW PO bid, tid (Boothe, 1996)
F 12.5 mg/kg BW PO bid for 10–14 days (Johnson-Delaney, 1996)

Amphotericin B

Bi 1.5 mg/kg BW IV q8–12h for 3–7 days (Ritchie and Harrison, 1997)
1 mg/ml in sterile water to nebulize 15 min bid (Ritchie and Harrison, 1997)
C 0.25–0.5 mg/kg BW 2–3 times/week on alternate days, slow IV, IP with 5% dextrose and water (Kinsell, 1986)
D 0.25–0.5 mg/kg BW 2–3 times/week on alternate days, slow IV, IP with 5% dextrose and water (Kinsell, 1986)
0.25–1.0 mg/kg BW IV sid (Johnson et al., 1981)
N 0.25–1.0 mg/kg BW IV sid (Johnson et al., 1981)

Ampicillin

Bi 250 mg/8 oz drinking water (change daily) (Burke, 1986)
100–200 mg/kg BW IM, PO q6–8h (Ritchie and Harrison, 1997)
Emus: 15–20 mg/kg BW IM, PO tid (Ritchie and Harrison, 1997)
Ratites: 5 mg/kg BW IM tid (Welsh et al., 1997)

Bo Ampicillin trihydrate: 5–10 mg/lb BW IM q8h for up to 7 days (Kinsell, 1986)

C Ampicillin sodium: 3 mg/lb BW IV, IM q8–12h (Kinsell, 1986)
Ampicillin trihydrate: 3–8 mg/lb BW IM, SC q8–12h or 10–30 mg/lb BW PO q8–12h (Kinsell, 1986)
22 mg/kg BW IV, PO, SC tid (Hawkins, 1996)
5–10 mg/kg BW IM, IV, SC tid (Boothe, 1996)
10–50 mg/kg BW PO tid (Boothe, 1996)

D Ampicillin sodium: 3 mg/lb BW IV, IM q8–12h (Kinsell, 1986)
Ampicillin trihydrate: 3–8 mg/lb BW IM, SC q8–12h or 5–10 mg/lb BW PO q6–8h (Kinsell, 1986)
20 mg/kg BW PO tid (Carr, 1997)
5–10 mg/kg BW IM, IV, SC tid (Boothe, 1996)
10–50 mg/kg BW PO tid (Boothe, 1996)
22 mg/kg BW IV, PO, SC tid (Hawkins, 1996)

F 5 mg/kg BW SC sid (McKellar, 1989)
10–30 mg/kg BW SC bid (Johnson-Delaney, 1996)

Gp May cause enterocolitis (Bartlett et al., 1978)
6 mg/kg BW SC tid for 5 days (Young et al., 1987)

H Toxic (Flecknell, 1987)

M 2–10 mg/100 g BW PO bid (Russell et al., 1981)
50–150 mg/kg BW SC bid (Flecknell, 1987)

N 30 mg/kg BW IM sid for 5 days (Welshman, 1985)
5 mg/kg BW IM bid (Flecknell, 1987)
20 mg/kg BW IM, IV, PO tid (Johnson et al., 1981)

R 50–150 mg/kg BW SC bid (Flecknell, 1987)
50 mg/adult rat IP sid for 10 days (Rettig et al., 1989)

Rb 22–44 mg/kg BW PO in divided doses (Bowman and Lang, 1986)
10–25 mg/kg BW IM sid for 5–7 days (Bowman and Lang, 1986)
10–25 mg/kg BW IM tid (Raphael, 1981)

Re 3–6 mg/kg BW IM, SC sid until 48 h beyond recovery (Marcus, 1981)
20 mg/kg BW IC bid for 7–9 days (Snipes, 1984)
Tortoises: 20 mg/kg BW IM sid for 7–14 days (Page and Mautino, 1990)

Amprolium

Bi 2–4 ml/gal water of 9.6% solution for 5 days (Ritchie and Harrison, 1997)

Bo 10 mg/kg BW daily in feed for 5 days (Schultz, 1989)

D 100–200 mg/kg BW/day PO in food or water for 7–10 days (Kinsell, 1986)

Apramycin

Sw 150 g/ton of food; use for 14 days (Sundlof et al., 1991)
12.5 mg/kg BW PO sid for 7 days (Mortensen et al., 1996)

Azithromycin

Bi 1 drop/g BW PO bid or 50–80 mg/kg BW/d PO of 30 mg/ml suspension, treat for 3 days, stop for 4 days, continue for 3–6 weeks (Rupley, 1997)

C 5–10 mg/kg BW PO for 5 days then every 48–72 h (Jordan, 2001)
7–15 mg/kg BW PO bid for 5–7 days (Greene, 1998)

D 5–10 mg/kg BW PO bid for 5–7 days (Greene, 1998)
Re Tortoises: 10 mg/kg BW PO suspension for 1 day, then 5 mg/kg BW PO for 4 days (Johnson, 1998)

Carbenicillin

Bi 200 mg/kg BW PO bid (Burke, 1986)
100–200 mg/kg BW IM, IV q6–12h (Ritchie and Harrison, 1997)
200 mg/kg BW PO bid (Ritchie and Harrison, 1997)
D 10–15 mg/lb BW PO q8h or 5–10 mg/lb BW IV q8h (Kinsell, 1986)
Re 100 mg/kg BW initially, then 75 mg/kg IM sid or IV bid (Frye, 1981)
Tortoises: 200–400 mg/kg BW IM q48h for 7–14 days (Page and Mautino, 1990)

Carnidazole

Bi 30–50 mg/kg BW once; may repeat in 10–14 days (Ritchie and Harrison, 1997)

Cefadroxil

Bi Ratites: 20 mg/kg BW PO bid (Welsh et al., 1997)

Cefazolin

Bi 25–50 mg/kg BW IM, IV bid (Ritchie and Harrison, 1997)
C 15–25 mg/kg BW IM, IV, SC q4–8h (Boothe, 1996)
D 15–25 mg/kg BW IM, IV, SC q4–8h (Boothe, 1996)
Gp 100 mg/kg BW IM bid (Fritz et al., 1987)
N 25 mg/kg BW IM, IV bid for 7–10 days (University of Washington, 1987)

Cefotaxime

Bi 75–100 mg/kg BW IM, IV q4–8h (Ritchie and Harrison, 1997)
50–100 mg/kg BW IM, IV tid (Ritchie and Harrison, 1997)
C 20–80 mg/kg BW IM, IV qid (Boothe, 1996)
D 20–80 mg/kg BW IM, IV qid (Boothe, 1996)
N 100–200 mg/kg BW IM tid-qid (Pernikoff and Orkin, 1991)
Re Tortoises: 20–40 mg/kg BW IM sid for 7–14 days (Page and Mautino, 1990)

Cefoxitin

Bi 50–100 mg/kg BW IM, IV bid, tid (Ritchie and Harrison, 1997)
C 10–30 mg/kg BW IM, IV, SC qid (Boothe, 1996)
D 10–30 mg/kg BW IM, IV, SC qid (Boothe, 1996)

Ceftazidime

Bi 75–100 mg/kg BW IM, IV tid, qid (Rupley, 1997)
N Propithecus: 50 mg/kg BW IM, IV tid (Feeser and White, 1992)
50 mg/kg BW IM tid (Feeser and White, 1992)
Re 20 mg/kg BW q72h (Lawrence et al., 1984)

Ceftiofur

Bi Ratites: 20 mg/kg BW IM bid (Welsh et al., 1997)
50–100 mg/kg BW IM qid (Rupley, 1997)
Bo 1.1 mg/kg BW IM sid for up to 5 days (Schultz, 1989)
D 2.2–4.4 mg/kg BW SC bid (Hoskins, 1997)

Ceftizoxime

N 75–100 mg/kg BW IM bid for 7 days (University of Washington, 1987)

Cephalexin

Bi 50 mg/kg BW PO qid (Burke, 1986)
Psittacines: 50–100 mg/kg BW PO tid (Ritchie and Harrison, 1997)
Emus: 35–50 mg/kg BW PO qid (Ritchie and Harrison, 1997)
Quail and ducks: 35–50 mg/kg BW PO q2–3h (Ritchie and Harrison, 1997)

C 35 mg/kg BW PO q12h (Kinsell, 1986)
20–40 mg/kg BW PO tid (Hawkins, 1996)
10–30 mg/kg BW PO q6–8h (Boothe, 1996)
10 mg/kg BW SC sid (Flecknell, 1996)

D 35 mg/kg BW PO q12h (Kinsell, 1986)
20–40 mg/kg BW PO tid (Carr, 1997)
10–30 mg/kg BW PO q6–8h (Boothe, 1996)
10 mg/kg BW SC sid (Flecknell, 1996)

F 10 mg/kg BW SC sid (Flecknell, 1996)
10–15 mg/kg BW PO bid for 10 days (Johnson-Delaney, 1996)

G 25 mg/kg BW SC sid (Flecknell, 1996)

Gp 50 mg/kg BW IM sid for 14 days (Richardson, 1992)
15 mg/kg BW SC sid (Flecknell, 1996)

M 60 mg/kg BW PO bid (Flecknell, 1987)
15 mg/kg BW IM bid (Flecknell, 1996)

N 20 mg/kg BW PO bid (Flecknell, 1987)

R 60 mg/kg BW PO bid (Flecknell, 1987)
15 mg/kg BW SC bid (Flecknell, 1996)

Rb 15–20 mg/kg BW PO bid (Flecknell, 1987)
15 mg/kg BW SC bid (Flecknell, 1996)

Sh 10 mg/kg BW SC sid (Flecknell, 1996)
Sw 10 mg/kg BW SC sid (Flecknell, 1996)

Cephaloridine

F 15 mg/kg BW IM sid (McKellar, 1989)
G 30 mg/kg BW IM bid (Flecknell, 1987)
Gp 10–25 mg/kg BW IM sid for 5–7 days (Harkness and Wagner, 1977)
15–25 mg/kg BW SC sid (Bauck, 1989)
12.5 mg/kg BW IM sid for 14 days (Dixon, 1986)
H May cause enterocolitis (Bartlett et al., 1978)
10 mg/kg BW IM bid (Holmes, 1984)
30 mg/kg BW IM bid (Flecknell, 1987)
M 30 mg/kg BW IM bid (Flecknell, 1987)
N 11 mg/kg BW IM bid (Melby and Altman, 1976)
20 mg/kg BW IM bid (Flecknell, 1987)
R 30 mg/kg BW IM bid (Flecknell, 1987)
Rb 10–25 mg/kg BW IM, SC sid for 5 days (Bowman and Lang, 1986)
Re 10 mg/kg BW IM, SC bid (Frye, 1981)

Cephalothin

Bi 100 mg/kg BW IM qid (Burke, 1986)
100 mg/kg BW IM, IV, PO qid (Ritchie and Harrison, 1997)
Quail and ducks: 100 mg/kg BW IM, IV, PO q2–3h (Ritchie and Harrison, 1997)
C 40–80 mg/kg BW/day IM, IV q8–12h (Kinsell, 1986)
20–40 mg/kg BW IM, IV, SC tid (Hawkins, 1996)
15–35 mg/kg BW IM, IV, SC q6–8h (Boothe, 1996)
D 40–80 mg/kg BW/day IM, IV q8–12h (Kinsell, 1986)
20–40 mg/kg BW IM, IV, SC tid (Hawkins, 1996)
15–35 mg/kg BW IM, IV, SC q6–8h (Boothe, 1996)

Rb 13 mg/kg BW IM qid for 6 days (Bowman and Lang, 1986)
Re 20–40 mg/kg BW IM bid (Frye, 1981)

Ceptriaxone

Bi 75–100 mg/kg BW IM, IV q4–8h (Rupley, 1997)

Chloramphenicol palmitate (not for use in food animals)

Bi 30–50 mg/kg BW PO tid, qid (Ritchie and Harrison, 1997)
C 15–20 mg/lb BW PO q8–12h (Kinsell, 1986)
25–50 mg/kg BW PO bid (Carr, 1997)
50 mg/cat PO q4–6h (Boothe, 1996)
Ch 30–50 mg/kg BW PO bid (Jenkins, 1992)
D 20–25 mg/lb BW PO q6–8h (Kinsell, 1986)
25–50 mg/kg BW PO tid (Carr, 1997)
50 mg/kg BW PO q4–6h (Boothe, 1996)
F 40 mg/kg BW PO tid for 14 days (Krueger et al., 1989)
50 mg/kg BW PO bid for 10 days (Krueger et al., 1989)
G 50 mg/kg BW PO bid (Bauck, 1989)
Gp 50 mg/kg BW PO bid (Bauck, 1989)
50 mg/kg BW PO tid (Russell et al., 1981)
H 20 mg/100 g BW PO tid (Russell et al., 1981)
50 mg/kg BW PO bid (Bauck, 1989)
M 20 mg/100 g BW PO tid (oral suspension) (Russell et al., 1981)
100 mg/200 ml drinking water for 3–5 days (Williams, 1976)
50 mg/kg BW PO bid (Bauck, 1989)
N 50 mg/kg BW PO bid (Flecknell, 1987)
R 20 mg/100 g BW PO tid (Russell et al., 1981)
50 mg/kg BW PO bid (Bauck, 1989)
Rb 50 mg/kg BW PO sid for 5–7 days (Harkness and Wagner, 1983)
50 mg/kg BW PO bid (Bauck, 1989)

30–50 mg/kg BW PO bid for 5–7 days (Carpenter et al., 1995)
750 mg/pint drinking water (Raphael, 1981)

Re Tortoises: 20 mg/kg BW PO bid for 7–14 days (Page and Mautino, 1990)

Chloramphenicol succinate (not for use in food animals)

Bi 80 mg/kg BW IM bid or tid (Burke, 1986)
80 mg/kg BW IM, IV, SC bid, tid (Ritchie and Harrison, 1997)

C 10 mg/kg BW IM, IV q12h (Kinsell, 1986)
50 mg/cat IM, IV, SC q4–6h (Boothe, 1996)

D 10 mg/kg BW IM, IV q12h (Kinsell, 1986)
50 mg/kg BW IM, IV, SC q4–6h (Boothe, 1996)
50 mg/kg BW SC sid (Flecknell, 1996)

F 25 mg/kg BW SC sid (Flecknell, 1996)
30–50 mg/kg BW IM, IV bid (Johnson-Delaney, 1996)

Fi 75 mg/kg BW PO sid in feed for 14 days (CCAC, 1984)

G 30 mg/kg BW IM bid (Flecknell, 1987)
50 mg/60 ml drinking water for 2 weeks (Williams, 1976)
50 mg/kg BW SC bid (Bauck, 1989)
30 mg/kg BW SC bid (Flecknell, 1996)

Gp 20 mg/kg BW IM bid (Flecknell, 1987)
50 mg/kg BW SC bid (Bauck, 1989)

H 30 mg/kg BM IM bid (Flecknell, 1987)
50 mg/kg BW SC bid (Bauck, 1989)
30 mg/kg BW SC bid (Flecknell, 1996)

M 50 mg/kg BW IM bid (Flecknell, 1987)
50 mg/kg BW SC bid (Bauck, 1989)

N 25 mg/kg BW IV bid for 10 days (DaRif and Rush, 1983)
50 mg/kg BW IM bid for 10 days (DaRif and Rush, 1983)
110 mg/kg BW IM qid for 5–10 days for pneumococcal meningoencephalitis (Ialeggio, 1989)

20 mg/kg BW IM bid (Flecknell, 1996)

R 50 mg/kg BW IM bid (Flecknell, 1987)
50 mg/kg BW SC bid (Bauck, 1989)
10 mg/kg BW IM bid (Flecknell, 1996)

Rb 30 mg/kg BW IM sid for 5–7 days (Harkness and Wagner, 1983)
50 mg/kg BW SC bid (Bauck, 1989)
50 mg/kg BW SC, IM, IV tid (Russell et al., 1981)
30 mg/kg BW IM, IV tid for 5–7 days (Carpenter et al., 1995)
15 mg/kg BW IM bid (Flecknell, 1996)

Re Toads: 5 mg/100 g BW initially, then 3 mg/100 g BW PO bid for 5 days (Marcus, 1981)
Turtles: 40 mg/kg BW IM, IP bid for 7 days (Marcus, 1981)
Tortoises: 20 mg/kg BW IM bid for 7–14 days (Page and Mautino, 1990)

Sw 11 mg/kg BW IM sid (Flecknell, 1996)

Chlorhexidine

Bi 10–25 ml of 2% solution/gal water PO; do not use in finches (Ritchie and Harrison, 1997)
10 ml of 2% solution/gal water PO for 10–14 days (Ritchie and Harrison, 1997)
5–10 mg/kg BW PO (Ritchie and Harrison, 1997)

Chlortetracycline

Bi 5000 ppm in food for 30–45 days (Burke, 1986)
Canaries: 1–1.5 g/l drinking water (Ritchie and Harrison, 1997)
Ratites: 20 mg/kg BW PO tid (Welsh et al., 1997)

Ch 400 mg/gal drinking water for 4 days (Jenkins, 1992)

Ciprofloxacin

Bi Psittacines: 80 mg/kg BW total daily dose (Van der Heyden, 1994)
Pigeons: 5–20 mg/kg BW PO bid for 5–7 days (Johnson-Delaney, 1996)
Ratites: 5 mg/kg BW PO bid (Welsh et al., 1997)
20–40 mg/kg BW IV, PO bid (Ritchie and Harrison, 1997)

C 5.2 mg/kg BW PO bid (McKellar, 1996)
5–15 mg/kg BW IV, PO bid (Boothe, 1996)

D 5.2 mg/kg BW PO bid (McKellar, 1996)
5–15 mg/kg BW IV, PO bid (Boothe, 1996)

F 10–15 mg/kg BW PO bid (Johnson-Delaney, 1996)

N 16–20 mg/kg BW PO q12h in sterile water (Kelly et al., 1992)

Rb 50 mg/kg BW IM tid for 4 days (Strunk et al., 1985)
40 mg/kg BW IM tid for 28 days (Norden and Shinners, 1985)
40 mg/kg BW IM bid for 17 days (Bayer et al., 1985)
12–20 mg/kg BW PO (Göbel, 1996)

Clindamycin

C 11 mg/kg BW PO bid (Boothe, 1996)

D 11 mg/kg BW PO bid (Boothe, 1996)

F 10 mg/kg BW PO bid (Johnson-Delaney, 1996)

Gp May cause enterotoxic cecitis (Bartlett, 1979)

Clofazimine

Bi Psittacines: 6 mg/kg BW total daily dose (Van der Heyden, 1994)

Clotrimazole

Bi 30–45 min sid for 3 days of 1% solution, off 2 days; for up to 4 months (Ritchie and Harrison, 1997)

Danofloxacin

Bi 50 ppm for 3 days (for day-old chicks) (Ritchie and Harrison, 1997)

Dimetridazole

H 500 mg/l drinking water (La Regina et al., 1980)

Rb 0.025% solution prepared using 45 g active ingredient/50 gal drinking water (Williams, 1979)

Doxycycline

Bi 18–26 mg/kg BW oral syrup PO bid in psittacines (Burke, 1986)

22–44 mg/kg BW IV sid or bid (Burke, 1986)

25–50 mg/kg BW IV once; used to get peak dose in critical case (Ritchie and Harrison, 1997)

Amazons, cockatoos, and African greys: 0.1% in diet (Ritchie and Harrison, 1997)

Green-winged macaws, Amazons, and cockatiels: 25–50 mg/kg BW PO q24–48h (Ritchie and Harrison, 1997)

African greys, Goffin cockatoos, blue and gold macaws, and pigeons: 25 mg/kg BW sid (Ritchie and Harrison, 1997)

Senegal parrots: 25 mg/kg BW PO bid (Ritchie and Harrison, 1997)

Canaries: 250 mg/l water; 1000 mg/kg in soft food (Ritchie and Harrison, 1997)

Nectar eaters: 8 mg/kg BW PO q12–24h (Ritchie and Harrison, 1997)

C 5–10 mg/kg BW PO bid (Hawkins, 1996)
D 10 mg/kg BW PO bid (Carr, 1997)
5–10 mg/kg BW PO bid (Hawkins, 1996)
N 5 mg/kg BW PO divided bid day 1; 2.5 mg/kg BW the following days (Wolff, 1990)
Rb 2.5 mg/kg BW PO bid (Carpenter et al., 1995)
Re 5–10 mg/kg BW PO sid for 10–45 days (Messonnier, 1996)

Enrofloxacin

Am 1.5–10 mg/kg BW IM, SC sid (Göbel, 1996)
Bi 7.5–15 mg/kg BW IM, PO bid (Ritchie and Harrison, 1997)
2.5–5 mg/kg BW IM bid (Rosskopf, 1989)
Poultry: 50 ppm in water (McKellar, 1996)
Ratites: 1–2 mg/kg BW IM, PO bid (Welsh et al., 1997)
C 2.5–5 mg/kg BW PO q12–24h (McKellar, 1996)
2.5–5 mg/kg BW IM, SC as a loading dose (McKellar, 1996)
5 mg/kg BW SC sid (Flecknell, 1996)
5 mg/kg BW IV bid (Hardie, 1995)
Ch 10 mg/kg BW IM, PO, SC bid (Jenkins, 1992)
2.5–5 mg/kg BW IM, SC, PO bid (Göbel, 1996)
D 2.5–5 mg/kg BW PO q12–24h (McKellar, 1996)
2.5–5 mg/kg BW IM, SC as a loading dose (McKellar, 1996)
5 mg/kg BW SC sid (Flecknell, 1996)
5 mg/kg BW IV bid (Hardie, 1995)
F 2.5–5 mg/kg BW IM, PO, SC bid (Göbel, 1996)
5–10 mg/kg BW IM, PO, SC bid (Johnson-Delaney, 1996)
G 2.5–5 mg/kg BW IM, PO, SC bid (Göbel, 1996)
10 mg/kg BW SC bid (Flecknell, 1996)
Go 2.5–5 mg/kg BW IM, SC sid (McKellar, 1996)
Gp 5–10 mg/kg BW PO (Dorrestein, 1992)
2.5–5 mg/kg BW IM, PO, SC bid (Göbel, 1996)
5–10 mg/kg BW SC bid (Flecknell, 1996)
100 mg/l water (Dorrestein, 1992)

H 5–10 mg/kg BW PO (Dorrestein, 1992)
100 mg/l water (Dorrestein, 1992)
2.5–5 mg/kg BW IM, PO, SC bid (Göbel, 1996)
10 mg/kg BW SC bid (Flecknell, 1996)

M 2.5–5 mg/kg BW IM, PO, SC bid (Göbel, 1996)
85 mg/kg BW SC bid for 14 days (Goelz et al., 1994)
85 mg/kg/d PO in deionized water for 14 days (Goelz et al., 1994)
85 mg/kg/d PO in drinking water (Matsumiya and Lavoie, 2003)

N 5 mg/kg BW IM, PO q24h for 5 days (Line, 1993)
5 mg/kg BW by gastric intubation sid for 10 days (Line et al., 1992)
50 mg/kg BW SC bid (Flecknell, 1996)

R 2.5–5 mg/kg BW IM, PO, SC bid (Göbel, 1996)
10 mg/kg BW SC bid (Flecknell, 1996)

Rb 5–10 mg/kg BW IM, SC bid (repeated injections may lead to necrosis, abscesses) (Carpenter et al., 1995)
10 mg/kg BW bid (Mladinich, 1989)
5 mg/kg BW PO bid (Broome et al., 1991)
5–10 mg/kg BW PO (Dorrestein, 1992)
100 mg/l water (Dorrestein, 1992)

Re 10 mg/kg BW IM, SC sid for 10–14 days (Messonnier, 1996)
2.5–5 mg/kg BW IM, PO bid for 10–14 days (Messonnier, 1996)

Sh 2.5–5 mg/kg BW IM, SC sid (McKellar, 1996)

Sw 2.5–5 mg/kg IM, PO sid (McKellar, 1996)

Erythromycin

Bi 200 mg/10 ml saline for nebulization tid (15 min) (Ritchie and Harrison, 1997)

Note: Do not inject IM; severe muscle necrosis.

45–90 mg/kg BW PO bid for 5–10 days (Ritchie and Harrison, 1997)

C 5–10 mg/lb BW PO q8h (Kinsell, 1986)

D 5–10 mg/lb BW PO q8h (Kinsell, 1986)

F 10–15 mg/kg BW PO qid (Johnson-Delaney, 1996)

Fi 100 mg/kg BW in feed for 21 days (CCAC, 1984)

Gp May cause enterocolitis (Bartlett et al., 1978)

H May cause enterocolitis (Bartlett et al., 1978)

N 40 mg/kg BW IM sid (Welshman, 1985)

75 mg/kg BW PO bid for 10 days (University of Washington, 1987)

Ethambutol

Bi 15 mg/kg BW PO for up to 1 year (Rosskopf, 1989)

Psittacines: 30 mg/kg BW total daily dose (Van der Heyden, 1994)

N 22.5 mg/kg BW PO sid in grape juice (reduce dose by ⅓ after 6 weeks) (Wolf et al., 1988)

Florfenicol

Fi 10 mg/kg BW PO sid for 10 days (Horsberg, 2002)

Fluconazole

Bi 2–5 mg/kg BW PO sid for 7–10d (Rupley, 1997)

N 2–3 mg/kg BW PO (Graybill et al., 1990)

Flucytosine

Bi Psittacines: 150–250 mg/kg BW PO bid for 2–4 weeks (Ritchie and Harrison, 1997)

50–250 mg/kg feed (Ritchie and Harrison, 1997)

Furazolidone

Bi 100–200 mg/l water (Ritchie and Harrison, 1997)
200 mg/kg soft food (Ritchie and Harrison, 1997)
N 10–15 mg/kg BW PO sid (Melby and Altman, 1976)
Rb 2.5 g/100 lb feed (Russell et al., 1981)
400 mg/pt in drinking water (Russell et al., 1981)
Re 25–40 mg/kg BW PO sid (Frye, 1981)

Gentamicin

Bi Cockatiels: 5–10 mg/kg BW IM q8–12h (Ritchie and Harrison, 1997)
Ratites: 1–2 mg/kg BW IM tid (Welsh et al., 1997)
Most large: 5 mg/kg BW IM bid or tid (Burke, 1986)
Most small: 10 mg/kg BW IM bid or tid (Burke, 1986)
Raptors: 2.5 mg/kg BW IM tid (Burke, 1986)
40 mg/kg BW PO sid or bid (Burke, 1986)
C 2 mg/lb BW IM, SC q12h the first day, then sid (Kinsell, 1986)
2.2 mg/kg BW SC tid (Senior, 1996)
6 mg/kg BW IV sid (Hardie, 1995)
D 2 mg/lb BW IM, SC q12h the first day, then sid (Kinsell, 1986)
2.2 mg/kg BW SC tid (Senior, 1996)
6 mg/kg BW IV sid (Hardie, 1995)
F 5 mg/kg BW IM, SC sid for 5 days (Johnson-Delaney, 1996)
G 0.5 mg/100 g BW IM sid (Russell et al., 1981)
5–8 mg/kg BW SC sid (Bauck, 1989)
Gp 5–8 mg/kg BW SC sid (Bauck, 1989)
H May cause enterocolitis (Bartlett et al., 1978)
0.5 mg/100 g BW IM sid (Russell et al., 1981)
5–8 mg/kg BW SC sid (Bauck, 1989)
M 0.5 mg/100 g BW IM sid (Russell et al., 1981)
1.2 g/l drinking water for 3 days (Russell et al., 1981)

5–8 mg/kg BW SC sid (Bauck, 1989)

N 2 mg/kg BW IM, IV bid for 10 days (DaRif and Rush, 1983)
2 mg/kg BW IM tid for 7–10 days (Ialeggio, 1989)
Baboons: 3 mg/kg BW IM bid (Ralph et al., 1989)

R 0.5 mg/100 g BW IM sid (Russell et al., 1981)
5–8 mg/kg BW SC sid (Bauck, 1989)

Rb 4 mg/kg BW IM sid (Russell et al., 1981)
5–8 mg/kg BW SC sid (Bauck, 1989)
2.5 mg/kg BW IM, SC tid for 5 days (Carpenter et al., 1995)

Re Nonchelonians: 2.5 mg/kg BW q72h supplemented with parenteral fluids (Frye, 1981)
Chelonians: 10 mg/kg q48h supplemented with parenteral fluids (Frye, 1981)
10–20 mg/15 ml normal saline bid nebulized for 30 min (Snipes, 1984)
Tortoises: 5 mg/kg BW IM q72h for 7–14 days (Page and Mautino, 1990)

Griseofulvin

C 20 mg/kg BW/day PO sid for 6 weeks, or 140 mg/(kg·week) once each week for 6 weeks (see note below) (Kinsell, 1986)

D 20 mg/kg BW/day PO sid for 6 weeks, or 140 mg/(kg·week) once each week for 6 weeks (see note below) (Kinsell, 1986)

Note: For C and D, qualified individuals have found that the above dosages may not be adequate and suggest the dosage of 65 mg/(kg·day). One should consider treatment for at least 6 weeks' duration. The once-a-week treatment is to be discouraged (Kinsell, 1986). One should also consider immune deficiency diseases if treatment appears ineffective.—Eds.

F 25 mg/kg BW PO (Ryland and Gorham, 1978)

Gp 75 mg/kg BW PO sid for 2 weeks (Harkness and Wagner, 1983)
1.5% in dimethyl sulfoxide applied topically bid for 14 days (Post and Saunders, 1979)
M 25 mg/100 g BW PO every 10 days (Russell et al., 1981)
N 20 mg/kg BW PO sid (Johnson et al., 1981)
200 mg/kg BW PO once every 10 days (Johnson et al., 1981)
R 25 mg/100 g BW PO every 10 days (Russell et al., 1981)
Rb 25 mg/100 g BW PO every 10 days (Russell et al., 1981)
2.5 mg/100 g BW PO for 14 days (Russell et al., 1981)
12.5–25 mg/kg BW PO bid for 30 days (Carpenter et al., 1995)

Hetacillin

C 25 mg/kg BW PO tid (Senior, 1996)
D 25 mg/kg BW PO tid (Senior, 1996)

Imipenem/cilastatin (Primaxin)

C 3–10 mg/kg BW IM, IV q6–8h (Boothe, 1996)
2–7.5 mg/kg BW IM, IV tid (Boothe, 1996)
D 3–10 mg/kg BW IM, IV q6–8h (Boothe, 1996)
2–7.5 mg/kg BW IM, IV tid (Boothe, 1996)

Isoniazid

Bi Psittacines: 30 mg/kg BW total daily dose (Van der Heyden, 1994)
N 5 mg/kg BW PO in divided doses (Johnson et al., 1981)
Chimpanzees: 15–25 mg/kg BW PO bid (Fineg et al., 1966)
25 mg/kg BW PO sid in grape juice (reduce dose by ⅓ after 6 weeks) (Wolf et al., 1988)

Itraconazole

Bi 5–10 mg/kg BW PO bid for 4–5 weeks (Rupley, 1997)
African Greys: 5 mg/kg BW PO sid (Rupley, 1997)

Kanamycin

Bi 10–20 mg/kg BW IM bid (Burke, 1986)
10–50 mg/l drinking water (change daily) for 3–5 days (Burke, 1986)
C 5–7.5 mg/kg BW IM, IV, SC tid (Boothe, 1996)
2.5 mg/lb BW SC q12h (Kinsell, 1986)
D 2.5 mg/lb BW SC q12h (Kinsell, 1986)
5–7.5 mg/kg BW IM, IV, SC tid (Boothe, 1996)
N 7.5 mg/kg BW IM bid (Johnson et al., 1981)
Re 10–15 mg/(kg·d) in divided doses IV, IM, IP (Frye, 1981)

Ketoconazole

Bi Psittacines: 30 mg/kg BW PO q12h (Ritchie and Harrison, 1997)
C 10–20 mg/kg BW PO q8–12h (Kinsell, 1986)
D 10–20 mg/kg BW PO q8–12h (Kinsell, 1986)
Re Tortoises: 30 mg/kg BW PO sid for 2–4 weeks (Page and Mautino, 1990)

Lincomycin

Bi Raptors: 100 mg/kg BW PO sid (Burke, 1986)
100–200 mg/l water PO (Ritchie and Harrison, 1997)
C 10 mg/lb BW PO q12h or 7 mg/lb BW PO q8h (Kinsell, 1986)
10 mg/kg BW IM q12h (Kinsell, 1986)
5–10 mg/lb BW slow IV in 5% glucose or normal saline (Kinsell, 1986)

Note: Do not continue therapy longer than 12 days; may cause pseudomembranous colitis.

D 10 mg/lb BW PO q12h or 7 mg/lb BW PO q8h (Kinsell, 1986)
10 mg/kg BW IM q12h (Kinsell, 1986)
5–10 mg/lb BW slow IV in 5% glucose or normal saline (Kinsell, 1986)

Note: Do not continue therapy longer than 12 days; may cause pseudomembranous colitis.

N 5–10 mg/kg BW IM bid (Williams, 1976)
Re 6 mg/kg BW IM bid, sid (Frye, 1981)

Marbofloxacin

Bi 2 mg/kg BW PO sid (Anadón et al., 2002)
C 2 mg/kg BW PO, SC sid (McKellar, 1996)
D 2 mg/kg BW PO, SC sid (McKellar, 1996)
1.25 mg/lb BW PO sid. Can be increased to 2.5 mg/lb BW. Treat for a maximum of 30 days (Pfizer Animal Health product literature)

Methicillin

N 50 mg/kg BW IM bid for 7 days (University of Washington, 1987)

Metronidazole

Bi Pigeons: 50 mg/kg BW PO bid for 5 days (Johnson-Delaney, 1996)
200–250 mg/kg BW PO sid for 3–7 days (Johnson-Delaney, 1996)
10–20 mg/kg BW IM sid for 2 days (Johnson-Delaney, 1996)
4 g/gal drinking water for 3–7 days (Johnson-Delaney, 1996)

C 10 mg/kg BW PO tid (Boothe, 1996)
10–15 mg/kg BW IV, PO bid-tid (Groman, 2000)
62.5 mg/kg BW/d PO (Groman, 2000)
25 mg/kg BW/d for 5 days (*Giardia*) (Groman, 2000)

D 60 mg/kg BW PO sid for 5 days (Kinsell, 1986)
10 mg/kg BW PO tid (Boothe, 1996)
10–15 mg/kg BW IV, PO bid-tid (Groman, 2000)
15 mg/kg BW PO sid, bid (Groman, 2000)
50 mg/kg BW/d PO for 5 days (*Giardia*) (Groman, 2000)

F 35 mg/kg BW PO sid for 5 days (Bell, 1994)

Fi 50 mg/kg BW PO sid for 5 days (Harms, 1996)
5–10 ppm continuous bath (Harms, 1996)

Gp 20 mg/kg BW PO, SC sid (Richardson, 1992)

M 2.5 mg/ml drinking water for 5 days (Roach et al., 1988)

N 35–50 mg/(kg·day) BW PO bid for 10 days (Holmes, 1984)

Rb 20 mg/kg BW PO bid (Carpenter et al., 1995)

Re 125–275 mg/kg BW PO once; may be repeated at 7- to 10-day intervals for 1–2 more treatments (Frye, 1981)
Tortoises: 250 mg/kg BW PO once; repeat in 2 weeks (Page and Mautino, 1990)

Minocycline

C 5–12.5 mg/kg BW PO bid (Boothe, 1996)

D 5–12.5 mg/kg BW PO bid (Boothe, 1996)

N 4 mg/kg BW PO (Whitney et al., 1977)
15 mg/kg BW PO q12h for 7 days (Junge et al., 1992)

Rb 6 mg/kg BW IV q8h (Nicolau et al., 1993)

Neomycin

Bi 10 mg/kg BW PO bid or tid (Burke, 1986)
80–100 mg/l drinking water (Ritchie and Harrison, 1997)

C 5–7 mg/lb BW PO q6–24h (Kinsell, 1986)

D 5–7 mg/lb BW PO q6–24h (Kinsell, 1986)

F 10–20 mg/kg BW PO (Ryland and Gorham, 1978)
10 mg/kg BW PO in divided doses (Flecknell, 1996)

G 100 mg/kg BW PO sid (Flecknell, 1987)
10 g/gal drinking water for 5 days, then 5 g/gal for an additional 5 days (Russell et al., 1981)

Gp 5 mg/300- to 400-g animal PO bid for 5 days (Farrar and Kent, 1965)
10 mg/kg BW PO sid (Flecknell, 1987; McKellar, 1989)
30 mg/kg SC (Flecknell, 1987)
5 mg/kg BW PO bid (Richardson, 1992)

H 5 ml Biosol/100 ml drinking water for 5 days, then give ½ dose for an additional 5 days (Russell et al., 1981)
125 mg/l drinking water (La Regina et al., 1980)
10 mg in 0.25 ml water/40-g animal sid via intragastric administration (Sheffield and Beveridge, 1962)
10 mg/kg BW PO sid (Flecknell, 1987)

M 2 mg/ml drinking water for 14 days; prepare fresh daily (Barthold, 1980)
10 g/gal drinking water for 5 days, then 5 g/gal for an additional 5 days (Russell et al., 1981)
50 mg/kg BW SC sid (McKellar, 1989)

N 10 mg/kg BW PO bid (Flecknell, 1987)

R 50 mg/kg BW IM bid (Flecknell, 1987)
10 g/gal drinking water for 5 days, then 5 g/gal for an additional 5 days (Russell et al., 1981)
2 mg/ml drinking water (Flecknell, 1996)

Rb 30 mg/kg BW PO bid for 5 days (Carpenter et al., 1995)
0.2–0.8 mg/ml drinking water (Flecknell, 1996)

Sh 11 mg/kg BW PO bid (Flecknell, 1996)

Sw 11 mg/kg BW PO bid (Flecknell, 1996)

Nitrofurantoin

C 1–2 mg/lb BW PO q8h with food (Kinsell, 1986)
D 1–2 mg/lb BW PO q8h with food (Kinsell, 1986)
Gp 50 mg/kg BW sid for 3 days (Richardson, 1992)
N 2–4 mg/kg BW IM, IV tid (Johnson et al., 1981)
R 0.2% in feed for 6–8 weeks (Russell et al., 1981)

Nitrofurazone

Bi ⅛ to ¼ tsp of 9.3% soluble powder/l of water (change daily) (Burke, 1986)
N 11 mg/kg BW PO sid (Melby and Altman, 1976)
Rb 11 mg/kg BW PO sid (Melby and Altman, 1976)
100 mg/l drinking water (Schuchman, 1977)

Norfloxacin

Bi Ratites: 3–5 mg/kg BW PO bid (Welsh et al., 1997)
C 22 mg/kg BW PO bid (McKellar, 1996)
D 22 mg/kg BW PO bid (McKellar, 1996)
M 200 mg/kg BW IM bid (our interpretation of Fromtling et al., 1985, Eds.)

Nystatin

Bi Psittacines: 300,000 IU/kg BW q8–12h for 7–14 days (Ritchie and Harrison, 1997)
Passerines: 100 IU/l water (Ritchie and Harrison, 1997)
N 200,000 U PO qid until 2 days following recovery (Fraser, 1991)
Re 100,000 IU/kg BW PO sid (Messonnier, 1996)

Orbifloxacin

C 2.5–5 mg/kg BW IM sid (McKellar, 1996)
D 2.5–5 mg/kg BW IM sid (McKellar, 1996)
Go 2.5–5 mg/kg BW IM sid (McKellar, 1996)
Sh 2.5–5 mg/kg BW IM sid (McKellar, 1996)
Sw 2.5–5 mg/kg BW IM sid (McKellar, 1996)

Oxolinic acid

Fi 15 mg/kg BW PO sid for 10 days (Horsberg, 2002)

Oxytetracycline

Bi 200 mg/kg BW IM sid (one dose) (Burke, 1986)
Ratites: 5 mg/kg BW IM bid (Welsh et al., 1997)
Bo 7–11 mg/kg BW/day not to exceed 4 consecutive days (Schultz, 1989)
C 20 mg/kg BW PO tid (Carr, 1997)
D 20 mg/kg BW PO tid (Carr, 1997)
G 800 mg/l drinking water (Williams, 1976)
20 mg/kg BW SC sid (McKellar, 1989)
Gp 5 mg/kg BW IM bid (Siegmund, 1979)
H 20 mg/kg BW SC sid (McKellar, 1989)
M 400 mg/l drinking water given continuously (Williams, 1976)
100 mg/kg BW SC bid (Flecknell, 1987)
N 10 mg/kg BW SC, IM (Flecknell, 1987)
R 60 mg/kg BW SC q72h of long-acting drug (Liquimycin LA-200) (Curl et al., 1988)
Rb 30–100 mg/kg BW in divided doses PO (Bowman and Lang, 1986)
400–1000 mg/l drinking water (Bowman and Lang, 1986)
15 mg/kg BW SC, IM (Flecknell, 1987)
15 mg/kg BW IM tid for 7 days (Carpenter et al., 1995)
50 mg/kg BW qid (Raphael, 1981)

Re 6–10 mg/kg BW IV, IM sid (Frye, 1981)

Sh 7–11 mg/kg BW/day not to exceed 4 consecutive days (Schultz, 1989)

Penicillin

Bi Penicillin G, benzathine: 100 mg/kg BW IM sid, qod (Ritchie and Harrison, 1997)

Note: May cause death if given IV (Ritchie and Harrison, 1997)

Penicillin G, procaine: 100 mg/kg BW IM q24–48h (Ritchie and Harrison, 1997)

Note: Never use procaine in parrots or passerines (Ritchie and Harrison, 1997)

Bo Penicillin G, procaine: 20,000–40,000 U/kg BW IM q12h (Schultz, 1989)

Penicillin G, procaine and penicillin G, benzathine: 20,000–40,000 U/kg BW SC q48h (Schultz, 1989)

C Penicillin G, procaine: 40,000 U/kg BW IM q24h (Kinsell, 1986)

D Penicillin G, potassium: 20,000 U/kg BW IM, IV (drip) q4–6h (Kinsell, 1986)

Penicillin G, procaine: 40,000 U/kg BW IM sid (Kinsell, 1986)

Penicillin G, procaine and penicillin G, benzathine: 1 ml/10–25 lb BW IM, SC repeat in 48 h (Kinsell, 1986)

Gp May cause enterotoxic cecitis (Bartlett, 1979)

M Penicillin, potassium: 100,000 IU/kg BW IM bid (do not use procaine penicillin) (Russell et al., 1981)

Penicillin, potassium: 60,000 U/mouse IM (Taber and Irwin, 1969)

N Penicillin G, procaine: 20,000 U/kg BW IM bid (Johnson et al., 1981)

Penicillin G, benzathine: 40,000 U/kg BW IM every 3 days (Johnson et al., 1981)

R Penicillin, potassium: 100,000 IU/kg BW IM bid (Russell et al., 1981)

Penicillin, oral: 15,000 IU/20 ml drinking water (Williams, 1976)

Rb Penicillin G, procaine and penicillin G, benzathine: 42,000 or 84,000 IU/kg BW SC once each week for 3 weeks (Cunliffe-Beamer and Fox, 1981)

Penicillin G, procaine and penicillin G, benzathine: "FloCillin"—2 ml/10 lb BW IM, SC qod (Russell et al., 1981)

Penicillin G, procaine: 60,000 U/kg BW IM sid for 10 days (Jaslow et al., 1981; Welch et al., 1987)

Penicillin G, procaine: 50,000 IU/kg BW sid (Bauck, 1989)

Re Penicillin G, procaine and penicillin G, benzathine: 10,000 U total penicillin activity/kg BW IM at 24- to 72-h intervals (Frye, 1981)

Penicillin G, potassium: 10,000–20,000 U/kg BW IM, SC tid or qid (Frye, 1981)

Sh Penicillin G, procaine and penicillin G, benzathine: 10,000 or 20,000 U/kg BW IM every 3 or 6 days, respectively (Schultz, 1989)

Sw Penicillin G, procaine and penicillin G, benzathine: 10,000–40,000 U/kg BW IM every 3 days (Schultz, 1989)

Piperacillin

Bi 100–200 mg/kg BW IM, IV q6–8h (Ritchie and Harrison, 1997)

Budgerigars: 200 mg/kg BW IM, IV q8h (Ritchie and Harrison, 1997)

N 100–150 mg/kg BW IM, IV bid for 7–10 days (University of Washington, 1987)

80–100 mg/kg BW IM, IV tid for 7–10 days (University of Washington, 1987)

Re 100–400 mg/kg BW IM sid (Messonnier, 1996)

Polymyxin B

Bi Canaries: 50,000 IU/l water (Ritchie and Harrison, 1997)

Rb 3 mg/300- to 400-g animal PO bid for 5 days (Farrar and Kent, 1965)

Potassium iodide

C 0.1 ml/kg BW PO of 20% solution for 8 weeks (González-Cabo et al., 1989)

Rifampin

Bi 10–20 mg/kg BW PO bid (Rosskopf, 1989)
Psittacines: 45 mg/kg BW total daily dose (Van der Heyden, 1994)

N 22.5 mg/kg BW PO sid in grape juice (reduce by ⅓ after 6 weeks) (Wolf et al., 1988)

Spectinomycin

Bi Canaries: 200–400 mg/l water (Ritchie and Harrison, 1997)

D 2.5–5 mg/lb BW IM q12h (Kinsell, 1986)

Streptomycin sulfate

Bi Not for use in psittacines or passerines (Ritchie and Harrison, 1997)
10–15 mg/kg BW IM bid (Burke, 1986)
10–30 mg/kg BW IM q8h (Ritchie and Harrison, 1997)
10–20 mg/kg BW IM bid for 7 days (Rosskopf, 1989)

Fi 30–40 mg/kg BW IP sid (CCAC, 1984)
M 4–5 mg/adult mouse SC sid (McDougall et al., 1967)
Rb 10 mg/kg BW IM q4h (CCAC, 1984)
Re 10 mg/kg BW IM bid (Frye, 1981)

Succinylsulfathiazole

Gp 0.1% in drinking water (Williams, 1976)

Sulfachlorpyrizidine

Bi 0.25 tsp/l water for 5–10 days (Schultz, 1989)
Canaries: 150–300 mg/l drinking water (Ritchie and Harrison, 1997)

Sulfadiazine and pyrimethamine (respectively)

Mi Toxic

Sulfadimethoxine

Bi 20 mg/kg BW PO bid (Burke, 1986)
50 mg/kg BW PO sid for 5 days, off for 3 days, repeat for 5 days (Ritchie and Harrison, 1997)
Ratites: 0.05% concentration in drinking water (Welsh et al., 1997)
C 25 mg/lb BW IM, IP, PO, SC the first day, then 12.5 mg/lb BW q24h for 6 days (Kinsell, 1986)
Ch 12.5 mg/kg BW PO bid (Hoefer, 1994)
D 25 mg/lb BW IM, IP, PO, SC the first day, then 12.5 mg/lb BW q24h for 6 days (Kinsell, 1986)
F 300 mg/kg BW daily in drinking water for 2 weeks (Bell, 1994)
Mi Toxic
Rb 75–100 mg/kg BW PO sid for 7 days (Rossoff, 1974)

12.5 mg/kg BW PO bid (Carpenter et al., 1995)

Re 90 mg/kg BW IV, IM sid first day, then 45 mg/kg BW sid days 2–6 (Frye, 1981)

Sulfamerazine

Fi 240 mg/kg BW sid in feed for 14 days (CCAC, 1984)

Gp 40 ml 12.5% solution/gal drinking water (Russell et al., 1981)

M 0.02% in drinking water (Flecknell, 1987)

Mi Toxic

R 0.02% in drinking water (Flecknell, 1987)

Sulfamethazine

Bi 30 mg/oz drinking water (Ritchie and Harrison, 1997)
Chickens: for coccidia, 128–187 mg/kg BW sid for 2 days, then ½ dose for 4 days (Ritchie and Harrison, 1997)
30 mg/oz solution PO full strength instead of drinking water for 5–7 days (Burke, 1986)

C 50 mg/kg BW PO, IV q12h of 12.5% solution (Kinsell, 1986)

D 50 mg/kg BW PO, IV q12h of 12.5% solution (Kinsell, 1986)

Gp 12.5%: add 4 ml/500 ml drinking water for 1–2 weeks (Williams, 1976)
12.5%: add 1.33–4.14 ml/l drinking water (Melby and Altman, 1976)
166–517 mg/l drinking water (CCAC, 1984)

H 665–800 mg/l drinking water (CCAC, 1984)

M 12.5%: dilute 1 ml with 49 ml water and give 0.5 ml diluted solution to 30-g mouse bid (Russell et al., 1981)
12.5%: add 5 ml/pt in drinking water (100 mg/kg BW PO) (Russell et al., 1981)
450–1200 mg/l drinking water (CCAC, 1984)

Mi Toxic
N 66 mg/kg BW PO bid (CCAC, 1984)
R 12.5%: add 5 ml/pt drinking water (100 mg/kg BW PO) (Russell et al., 1981)
665–950 mg/l drinking water (CCAC, 1984)
Rb 12.5%: add 5 ml/pt drinking water (100 mg/kg BW PO) (Russell et al., 1981)
900–1350 mg/l drinking water (CCAC, 1984)
Re 0.5 g/kg BW PO sid first day, then 0.25 g/kg BW days 2–4 (Frye, 1981)

Sulfaquinoxaline

Bi Poultry: 0.0125–0.025% in drinking water (Schultz, 1989)
Bo 10 g/100 lb BW PO daily for 3–5 days (Schultz, 1989)
Gp 0.25–1.0 g/l drinking water for 30 days (Schuchman, 1977)
Mi Toxic
Rb 0.05% in drinking water (Patton, 1979)
6 mg/lb BW PO for 5–7 days (Russell et al., 1981)
Re 0.04% in drinking water for 3–5 days (Frye, 1981)
Sh 10 g/100 lb BW PO daily for 3–5 days (Schultz, 1989)
Sw 0.0125–0.025% in drinking water (Schultz, 1989)

Sulfasalazine

N 30 mg/kg BW PO bid (Isaza et al., 1992)

Sulfisoxazole

N 50 mg/kg BW PO sid (Johnson et al., 1981)

Tetracycline

Am 1 mg/6 g BW PO (stomach tube) bid for 7 days (mix in small volume of distilled water) (Marcus, 1981)

Bi 250 mg/kg BW of oral suspension bid (Burke, 1986)
50 mg/kg BW PO tid (Ritchie and Harrison, 1997)

C 10–25 mg/lb BW PO q8–12h (Kinsell, 1986)
22 mg/kg BW PO tid (Carr, 1997)

D 10–25 mg/lb BW PO q8–12h (Kinsell, 1986)
22 mg/kg BW PO tid (Carr, 1997)

G 250 mg/100 ml drinking water for 14 days (Williams, 1976)
2 mg/100 g BW PO or IM (Clifford, 1973)
20 mg/kg BW PO bid (Bauck, 1989)

Gp 112–350 mg/l drinking water (CCAC, 1984)
20 mg/kg BW PO bid (Bauck, 1989)
50 mg/kg BW PO by dropper divided into 3 doses (Richardson, 1992)
5 mg/kg BW IM bid (Richardson, 1992)

H 400 mg/l drinking water (La Regina et al., 1980)
20 mg/kg BW PO bid (Bauck, 1989)

M 3–5 mg/ml drinking water for 5–7 days (Harkness and Wagner, 1983)
1 mg/ml drinking water for 7 days (Barthold, 1980)
20 mg/kg BW PO bid (Bauck, 1989)
100 mg/kg BW SC sid (McKellar, 1989)

N 20–25 mg/kg BW PO bid to tid for 7–10 days (Johnson et al., 1981; University of Washington, 1987)
25 mg/kg BW IM, IV bid (University of Washington, 1987)

R 450–643 mg/l drinking water (CCAC, 1984)
20 mg/kg BW PO bid (Bauck, 1989)
100 mg/kg BW SC (McKellar, 1989)

Rb 30–100 mg/kg BW in divided doses PO (Bowman and Lang, 1986)
20 mg/kg BW PO bid (Bauck, 1989)
500–900 mg tetracycline powder in dextrose/l drinking water; fresh twice daily and protect from light (Bauck, 1989)

Re 25–50 mg/kg BW PO bid until 48 h past recovery (Marcus, 1981)

Ticarcillin

Bi 200 mg/kg BW IM, IV bid to qid (Burke, 1986)
C 75–100 mg/kg BW IV q6–8h (Boothe, 1996)
D 75–100 mg/kg BW IV q6–8h (Boothe, 1996)

Tilmicosin

Rb 25 mg/kg BW SC once (McKay et al., 1996)

Tobramycin

Bi 2.5–5 mg/kg BW IM bid (Ritchie and Harrison, 1997)
C 2 mg/kg BW IM, IV, SC tid (Boothe, 1996)
D 2 mg/kg BW IM, IV, SC tid (Boothe, 1996)
Gp 30 mg/kg BW q24h (Kapusnik et al., 1988)

Trimethoprim

N 75 mg/kg IM sid (Welshman, 1985)

Trimethoprim/sulfadiazine

C 5 mg/lb BW sid (Kinsell, 1986)
15 mg/kg BW IM, PO bid (Hawkins, 1996)
Ch 30 mg/kg BW IM, PO, SC bid (Jenkins, 1992)
D 15 mg/kg BW IM, PO bid (Hawkins, 1996)
30 mg/kg BW/day PO; in severe infections use 1/2 daily dose q12h; administer 2–3 days after signs subside but not more than 14 consecutive days (Kinsell, 1986)
1 ml/5 lb BW of oral suspension (Kinsell, 1986)
1 ml/20 lb SC sid of 24% injectable (Kinsell, 1986)
F 30 mg/kg BW PO or oral suspension (Bell, 1994)
Fi 25–33.3 mg/kg BW PO sid for 5–8 days (Ranheim et al., 2002)

G 30 mg/kg BW SC sid (Bauck, 1989)

Gp 0.5 ml/kg BW SC of 240 mg/ml solution (Flecknell, 1987)
30 mg/kg BW SC sid (Bauck, 1989)

H 30 mg/kg BW SC sid (Bauck, 1989)

M 0.5 ml/kg BW SC of 240 mg/ml solution (Flecknell, 1987)

N 0.2 ml/kg BW SC of 240 mg/ml solution (Flecknell, 1987)
0.1 ml/kg BW SC of 240 mg/ml solution for 7–10 days (Ialeggio, 1989)
Prosimians: 25 mg/kg BW SC, IM sid (Feeser and White, 1992)

R 0.5 ml/kg BW SC of 240 mg/ml solution (Flecknell, 1987)

Rb 0.2 ml/kg BW SC bid of 240 mg/ml solution (Flecknell, 1987)
30 mg/kg BW SC sid (Bauck, 1989)

Re Tortoises: 30 mg/kg BW IM, PO q48h for 7–14 days (Page and Mautino, 1990)
30 mg/kg BW IM, SC sid (Messonnier, 1996)

Trimethoprim and sulfamethoxazole (dosed on sulfa concentration)

Bi 100 mg/kg BW PO bid (Burke, 1986)
25 mg/kg BW PO q12h (Ritchie and Harrison, 1997)
50 mg/kg BW PO sid (Ritchie and Harrison, 1997)

G 15 mg/kg BW PO bid (Bauck, 1989)

Gp 15 mg/kg BW PO bid (Bauck, 1989)

H 15 mg/kg BW PO bid (Bauck, 1989)

N *Lemur* and *Varecia*: 50 mg/kg BW PO sid (Feeser and White, 1992)

Rb 15 mg/kg BW PO bid (Bauck, 1989)

Re Tortoises: 30 mg/kg BW IM, PO q48h for 7–14 days (Page and Mautino, 1990)

Tylosin

Bi 10–40 mg/kg BW IM bid or tid (Burke, 1986)

Bo 17.6 mg/kg BW/day IM not to exceed 5 days (Schultz, 1989)

C 1–5 mg/lb BW IM q12–24h (do not mix with any other solution) (Kinsell, 1986)
10–20 mg/lb BW/day PO divided q6–8h (Kinsell, 1986)

D 1–5 mg/lb BW IM q12–24h (do not mix with any other solution) (Kinsell, 1986)
10–20 mg/lb BW/day PO divided q6–8h (Kinsell, 1986)

G 10 mg/100 g BW PO for 21 days (Russell et al., 1981)
10 mg/kg BW IM, SC sid (McKellar, 1989)

H 100 mg/kg BW PO sid (Flecknell, 1987)
10 mg/100 g BW PO for 21 days (Russell et al., 1981)
10 mg/kg BW IM, SC sid (McKellar, 1989)

M 0.2–0.8 mg/100 g BW IM bid (Russell et al., 1981)
10 mg/kg BW SC bid (Flecknell, 1987)
10 mg/100 g BW PO for 21 days (Russell et al., 1981)

N 10 mg/kg BW IM bid (Welshman, 1985)

R 10 mg/kg BW SC sid (Flecknell, 1996)
5 g/l in drinking water mixed with dextrose; give 100 ml treated water to each rat daily (Carter et al., 1987)
10 mg/kg BW SC bid (Flecknell, 1987)
10 mg/100 g BW PO for 21 days (Russell et al., 1981)

Rb 10 mg/kg BW IM, SC, PO bid (Carpenter et al., 1995)

Re 25 mg/kg BW IM, PO sid for 7 days (Marcus, 1981)

Sw 8.8 mg/kg BW IM q12h not to exceed 3 days (Schultz, 1989)
2–10 mg/kg BW IM sid (Flecknell, 1996)

Vancomycin

H 20 mg/kg BW PO by gavage (Boss et al., 1994)

Rb 50 mg/kg BW IV q8h (Nicolau et al., 1993)

PARASITICIDES

Acetic acid

Fi 1–2 g/l water for 1–10 min (Klesius and Rogers, 1995)
500 ppm 30-s dip (protozoa, crustacea) (Harms, 1996)

Albendazole

D 25 mg/kg BW PO q12h for 4 days (Barr et al., 1993)
N 25 mg/kg BW PO for 5 days (Wolff, 1990)

Amprolium

Bi 2–4 ml of 9.6% solution/gal water for 5 days (Ritchie and Harrison, 1997)
Bo 5 mg/kg BW daily in feed for 21 days prophylaxis (Schultz, 1989)
10 mg/kg BW daily in feed for 5 days for treatment (Schultz, 1989)
D 100–200 mg/kg BW PO sid in food or water for 7–10 days (Kinsell, 1986)
F 19 mg/kg BW daily PO sid or in drinking water (Bell, 1994)
Fi 10 ppm bath for 7–10 days (Harms, 1996)

Rb 9.6% solution: 1 ml/15 lb BW PO for 5 days (Williams, 1979)
1 ml/7 kg BW of 9.6% solution sid for 5 days (Carpenter et al., 1995)
5 ml/gal of 9.6% solution in drinking water for 5 days (Carpenter et al., 1995)

Beta-cyclodextrin

Sh 1 g/kg BW PO for 3 days (Castro-Hermida et al., 2002)

Bunamidine

C 25–50 mg/kg BW PO; single dose given on an empty stomach (after 3- to 4-h fast) (Kinsell, 1986)
D 25–50 mg/kg BW PO; single dose given on an empty stomach (after 3- to 4-h fast) (Kinsell, 1986)
N 25 mg/kg BW PO (Williams, 1976)
Re 25–50 mg/kg BW PO, not more often than once every 2–3 weeks (Frye, 1981)

Carbaryl

Bi Dust lightly with 5% powder or add to nest box; remove after 24 h (Ritchie and Harrison, 1997)
M Dust with 5% powder or dilute 1:1 with talc (Harkness and Wagner, 1983)
R Dust with 5% powder or dilute 1:1 with talc (Harkness and Wagner, 1983)
Rb Dust with 5% powder or dilute 1:1 with talc (Harkness and Wagner, 1983)

Carnidazole

Bi 30–50 mg/kg BW PO once, repeat in 10–14 days if necessary (Ritchie and Harrison, 1997)

Clazuril

Bi Pigeons: 2.5 mg/kg BW PO once (Coussement et al., 1988)

Copper sulfate

Fi Alkalinity of water divided by 100 = mg/l dose (Klesius and Rogers, 1995)

Cypermetrin

Fi 16.7 mg per 1000 liters seawater for 30 min (salmon and trout) (Horsberg, 2002)

Decoquinate

F 0.5 mg/kg BW daily mixed in moist food (Bell, 1994)
M 0.5 mg/g food for 3 days (Williams, 1976)

Deltametrin

Fi 2–3 mg per 1000 liters seawater for 30–40 min (salmon and trout) (Horsberg, 2002)

Dichlorvos—*See also* Vapona pest strip (DDVP)

C 5 mg/lb BW PO (Kinsell, 1986)
D 12–15 mg/lb BW PO in adults (Kinsell, 1986)
5 mg/lb BW PO in puppies (Kinsell, 1986)
Fi 0.2 ppm continuous in water, repeated weekly for 4 weeks (Harms, 1996)

M 500 mg/kg food for 24 h; repeat in 12 and 24 days (Wagner, 1970)
500 mg/kg food for 3 days (Williams, 1976)
N 10–15 mg/kg BW PO for 2–3 days (Russell et al., 1981)
30 mg/kg BW PO once (Melby and Altman, 1976)
R 0.5 mg/g food for 1 day (Wagner, 1970)
Rc 30 mg/kg BW PO (Evans and Evans, 1986)
Re 12.5 mg/kg BW PO daily for 2 doses (Frye, 1981)

Diethylcarbamazine

C 25–50 mg/lb BW PO once, repeat in 10–20 days for ascarids (Kinsell, 1986)
D 3–5 mg/lb BW PO sid daily for heartworm prevention (Kinsell, 1986)
25–50 mg/lb BW PO once; repeat in 10–20 days for ascarids (Kinsell, 1986)
N 50 mg/kg sid for 10 days in orange juice (Eberhard, 1982)

Diflubenzuron

Fi 3 mg/kg BW for 14 days (route not indicated) (Horsberg, 2002)

Diiodohydroxyquin

N 20 mg/kg BW PO bid for 3 weeks (Russell et al., 1981)
30 mg/kg BW PO for 10 days (Cummins et al., 1973)
630 mg/chimpanzee PO tid for 3 weeks (Van Riper et al., 1966)
650 mg daily/animal PO for 10–20 days (Ialeggio, 1989)

Dimetridazole (no longer available)

H 1 g/l drinking water for 2 weeks (La Regina et al., 1980)
M 1 g/l drinking water for 2 weeks (Frost, 1977)
10 mg/ml drinking water for 5 days (Roach et al., 1988)

Dithiazanine iodide

M 0.1 mg/g food for 7 days (Williams, 1976)
N 10–20 mg/kg BW PO sid for 3–10 days (Russell et al., 1981)
100 mg/12–20 lb BW bid for 2 weeks (maple syrup acts as vehicle) (Van Riper et al., 1966)
Re 20 mg/kg BW PO sid for 10 days (Frye, 1981)

Emamectin

Fi 50 µg/kg BW sid for 7 days (route not indicated) (Horsberg, 2002)

Emetine hydrochloride

Re 0.5 mg/kg BW/day IM, SC sid, bid for 10 days (Frye, 1981)

Fenbendazole

Am 10 mg/kg BW PO (Cooper, 1985)
Bi Low margin of safety; see Ritchie and Harrison, 1997, for doses
Bo 7.5 mg/kg BW PO (Schultz, 1989)
C 33 mg/kg BW PO sid for 5–7 days (Kinsell, 1986)
D 50 mg/kg BW PO sid for 3 days (Kinsell, 1986)
Fi 11 mg/kg BW PO sid for 2 treatments (Harms, 1996)
20 mg/kg BW PO once; repeat in 7 days (Harms, 1996)
2.5 g/kg feed daily for 3 days; repeat in 14–21 days (Harms, 1996)

Go 5 mg/kg BW PO (Schultz, 1989)

M 100 ppm in food for 14 days (Reiss et al., 1987)
20 mg/kg BW PO for 5 days (McKellar, 1989)

N Lemur, Varecia: 50 mg/kg BW PO sid for 3 days (Feeser and White, 1992)

R 8–12 mg/kg BW/day in feed daily (150 ppm) on alternating weeks (Coghlan et al., 1993)
20 mg/kg BW PO for 5 days (McKellar, 1989)
150 ppm in feed for five 7-day periods, with treatment periods separated by 7 days (Huerkamp et al., 2000)

Rb 50 ppm in food for 5 days (Duwel and Brech, 1981)
20 mg/kg BW PO for 5 days (McKellar, 1989)

Rc 50 mg/kg BW PO sid for 3 days (Evans and Evans, 1986)

Re Tortoises: 50–100 mg/kg BW PO once; repeat in 2 weeks (Page and Mautino, 1990)

Sh 5 mg/kg BW PO (Schultz, 1989)

Sw 5 mg/kg BW PO (Schultz, 1989)

Formalin

Fi 25 mg/l water in ponds; <250 mg/l water for 1 h in tanks and raceways (Klesius and Rogers, 1995)
10 ppm in bath indefinitely (hybrid striped bass and other sensitive species) (Harms, 1996)
15–25 ppm in bath indefinitely or repeated every 3 days with 70–90% water changes (Harms, 1996)
250 ppm in 5–10 min dip (Harms, 1996)
400 ppm in soft water up to 1-h bath every 3 days for 3 treatments (Harms, 1996)
500 ppm in hard water up to 1-h bath every 3 days for 3 treatments (Harms, 1996)

Furadantin—*See* Nitrofurantoin

Hydrogen peroxide (3%)

Fi 17.5 ml/l water for 4- to 10-min dip once (Harms, 1996)

Iodoquinol—*See* Diiodohydroxyquin

Ivermectin

Am *Rana pipiens*: 2 mg/kg BW SC (Letcher and Glade, 1992)

Bi 200–400 µg/kg BW PO or topically in birds <500 g (Clyde, 1996a)
200–400 µg/kg BW IM, SC, PO in birds >500 g (Clyde, 1996a)

Bo 0.2 mg/kg BW SC (Schultz, 1989)

C 400 µg/kg BW SC (Clyde, 1996a)

Ch 200 µg/kg BW PO, SC every 1–2 weeks prn (Hoefer, 1994)

F 1 mg/kg BW SC total dose (Egerton et al., 1980)
200–400 µg/kg BW SC, PO (Messonnier, 1994)
1:20 dilution with propylene glycol for topical treatment of ear mites; repeat in 14 days (Clyde, 1996a)

Gp 500 µg/kg BW SC (McKellar et al., 1992)
400 µg/kg BW SC; repeat in 14 days (Clyde, 1996a)

M 2 mg/kg BW by gavage; repeat in 10 days (Huerkamp, 1990)
1 part 1% ivermectin with 10 parts tap water; mist 1–2 ml over entire cage (Le Blanc et al., 1993)

N 200 µg/kg BW IM; repeat in 10 days (Battles et al., 1988)
200 µg/kg BW SC (Ialeggio, 1989)
200 µg/kg BW PO (Feeser and White, 1992)

R 200 µg/kg BW sid for 5 days by gastric intubation (Battles et al., 1987)
200 µg/kg BW SC once (Findon and Miller, 1987)
3 mg/kg BW PO once (Summa et al., 1992)
2 mg/kg BW PO for 3 treatments at 7- to 9-day intervals (Huerkamp, 1993)

2 mg/kg BW topical as a spot method every 14 days for 3 treatments (Kondo et al., 1998)

Rb 200–400 µg/kg BW SC, PO (Messonnier, 1994)

200–400 µg/kg BW SC, repeat in 10–14 days (Carpenter et al., 1995)

400 µg/kg BW SC (McKellar et al., 1992)

Re Snakes: 200 µg/kg BW SC, IM, PO; repeat in 14 days (Messonnier, 1994)

Snakes and lizards: 200–400 µg/kg BW IM, SC (Clyde, 1996a)

Turtles and tortoises: TOXIC—Do Not Use (Clyde, 1996a)

Sh 200 µg/kg BW PO (Lucientes et al., 1998)

Sw 300 µg/kg BW SC (Schultz, 1989)

Levamisole

Am 10 mg/kg BW IM (Cooper, 1985)

Xenopus: 12 mg/l water with no more than 1 frog/5 l water (60 mg drug/animal minimum, up to 75 mg/frog) (Iglauer et al., 1997)

Bi Australian parakeets: 15 mg/kg BW by gavage; repeat in 10 days (Ritchie and Harrison, 1997)

Anseriformes: 20–50 mg/kg BW by gavage (Ritchie and Harrison, 1997)

Ratites: 30 mg/kg BW by gavage; repeat in 10 days (Ritchie and Harrison, 1997)

Immune modulators: 2 mg/kg BW IM q14 days for 3 treatments (Ritchie and Harrison, 1997)

4–8 mg/kg BW IM once; repeat in 10–14 days (Harrison and Harrison, 1986)

Bo 8 mg/kg BW SC, PO (Schultz, 1989)

Fi 10 mg/kg BW PO once every 7 days for 3 treatments (Harms, 1996)

11 mg/kg BW IM once every 7 days for 2 treatments (Harms, 1996)

50 ppm in 2-h bath for external trematodes (Harms, 1996)
N 7.5 mg/kg BW SC; repeat in 2 weeks (Welshman, 1985)
Rc 4–10 mg/kg BW PO (Evans and Evans, 1986)
Re 5 mg/kg BW intracoelomic once; may be repeated in 2–3 weeks (Frye, 1981)
Sh 8 mg/kg BW SC, PO (Schultz, 1989)
Sw 8 mg/kg BW SC, PO (Schultz, 1989)

Lime sulfur

Gp 1:40 sponged over body weekly for 6 weeks (Russell et al., 1981)

Lindane

Gp 1% used as dip (Zajac et al., 1980)

Malachite green

Fi 0.1 ppm in continuous bath (Harms, 1996)
2 ppm in 30-min bath (Harms, 1996)

Malathion

Gp 0.5% used as dip (Russell et al., 1981)
M 5 ml of 1% suspension in bedding (Russell et al., 1981)
R 5 ml of 1% suspension in bedding (Russell et al., 1981)
Rb 0.5% sponged twice weekly (Russell et al., 1981)

Mebendazole

Bi 25 mg/kg BW bid for 5 days (Harrison and Harrison, 1986)
D 10 mg active ingredient/lb BW PO sid sprinkled on food for 5 days; may repeat in 3 weeks (Kinsell, 1986)

Fi 50 mg/kg BW PO once every 3 weeks for 3 treatments (nematodes) (Harms, 1996)
100 ppm in 10-min to 2-h dip (monogenean trematodes) (Harms, 1996)
G 2.2 mg/ml tap water/animal sid for 5 days, by gavage (Smith and Snider, 1988)
M 40 mg/kg BW as a drench; repeat in 7 days (Russell et al., 1981)
N 3–5 mg/kg BW PO (Russell et al., 1981)
15 mg/kg BW PO for 3 days (Wolff, 1990)
R 10 mg/kg BW PO for 5 days (McKellar, 1989)
Rb 10 mg/kg BW PO for 5 days (McKellar, 1989)
Rc 25–40 mg/kg BW PO sid for 3–5 days (Evans and Evans, 1986)

Methyridine

R 125 mg/kg BW SC once (Weisbroth and Scher, 1971)
125 mg/kg BW IP once (Weisbroth and Scher, 1971)
200 mg/kg BW IP once (Peardon et al., 1966)
100 mg/kg BW SC (Williams, 1976)

Metronidazole

Bi Pigeons: 50 mg/kg BW PO bid for 5 days (Johnson-Delaney, 1996)
Pigeons: 200–250 mg/kg BW PO sid for 3–7 days (Johnson-Delaney, 1996)
Pigeons: 10–20 mg/kg BW IM sid for 2 days (Johnson-Delaney, 1996)
Pigeons: 4 g/gal drinking water for 3–7 days (Johnson-Delaney, 1996)
C 10 mg/kg BW PO tid (Boothe, 1996)
D 60 mg/kg BW PO sid for 5 days (Kinsell, 1986)

10 mg/kg BW PO tid (Boothe, 1996)

F 35 mg/kg BW PO sid for 5 days (Bell, 1994)

Fi 50 mg/kg BW PO sid for 5 days (Harms, 1996)
5–10 ppm in continuous bath (Harms, 1996)

Gp 20 mg/kg BW PO, SC sid (Richardson, 1992)

M 2.5 mg/ml drinking water for 5 days (Roach et al., 1988)

N 35–50 mg/(kg·day) BW PO bid for 10 days (Holmes, 1984)

Rb 20 mg/kg BW PO bid (Carpenter et al., 1995)

Re 125–275 mg/kg BW PO once, may be repeated at 7- to 10-day intervals for 1–2 more treatments (Frye, 1981)
Tortoises: 250 mg/kg BW PO once; repeat in 2 weeks (Page and Mautino, 1990)

Nicarbazin

Rb 125 ppm in food for 1 month (Sorribas et al., 1992)

Niclosamide

Bi 220 mg/kg BW PO once; repeat in 10–14 days (Harrison and Harrison, 1986)
Finches: 500 mg/kg BW PO once a week for 4 weeks (Harrison and Harrison, 1986)

G 1 mg/10 g BW PO (Burke, 1979)

H 500 mg in 150 g food (Burke, 1979)
10 mg/100 g BW PO as a drench, repeat in 2 weeks (Russell et al., 1981)

M 100 mg/kg BW once PO (Harkness and Wagner, 1983)
500 mg/150 g ground feed for 1 week (Williams, 1976)

N 30 mg/kg BW PO; repeat in 2–3 weeks (Russell et al., 1981)
140 mg/kg BW PO (Williams, 1976)

R 100 mg/kg BW once PO (Harkness and Wagner, 1983)
10 mg/100 g BW as a drench; repeat in 2 weeks (Russell et al., 1981)

100 mg/kg BW for 1 week (Williams, 1976)
1 mg/g feed for 2 weeks separated by 1 week (Russell et al., 1981)

Rb 150 mg/kg BW PO (Williams, 1976)

Re 150 mg/kg BW PO; not more often than once each month (Frye, 1981)

Nitrofurantoin

R 0.2% in feed for 6–8 weeks (Russell et al., 1981)

Nitrofurazone

Fi 75–100 mg/kg BW PO sid for 5–15 days (Harms, 1996)

Paromomycin

N 50 mg/kg BW PO in 3 divided doses sid for 10 days (Williams, 1976)

Sh 100 mg/kg BW PO sid for 3 days (Viu et al., 2000)

Phenothiazine

Rb 1 g/50 g molasses-treated feed (Siegmund, 1979)

Piperazine (adipate and citrate)

Bi 100–500 mg/kg BW PO once; repeat in 10–14 days (Ritchie and Harrison, 1997)
Psittacines: not effective (Ritchie and Harrison, 1997)

Bo 110 mg/kg BW PO (Schultz, 1989)

C 0.86 g/lb BW PO; repeat in 10–21 days (Kinsell, 1986)

D 0.86 g/lb BW PO; repeat in 10–21 days (Kinsell, 1986)

G 20–60 mg/100 g BW PO (Russell et al., 1981)

3–5 mg/ml drinking water for 7 days, off 7 days, repeat for 7 days (Russell et al., 1981)

Go 110 mg/kg BW PO (Schultz, 1989)

Gp Piperazine adipate: 4–7 mg/ml drinking water (Williams, 1976)

H 3–5 mg/ml drinking water for 7 days, off 7 days, repeat for 7 days (Russell et al., 1981)

Piperazine citrate: 10 mg/ml drinking water for 7 days, off 5 days, repeat for 7 days (Unay and Davis, 1980)

Piperazine citrate: 2 ml of 10 mg/ml given once by gavage (Unay and Davis, 1980)

M 500 mg/100 ml drinking water for 14 days (Reiss et al., 1987)

Piperazine adipate: 4–7 mg/ml drinking water for 3–10 days (Williams, 1976)

Piperazine citrate: 200 mg/kg BW daily in drinking water for 7 days, off 7 days, repeat for 7 days (Hoag, 1961)

N 65 mg/kg BW PO sid for 10 days (Russell et al., 1981)

100 mg/kg BW PO (Ialeggio, 1989)

R 200 mg/100 ml drinking water (Rossoff, 1974)

Piperazine adipate: 250 mg/50–60 g BW in drinking water for 3 days (Habermann and Williams, 1957)

Rb Piperazine adipate: 0.5 mg/kg BW PO for 2 days (Brooks, 1979)

Piperazine citrate: 100 mg/ml drinking water for 1 day (USDA, 1976)

Piperazine powder: 200 mg/kg BW PO (Harkness and Wagner, 1983)

Rc 75–150 mg/kg PO (Evans and Evans, 1986)

Re Piperazine citrate: 40–60 mg/kg BW PO; not more often than once every 2 weeks (Frye, 1981)

Sh 110 mg/kg BW PO (Schultz, 1989)

Sw 110 mg/kg BW PO (Schultz, 1989)

Potassium permanganate

Fi 2 mg/l water in ponds for an indefinite period; 10 mg/l water for 10 min (Klesius and Rogers, 1995)
1 ppt for 30- to 40-s dip (Harms, 1996)
20 ppm for 1-h bath (Harms, 1996)
2–5 ppm for indefinite bath (Harms, 1996)

Praziquantel

Bi Toxic in finches (Ritchie and Harrison, 1997)
10–20 mg/kg BW PO; repeat in 10 days (Ritchie and Harrison, 1997)
Toucans for flukes: 10 mg/kg BW PO sid for 14 days, then 6 mg/kg BW PO sid for 14 days (Ritchie and Harrison, 1997)
For flukes: 9 mg/kg BW IM sid for 3 days, then PO for 11 days (Ritchie and Harrison, 1997)
For tapeworms: 9 mg/kg BW IM once; repeat in 10 days (Ritchie and Harrison, 1997)

Fi 2 ppm in 24-h bath (Harms, 1996)
1 ppm for >90-h bath or 2 ppm for 4-h bath (Diplostomum eye flukes) (Harms, 1996)
330 mg/kg BW PO once (Diplostomum eye flukes) (Harms, 1996)
500 mg/kg BW PO once (internal cestodes Bothriocephalus sp.) (Harms, 1996)
50 mg/kg BW PO once (internal cestodes Eubothrium sp.) (Harms, 1996)
5 mg/kg BW IP once; repeat in 14–21 days (Harms, 1996)

M 5 mg/kg BW SC or 10 mg/kg BW PO (McKellar, 1989)

N 0.1 ml/kg BW IM (Droncit injectable) (Welshman, 1985)
40 mg/kg BW PO, IM once (Wolff, 1990)

R 5 mg/kg BW SC or 10 mg/kg BW PO (McKellar, 1989)

Rb 5–10 mg/kg BW IM, SC, PO once; repeat in 10 days (Carpenter et al., 1995)
5 mg/kg BW SC or 10 mg/kg BW PO (McKellar, 1989)
Rc 5–10 mg/kg BW IM, PO (Evans and Evans, 1986)
10–15 mg/kg BW SC; up to 100 mg/kg BW for some trematodes (Evans and Evans, 1986)
Re 8–20 mg/kg BW IM, PO once; repeat in 14 days (Messonnier, 1996)
10 mg/kg BW IM, PO; up to 30 mg/kg BW PO for trematodes (Clyde, 1996b)

Pyrantel pamoate

Bi 4.5 mg/kg BW PO once; repeat in 10–14 days (Ritchie and Harrison, 1997)
D 1 ml/5–20 lb BW PO (Kinsell, 1986)
N Lemur: 6 mg/kg BW PO (Feeser and White, 1992)
Rc 10–20 mg/kg BW PO (Evans and Evans, 1986)

Pyrethrin

Rb 0.5% applied as a dust (Russell et al., 1981)

Pyrivinium pamoate

H 0.8 mg/l drinking water for 30 days (Frost, 1977)
M 0.8 mg/l drinking water for 28 days (Russell et al., 1981)
1.6 mg/g food for 30 days (Williams, 1976)
N 5 mg/kg BW PO every 6 months (more often if needed) (Cummins et al., 1973)
R 0.003% in drinking water for 30 days (Blair and Thompson, 1969)
0.012% in food for 30 days (Blair and Thompson, 1969)

Quinacrine hydrochloride

Bi 5–10 mg/kg BW PO sid for 7 days (Harrison and Harrison, 1986)

N 10 mg/kg BW PO tid every 10 days (Russell et al., 1981)

R 75 mg/kg BW PO total dose (Balazs et al., 1962)

Ronnel

N 55 mg/kg BW PO qod for 4 treatments, then once weekly for 3 months; a total of 16 treatments (Finegold et al., 1968)

Rotenone

N One part rotenone in 3 parts mineral oil applied topically once a week for 2 weeks (Bowman and Griffith, 1987)

Rb Mix with mineral oil and apply in ear for 3 days off and on for 3 weeks (Russell et al., 1981)

Selemectin

Rb 6–18 mg/kg BW topical (McTier et al., 2003)

Sodium chloride

Fi 0.5–1% in water for indefinite period; 3% in water for 30 s to 10 min (dip); 1% for 10 min to 2 h (dip) (Klesius and Rogers, 1995)

Teflubenzuron

Fi 10 mg/kg BW for 7 days (route not indicated) (Horsberg, 2002)

Tetrachlorethylene

Re 0.2 ml/kg BW PO; not more often than once each month (Frye, 1981)

Thiabendazole

Bi 250–500 mg/kg BW PO once; repeat in 10–14 days for ascarids (Ritchie and Harrison, 1997)
100 mg/kg BW PO sid for 7–10 days (Ritchie and Harrison, 1997)

Bo 66 mg/kg BW PO; 110 mg/kg BW PO for severe parasitism and Cooperia (Schultz, 1989)

F Tresaderm: 2 drops in each ear canal daily for 7 days, wait 7 days, then retreat another 7 days (Patterson and Kirchain, 1999)

M 100–200 mg/kg BW PO (Harkness and Wagner, 1983)
100 mg/kg BW PO once weekly for 4 weeks (Burke, 1979)

N 50–100 mg/kg BW PO; repeat in 2 weeks (Van Riper et al., 1966)
100 mg/kg BW PO; repeat in 2 weeks, then once every 6 months (Cummins et al., 1973; Ialeggio, 1989)
100 mg/kg BW PO sid for 3 days (Welshman, 1985)

R 200 mg/kg BW PO for 5 days (Rossoff, 1974)
0.1% in feed (Harkness and Wagner, 1983)

Rb 50 mg/kg BW PO; repeat in 3 weeks (Carpenter et al., 1995)
25 mg/kg BW PO (Williams, 1976)
100 mg/kg BW PO for 5 days (McKellar, 1989)

Re 50 mg/kg BW PO as a drench; use as often as necessary (Frye, 1981)

Sw 75 mg/kg BW PO (Schultz, 1989)

Thiabendazole and piperazine hydrate (respectively)

H 0.1% in diet for 6 weeks, and 0.6% in drinking water starting 2 weeks before the thiabendazole (Taylor, 1992)

Tinidazole

M 2.5 mg/ml drinking water for 5 days (Roach et al., 1988)

Trichlorfon

Fi 0.25–0.5 ppm in 1-h bath for 5 days (Harms, 1996)
2 ppm in 1-h bath once (Harms, 1996)
5 ppm in 30-min bath once (Harms, 1996)

M 1.75 g/l drinking water with 1 g sugar, for 14 days, assuming a mouse consumes 2.2–3.2 ml water daily (Simmons et al., 1965)
175 mg/100 ml drinking water for 14 days (Reiss et al., 1987)

Vapona pest strip (DDVP)

M Place a 1 × 1 in. strip on each cage (for 24 h) on each cage-change day for four changings [our interpretation of French, 1987—Eds.]

Re 1 strip/1000 cu ft room space; use continuously (Frye, 1981)

MISCELLANEOUS DRUGS

Acetylcysteine

C 140 mg/kg BW IV once, then repeat q6h with 70 mg/kg BW IV or PO for 7 treatments (Kore, 1997)

D 140 mg/kg BW IV once, then repeat q6h with 70 mg/kg BW IV or PO for 7 treatments (Kore, 1997)

M 653 mg/kg PO IP (Borchard et al., 1990)
1200 mg/kg BW PO (Borchard et al., 1990)

R 400 mg/kg BW IP (Borchard et al., 1990)

Alcuronium

C 0.1 mg/kg BW IV (Flecknell, 1996)

D 0.1 mg/kg BW IV (Flecknell, 1996)

Sw 0.25 mg/kg BW IV (Flecknell, 1996)

Allopurinol

Bi Budgerigars: 100 mg in 10 ml water, then dilute 1 ml of solution in 30 ml water; give fresh several times daily (Ritchie and Harrison, 1997)

D 10 mg/kg BW PO q8h, then reduce to 10 mg/kg BW PO sid (Kinsell, 1986)

Alloxan

C 1 ml 10% solution in citrate-phosphate buffer (pH 3.5–4.0) given IA at a rate of 0.5 ml/min (Reiser et al., 1987)
750 mg/kg BW PO (Borchard et al., 1990)
M 75 mg/kg BW IV (Borchard et al., 1990)
R 40 mg/kg BW IV (Borchard et al., 1990)
200 mg/kg BW IP, SC (Borchard et al., 1990)

Alprazolam

C 0.1 mg/kg BW tid or prn (Dodman, 1995)

Aminophylline

Bi 10 mg/kg BW IV q3h; after initial response give PO (Ritchie and Harrison, 1997)
C 10 mg/kg BW IM, IV q8–12h: for IV use, dilute in 10–20 ml normal saline or 5% dextrose in water and inject slowly (Kinsell, 1986)
D 10 mg/kg BW IM, IV q8–12h: for IV use, dilute in 10–20 ml normal saline or 5% dextrose in water and inject slowly (Kinsell, 1986)
N 25–100 mg/animal PO bid (Johnson et al., 1981)
Lemur: 10 mg/kg BW IV (Feeser and White, 1992)
Re 2–4 mg/kg BW IM as needed (Frye, 1981)

Amitriptyline

C 5–10 mg total dose PO (Borchard et al., 1990)
2–4 mg/kg BW sid-tid (Dodman, 1995)
0.5–1 mg/kg BW PO sid, bid (Shanley and Overall, 1995)
D 1–2 mg/kg BW PO (Borchard et al., 1990)
1–2 mg/kg BW PO bid to start (Shanley and Overall, 1995)
M 1 mg/kg BW IP, PO (Borchard et al., 1990)

R 20 mg/kg BW IP (Borchard et al., 1990)
10 mg/kg BW SC (Borchard et al., 1990)
30 mg/kg BW PO (Borchard et al., 1990)

Amphetamine

M 5 mg/kg BW IP (Taber and Irwin, 1969)

Atenolol

C 6.25–12.5 mg/kg BW PO q12–24h (Anonymous, 1994)
D 1 mg/kg BW PO sid (Jacobs, 1996)
F 6.25 mg/kg BW PO sid (Johnson-Delaney, 1996)

Atipamezole

Bo 0.02 mg/kg BW IV (Dunlop and Hoyt, 1997)
C 0.3–0.5 mg/kg BW IV, SC (Flecknell, 1996)
D 50–400 µg/kg BW IM, IV (Flecknell, 1996)
G 1 mg/kg BW IP, SC (Flecknell, 1996)
Go 0.02 mg/kg BW IV (Dunlop and Hoyt, 1997)
H 1 mg/kg BW SC (Flecknell, 1996)
M 1–2.5 mg/kg BW IP (Cruz et al., 1998)
1 mg/kg BW IM, IP, SC, IV (Flecknell, 1993)
R 1 mg/kg BW IP, SC (Flecknell, 1996)
Rb 0.2 mg/kg BW IV (Flecknell, 1996)
1 mg/kg BW IV, SC (Flecknell, 1996)
Sh 0.02 mg/kg BW IV (Dunlop and Hoyt, 1997)

Atracurium

Bi Chickens: 0.25–0.46 mg/kg BW IV (Lukasik, 1995)
C 0.2 mg/kg BW IV (Flecknell, 1996)
0.2–0.25 mg/kg BW IV initial bolus; 0.1–0.15 mg/kg BW IV repeat boluses (Lukasik, 1995)

0.25 mg/kg BW IV loading dose followed by 3–8 μg/kg BW/min IV infusion (Lukasik, 1995)

D 0.5 mg/kg BW IV (Flecknell, 1996)
0.2–0.25 mg/kg BW IV initial bolus; 0.1–0.15 mg/kg BW IV repeat boluses (Lukasik, 1995)
0.25 mg/kg BW IV loading dose followed by 3–8 μg/kg BW/min IV infusion (Lukasik, 1995)

N 0.25–0.3 mg/kg BW IV (Tsai et al., 1987)

Atropine

Bi 0.01–0.04 mg/kg BW IM, SC (Ritchie and Harrison, 1997)
0.01–0.04 mg/kg BW IM, SC (Harrison and Harrison, 1986)
Organophosphate toxicity: 0.1–0.5 mg/kg BW IM, SC repeated as needed (Ritchie and Harrison, 1997)

Bo 0.6–0.12 mg/kg BW IV (Schultz, 1989)
For organophosphate poisoning: 0.5–1.0 mg/kg BW IV; may repeat in 1–2h (Schultz, 1989)
0.02–0.04 mg/kg BW IV (Dunlop and Hoyt, 1997)
0.13 mg/kg BW IM, SC (Dunlop and Hoyt, 1997)

C 0.05 mg/kg BW IM, IV, SC q6h (Kinsell, 1986)

Ch 0.15 mg SC, IM, IV (Rossoff, 1974)

D 0.05 mg/kg BW IM, IV, SC q6h (Kinsell, 1986)

F 0.05 mg/kg BW IM, SC (Andrews and Illman, 1987)
0.02–0.05 mg/kg BW IM, IV, SC (Cantwell, 2001)

G 0.02–0.05 mg/kg BW SC, IM, IV (CCAC, 1984)

Go 0.04–0.80 mg/kg BW IM (Swindle and Adams, 1988)
0.13 mg/kg BW IV (Swindle and Adams, 1988)
0.02–0.04 mg/kg BW IV (Dunlop and Hoyt, 1997)
0.13 mg/kg BW IM, SC (Dunlop and Hoyt, 1997)

Gp 0.02–0.05 mg/kg SC, IM, IV (CCAC, 1984)

H 0.02–0.05 mg/kg BW SC, IM, IV (CCAC, 1984)

M 0.05 mg/kg BW IM, SC, IV (Green, 1982)
0.02–0.05 mg/kg BW SC, IM, IV (CCAC, 1984)

N 0.10 mg/kg BW SC (Domino et al., 1969)
0.05 mg/kg BW SC, IM, IV (CCAC, 1984)
R 0.04 mg/kg BW IM (Weisbroth and Fudens, 1972)
0.02–0.05 mg/kg BW SC, IM, IV (CCAC, 1984)
Rb 0.20 mg/kg BW IM, IV, SC (Green, 1982)
For organophosphate overdose: 10 mg/kg BW SC every 20 min (Harkness and Wagner, 1983)
1–3 mg/kg BW IM, SC 30 min before surgery (Green, 1982)
Re 0.04 mg/kg BW IM, IV, SC, PO as needed (Frye, 1981)
Sh 0.04–0.80 mg/kg BW IM (Swindle and Adams, 1988)
0.13 mg/kg BW IV (Swindle and Adams, 1988)
0.02–0.04 mg/kg BW IV (Dunlop and Hoyt, 1997)
0.13 mg/kg BW IM, SC (Dunlop and Hoyt, 1997)
Sw 0.05–0.5 mg/kg BW SC (Swindle and Adams, 1988)
0.044–0.4 mg/kg BW IM (Swindle and Adams, 1988)

Benazepril

D 0.25 mg/kg BW PO sid (Martin, 1996)

Betamethasone

Gp 0.1–0.2 ml IM, SC (Richardson, 1992)

Bretylium

C 15 mg/kg BW IV (Borchard et al., 1990)
D 5 mg/kg BW IV (Borchard et al., 1990)
M 12.5 mg/kg BW IV (Borchard et al., 1990)
N 200 mg/kg BW PO (Borchard et al., 1990)
R 5 mg/kg BW IV (Borchard et al., 1990)
400 mg/kg BW PO (Borchard et al., 1990)
Rb 10 mg/kg BW IV (Borchard et al., 1990)
Sw 5 mg/kg BW IV (Schumann et al., 1993)

Bromhexine

Bi 0.15 mg/100 g BW IM bid, sid (Harrison and Harrison, 1986)

Buspirone

C 2–4 mg/kg BW PO bid (Dodman, 1995)
0.5–1 mg/kg BW PO sid (Shanley and Overall, 1995)
D 1 mg/kg BW PO sid (Shanley and Overall, 1995)

Calcitonin

Re 50 IU/kg BW IM; use in conjunction with oral calcium supplementation (see Neo-Calgucon) (Messonnier, 1996)

Calcium borogluconate

Re 10 ml/kg BW of 1% solution IM, SC (Bennett, 1997)

Calcium EDTA

Bi 35 mg/kg BW bid for 5 days; repeat in 3–4 days if necessary (Ritchie and Harrison, 1997)
Bo 110 mg/kg BW IP, IM in 1–2% solution in 5% glucose; skip 2 days and repeat for 2 days for up to 10–14 days (Schultz, 1989)

Calcium gluconate

Bi 5 ml/30 ml water PO (Ritchie and Harrison, 1997)
50–500 mg/kg BW IV slowly to effect (Ritchie and Harrison, 1997)
5–10 mg/kg BW IM bid (Rupley, 1997)
Rb 5–10 ml of 10% solution PO (Raphael, 1981)
3–5 ml of 10% solution IV (Raphael, 1981)

Re 500 mg/kg BW once each week for 4–6 weeks (Messonnier, 1996)

Calcium gluconate/calcium lactate

Bi 5–10 mg/kg BW IM bid prn (Ritchie and Harrison, 1997)

Calcium glycerophosphate (Calphosan)

Bi 0.5–1 ml/kg BW IM once; may repeat weekly (Harrison and Harrison, 1986)

Captopril

C 0.5–2 mg/kg BW PO tid (Anonymous, 1994)
D 0.5–2 mg/kg BW PO tid (Jacobs, 1996)

Chloroquine phosphate

N 150 mg/adult rhesus monkey PO days 1 and 3 (Schofield et al., 1985)

Chlorpheniramine

Gp 5 mg/kg BW SC (Borchard et al., 1990)
M 1 mg/kg BW IP (Borchard et al., 1990)
N 0.5 mg/kg BW/day PO in divided doses (Johnson et al., 1981)

Cholestyramine (for reversal of antibiotic-induced entero-colitis)

Rb Cholestyramine (2 g active ingredient, which is equivalent to 4 g Questran™) in 20 ml drinking water for 21 days (Lipman et al., 1989)

Cimetidine

Bi 2.5–5 mg/kg BW IV q6–12h slow injection over 30–40 min (Ritchie and Harrison, 1997)
D 5–10 mg/kg BW IM, IV bid, tid (Hoskins, 1997)
5–10 mg/kg BW IV, PO tid, qid (Washabau and Hall, 1997)
F 10 mg/kg BW IV, PO tid (Harrenstien, 1994)
Rb 5–10 mg/kg BW q6–12h (Carpenter et al., 1995)

Cisapride

Bi 0.5–1.5 mg/kg BW PO tid (Ritchie and Harrison, 1997)
C 0.1–1 mg/kg BW PO bid, tid (Washabau and Hall, 1997)
D 0.1–1 mg/kg BW PO bid, tid (Washabau and Hall, 1997
Rb 0.5 mg/kg BW SC bid, tid (Paul-Murphy and Ramer, 1998)

Clomipramine

Bi 0.5–1 mg/kg BW PO q12–24h (Rupley, 1997)
C 1–1.5 mg/kg BW PO sid (Dodman, 1995)
0.5 mg/kg BW PO sid (Shanley and Overall, 1995)
D 1 mg/kg BW PO bid for 2 weeks, then 2 mg/kg BW PO bid for 2 weeks, then 3 mg/kg BW PO bid for 4 weeks (maintenance) (Shanley and Overall, 1995)

Cortisone

R 0.25–1.25 mg/day SC, IM, PO (Rossoff, 1974)

Cyclosporine

D 2% drops in the eye for 6 weeks (González Alonso-Alegre et al., 1999)
R 100 mg/kg BW/day SC (Thliveris et al., 1991)

25 mg/kg BW/day IP (Thliveris et al., 1991)
15 mg/kg BW/day SC (Sonnino et al., 1990)

Rb 10 mg/kg BW/d IV at 2 mg/kg/min (Petraitiene et al., 2001)

Cyproterone

D 1.25–2.5 mg/kg BW/day for 10 days (Cotard, 1996)

Delmadinone acetate

D 3 mg/kg BW SC once (Cotard, 1996)

Deoxycorticosterone pivalate

D 2.2 mg/kg BW IM every 25 days (Sullivan and Graziani, 1996)

Dexamethasone

Bi 0.5–2 mg/kg BW IM, IV sid (Ritchie and Harrison, 1997)

Bo 5–20 mg IV, IM, PO (Schultz, 1989)

C 0.125–0.5 mg sid or divided doses IV, IM, PO (Kinsell, 1986)

D 0.25–1.25 mg sid or divided bid PO (Kinsell, 1986)
0.25–1.0 mg sid IM, IV (Kinsell, 1986)

F 0.5–1 mg/kg BW IM, SC (Johnson-Delaney, 1996)
2–4 mg/kg BW IM, IV once (Johnson-Delaney, 1996)
0.5–2 mg/kg BW IV (Hillyer, 1997)

Gp 0.1 ml SC (Richardson, 1992)

N 0.25–1.0 mg/kg BW PO, IM total dose (Melby and Altman, 1976)

Rb 0.5–2 mg/kg BW IM, IV (Paul-Murphy and Ramer, 1998)

Re 0.125–0.625 mg/kg BW IV, IM as needed (Frye, 1981)

Dexamethasone sodium phosphate

Bi 2–4 mg/kg BW IV sid, bid (Rupley, 1997)
Bo 1–2 mg/kg BW slow IV (Schultz, 1989)
C 1–5 mg/kg BW slow IV (Schultz, 1989)
D 1–5 mg/kg BW slow IV (Schultz, 1989)
Sh 1–2 mg/kg BW slow IV (Schultz, 1989)

Dextrose

Bi 50–100 mg/kg BW slow IV (Ritchie and Harrison, 1997)
Rb 2 ml/kg BW of 50% solution (Williams, 1976)

Diethylstilbestrol

Bi 0.03–0.1 ml of 0.25 mg/ml stock/30 g BW IM (Harrison and Harrison, 1986)
1 drop of 0.25 mg/ml stock/30 ml drinking water (Harrison and Harrison, 1986)
C 0.05–0.1 mg/day PO (Kinsell, 1986)
D 0.1–1 mg/day PO (Kinsell, 1986)

Digoxin

D 0.006–0.009 mg/kg BW PO bid to achieve 1–2 ng/ml serum concentration (Jacobs, 1996)
F 0.1 mg PO sid (Hillyer, 1997)

Diltiazem

C 7.5 mg/kg BW PO tid (Anonymous, 1994)
D 0.5–1.5 mg/kg BW PO tid (Jacobs, 1996)
F 3.75–7.5 mg/animal PO bid (Johnson-Delaney, 1996)

Dimethyl sulfoxide

Bi 1 ml/kg BW topically every 4–5 days or weekly (Ritchie and Harrison, 1997)

D Apply topically; do not exceed 20 ml/day for 14 days (Kinsell, 1986)

Diphenhydramine

Bi 2–4 mg/kg BW q12h IM, IV, PO (Ritchie and Harrison, 1997)

C 4 mg/kg BW PO q8h (Kinsell, 1986)
0.5 mg/lb BW IV (considered a high dose by Kinsell, 1986)

D 4 mg/kg BW PO q8h (Kinsell, 1986)
0.5 mg/lb BW IV (considered a high dose by Kinsell, 1986)

F 0.5–2 mg/kg BW IM, IV, PO bid or tid prn (Johnson-Delaney, 1996)

Gp 5 mg/kg BW SC (Melby and Altman, 1976)
12.5 mg/kg BW IP (Borchard et al., 1990)

M 50 mg/kg BW IP (Borchard et al., 1990)

N Lemur: 5 mg/kg BW IM (Feeser and White, 1992)

R 10 mg/kg BW SC (Borchard et al., 1990)

Diphenoxylate/atropine sulfate

N 1 ml/animal PO tid (Holmes, 1984)

Doxapram

Bi 5–10 mg/kg BW IV, IM once (Harrison and Harrison, 1986)

C 5–10 mg/kg BW IV; may repeat in 15–20 min (Kinsell, 1986)

D 5–10 mg/kg BW IV; may repeat in 15–20 min (Kinsell, 1986)

F 5–11 mg/kg BW IV (Johnson-Delaney, 1996)
1–2 mg/kg BW IV (Flecknell, 1987)
G 5–10 mg/kg BW IV (Flecknell, 1987)
Go 2–10 mg/kg BW IV (Swindle and Adams, 1988)
Gp 5 mg/kg BW IV (Flecknell, 1987)
10–15 mg/kg BW IM, SC (Richardson, 1992)
H 5–10 mg/kg BW IV (Flecknell, 1987)
M 5–10 mg/kg BW IV (Flecknell, 1987)
N 2 mg/kg BW IV (Flecknell, 1987)
R 5–10 mg/kg BW IV (Flecknell, 1987)
Rb 2–5 mg/kg BW IV (Flecknell, 1987)
Sh 2–10 mg/kg BW IV (Swindle and Adams, 1988)
Sw 2–10 mg/kg BW IV (Swindle and Adams, 1988)

Doxepin

Bi 0.5–1 mg/kg BW PO bid (Ritchie and Harrison, 1997)
D 3–5 mg/kg BW PO bid (Shanley and Overall, 1995)

Edrophonium

C 0.5 mg/kg BW IV (Lukasik, 1995)
D 0.5 mg/kg BW IV (Lukasik, 1995)

Enalapril

D 0.5 mg/kg BW PO sid, bid (Jacobs, 1996)
0.5 mg/kg BW PO sid (package insert)
F 0.5 mg/kg BW PO q48h (Johnson-Delaney, 1996)

Esmolol

C 0.25–0.5 mg/kg BW IV slow bolus; 50–200 μg/(kg·min) infusion (Anonymous, 1994)

D 0.25–0.5 mg/kg BW IV slow bolus; 50–200 μg/(kg·min) infusion (Anonymous, 1994)

Flumazenil

Bi Quail: 0.1 mg/kg BW IM (Day and Boge, 1996)

Fluoxetine

Bi 2.3–3 mg/kg BW PO sid (Dodman, 1997)
2 mg/kg BW PO bid (Rupley, 1997)
C 0.5 mg/kg BW PO sid (Shanley and Overall, 1995)
D 1 mg/kg BW PO sid (Shanley and Overall, 1995)

Flutamide

D 5 mg/kg BW/day PO for 7 days (Cotard, 1996)

Furosemide

Bi 0.15–2 mg/kg BW IM, IV q12–24h (Ritchie and Harrison, 1997)
0.05 mg/300 g BW IM bid (Harrison and Harrison, 1986)
C 2 mg/kg BW IV q12h to a maximum total dose of 5 mg (Kinsell, 1986)
2–4 mg/kg PO q8–12h (Kinsell, 1986)
D 2 mg/kg BW IV q12h to a maximum total dose of 40 mg (Kinsell, 1986)
2–4 mg/kg PO q8–12h (Kinsell, 1986)
F 2–4 mg/kg BW IM, IV (Hillyer, 1997)
N 2 mg/kg BW PO (Johnson et al., 1981)
Rb 2–5 mg/kg BW IM, IV, PO, SC bid (Paul-Murphy and Ramer, 1998)
Re 5 mg/kg BW IM, IV sid or bid (Frye, 1981)

Gallamine

Am 6 mg/kg BW in ventral lymph sac (Lumb and Jones, 1984)
C 1 mg/kg BW IV (Flecknell, 1996)
D 1 mg/kg BW IV (Flecknell, 1996)
Go 4 mg/kg BW IV (Flecknell, 1996)
Gp 0.1–0.2 mg/kg BW IV (Flecknell, 1996)
M 1.2 mg/kg BW IV (Lumb and Jones, 1984)
R 1 mg/kg BW IV (Flecknell, 1996)
0.01 mg/kg BW IV (Borchard et al., 1990)
Rb 1 mg/kg BW IV (Flecknell, 1996)
0.2–0.3 mg/kg BW IV (Lumb and Jones, 1984)
Sh 1 mg/kg BW IV (Flecknell, 1996)
Sw 2 mg/kg BW IV (Flecknell, 1996)

Glycopyrrolate

C 5 µg/lb or 0.25 ml/10 lb BW IM (package insert)
D 0.01 mg/kg BW IM (Ko et al., 1997)
0.01 mg/kg BW IV (Flecknell, 1996)
F 0.01 mg/kg BW IM, SC (Mason, 1997)
0.01–0.02 mg/kg BW IM, SC (Mason, 1997)
0.01 mg/kg BW IM, IV, SC (Cantwell, 2001)
G 0.01–0.02 mg/kg BW IM, SC (Mason, 1997)
Gp 0.01–0.02 mg/kg BW IM, SC (Mason, 1997)
N 13–17 µg/kg IM (Sanders et al., 1991)
R 0.5 mg/kg BW IM (Flecknell, 1996)
0.01–0.02 mg/kg BW IM, SC (Mason, 1997)
Rb 0.1 mg/kg BW IM, SC (Flecknell, 1996)
0.011 mg/kg BW IV (Aeschbacher, 1995)
0.01 mg/kg BW IV (Flecknell, 1996)

Gonadotropin-releasing hormone

F 20 μg IM; repeat in 12 days if necessary (Kolmstetter et al., 1996)

Guanfacine

N 0.5 mg/kg BW IM, PO bid (Macy et al., 2000)

Heparin

C 1 mg/kg BW IV (Kinsell, 1986)
D 1 mg/kg BW IV (Kinsell, 1986)
Gp 5 mg/kg BW IV (Melby and Altman, 1976)
M 10 mg/kg BW IV (Melby and Altman, 1976)
N 2 mg/kg BW IV (Melby and Altman, 1976)
R 10 mg/kg BW IV (Borchard et al., 1990)
Rb 5 mg/kg BW IV (Melby and Altman, 1976)

Human chorionic gonadotropin (hCG)

F 100 IU IM; repeat in 12 days if necessary (Kolmstetter et al., 1996)
100 IU IM, SC; may repeat in 2 weeks (Johnson-Delaney, 1996)
Rb 20–25 IU IV (Hafez, 1970)

Hydralazine

D 0.5–2 mg/kg BW PO bid (Jacobs, 1996)

Indapamide

R 3 mg/kg BW IP (Delbarre and Delbarre, 1988)

Insulin

N Start NPH insulin at 0.25–0.5 U/kg BW/day SC (Schultz, 1989)

Iodine (Lugol's)

Bi 2 ml/30 ml water stock; dose at 1 drop in each 250 ml water given daily for goiter (Harrison and Harrison, 1986)

Iron

R 240 mg/kg feed (Borràs, 1998)

Iron dextran

Bi 10 mg/kg BW IM; repeat weekly (Harrison and Harrison, 1986)

Kaolin

Gp 0.2 ml given 3–4 times daily (Kaopectate V) (Richardson, 1992)

Kaolin/pectin

N 0.5–1 ml/kg BW PO q2–6h (Johnson et al., 1981)

Levallorphan

Any species: give 1 mg levallorphan (up to a maximum of 0.5 mg/kg BW) for every 50 mg of morphine that was given (Green, 1982)

Levonorgestrel

N 1 mg/kg BW PO q24h (Mann et al., 1986)

Levothyroxine

Bi 20 μg/kg BW PO q12–24h (Ritchie and Harrison, 1997)

Loperamide

D 0.08 mg/kg BW PO qid (Chiapella, 1988)
Rb 0.1 mg/kg BW PO tid for 3 days, then sid for 2 days (Banerjee et al., 1987)

Meclazine

Rb 2–12 mg/kg BW PO sid (Paul-Murphy and Ramer, 1998)

Medroxyprogesterone acetate

Bi 5–25 mg/kg BW IM, SC q4–6h (Ritchie and Harrison, 1997)

Megestrol acetate

D 0.55 mg/kg PO for 4 weeks (Cotard, 1996)
F Not recommended (Kolmstetter et al., 1996)

Meprobamate

Gp 100 mg/kg BW IM (Melby and Altman, 1976)
H 100 mg/kg BW IM (Melby and Altman, 1976)
M 100 mg/kg BW IM (Melby and Altman, 1976)
N 100–400 mg/kg BW PO (Melby and Altman, 1976)
R 150 mg/kg BW IM (Melby and Altman, 1976)
Rb 50–150 mg/kg BW IM (Melby and Altman, 1976)

Methylprednisolone

C 1 mg/kg BW IM/week (Kinsell, 1986)
D 20 mg or less intrasynovially (Kinsell, 1986)
1 mg/kg BW IM/week (Kinsell, 1986)
Gp 2 mg/kg BW IM every 30 days (Bauck, 1989)

Methylprednisone

Rb 5 mg/kg BW/d IV (Petraitiene et al., 2001)

Metoclopramide

Bi 0.5 mg/kg BW IM, IV, PO bid, tid (Rupley, 1997)
C 0.2–0.5 mg/kg BW PO tid (Washabau and Hall, 1997)
Ch 0.5 mg/kg BW SC tid (Johnson-Delaney, 1996)
D 0.2–0.4 mg/kg BW SC tid (Hoskins, 1997)
0.2–0.5 mg/kg BW PO tid (Washabau and Hall, 1997)
1–2 mg/kg BW/day IV over 24 h (Hoskins, 1997)
Rb 0.2–0.5 mg/kg BW PO, SC (Carpenter et al., 1995)
0.2–0.4 mg/kg BW SC sid-tid (Messonnier, 1996)

Metocurine

Am 0.94 mg/kg BW in ventral lymph sac (Lumb and Jones, 1984)
M 0.08–0.1 mg/kg BW IV (Lumb and Jones, 1984)
R 0.009 mg/kg BW IV (Lumb and Jones, 1984)
Rb 0.01–0.015 mg/kg BW IV (Lumb and Jones, 1984)

Mineral oil

Bi 1–3 drops/30 g BW PO once (Harrison and Harrison, 1986)
5 ml/kg BW PO once (Harrison and Harrison, 1986)
C 2–6 ml PO (Kinsell, 1986)
D 5–30 ml PO (Kinsell, 1986)

Misoprostol

C Not recommended (Kore, 1997)
D 2–5 µg/kg BW PO tid (Kore, 1997)

Nalorphine

Note: Any species: give 1 mg nalorphine (up to a maximum of 2 mg/kg BW) for every 10 mg of morphine that was given (Green, 1982)

C 1 mg/kg BW IM, IV, SC; no more than 5 mg per dose (Kinsell, 1986)
D 5 mg/kg BW IM, IV, SC; no more than 5 mg per dose (Kinsell, 1986)
M 2 mg/kg BW IV (Harkness and Wagner, 1983)
R 2 mg/kg BW IV (Harkness and Wagner, 1983)
Rb 2 mg/kg BW IV (Harkness and Wagner, 1983)

Naloxone

C 0.04 mg/kg BW IM, IV, SC (Short, 1997)
D 0.04 mg/kg BW IM, IV, SC (Short, 1997)
Dose to effect, usually 0.2–0.4 mg total dose IM, SC, IV (Kinsell, 1986)
G 0.01–0.1 mg/kg BW IP, IV (Flecknell, 1987)
Gp 0.01–0.1 mg/kg BW IP, IV (Flecknell, 1987)
H 0.01–0.1 mg/kg BW IP, IV (Flecknell, 1987)
M 0.05–0.1 mg/kg BW IM, IP, IV (Flecknell, 1993)
0.01–0.1 mg/kg BW IP, IV (Flecknell, 1987)
N 0.01–0.05 mg/kg BW IM, IV (Flecknell, 1987)
2–3 ml SC, IM, IV (Rosenberg, 1991)
R 0.01–0.1 mg/kg BW IP, IV (Flecknell, 1987)
Rb 0.01–0.1 mg/kg BW IM, IV (Flecknell, 1987)

Naltrexone

Bi 1.5 mg/kg BW PO bid, tid (Rupley, 1997)
C 2–4 mg/kg BW sid (Dodman, 1995)

Neo-Calglucon

Re 1 ml/kg BW PO bid, prn (used with calcitonin) (Messonnier, 1996)

Neostigmine

C 40–60 µg/kg BW IV (Lukasik, 1995)
D 40–60 µg/kg BW IV (Lukasik, 1995)

Omeprazole

C 0.7 mg/kg BW PO sid (Washabau and Hall, 1997)
Not recommended (Kore, 1997)
D 0.7 mg/kg BW PO sid (Washabau and Hall, 1997)

Oxytocin

Bi 5 U/kg BW IM, IV, SC once (Ritchie and Harrison, 1997)
Bo 75–100 U IM, IV (Schultz, 1989)
C 5–10 U IM, IV, SC (Kinsell, 1986)
D 5–30 U IM, IV, SC (Kinsell, 1986)
Gp 0.2–0.3 U/kg BW IM (Harrenstien, 1994)
1–2 U IM (Richardson, 1992)
N 5–20 U IM, IV total dose (Melby and Altman, 1976)
R 1 U SC, IM total dose (Rossoff, 1974)
Rb 1–2 U IM, SC total dose (Melby and Altman, 1976)
0.2–3 units/kg BW IM, IP, IV, SC (Schuchman, 1977)
Sh 30–50 U IM, IV, SC (Kinsell, 1986)
Sw 30–50 U IM, IV, SC (Kinsell, 1986)

Pancuronium

C 0.06 mg/kg BW IV (Flecknell, 1996)
0.03–0.1 mg/kg BW IV initial bolus; 0.015–0.05 mg/kg BW IV repeat boluses (Lukasik, 1995)
0.1 mg/kg BW IV (Borchard et al., 1990)

D 0.06 mg/kg BW IV (Flecknell, 1996)
0.03–0.1 mg/kg BW IV initial bolus; 0.015–0.05 mg/kg BW IV repeat boluses (Lukasik, 1995)
0.1 mg/kg BW IV (Borchard et al., 1990)

Go 0.06 mg/kg BW IV (Flecknell, 1996)

Gp 0.06 mg/kg BW IV (Flecknell, 1996)

M 0.03 mg/kg BW IV (Lumb and Jones, 1984)

N 0.07 mg/kg BW IV (Durant et al., 1980)

R 2 mg/kg BW IV (Flecknell, 1996)

Rb 0.1 mg/kg BW IV (Flecknell, 1996)
0.008 mg/kg BW IV (Lumb and Jones, 1984)

Sh 0.06 mg/kg BW IV (Flecknell, 1996)

Sw 0.06 mg/kg BW IV (Flecknell, 1996)

Parachloramphetamine

R 2 mg/kg BW IP once (Saito et al., 1996)

Note: Used for chemically induced ejaculation in rats.

Pindolol

D 0.125–0.25 mg/kg BW PO bid (Dodman and Shuster, 1994)

Prednisolone

C For prolonged use, 2–4 mg/kg BW PO qod (Kinsell, 1986)
For immune suppression, 3 mg/kg BW IM, PO q12h (Kinsell, 1986)

For allergy, 1 mg/kg BW IM, PO q12h (Kinsell, 1986)

D For prolonged use, 0.5–2 mg/kg BW PO qod (Kinsell, 1986)
For immune suppression, 2 mg/kg BW IM, PO q12h (Kinsell, 1986)
For allergy, 0.5 mg/kg BW IM, PO q12h (Kinsell, 1986)

Prednisolone sodium phosphate

Bi 0.5–1 mg/kg BW once IM, IV (anti-inflammatory) (Rupley, 1997)

Prednisolone sodium succinate

Bi 10–20 mg/kg BW IV, IM every 15 min to effect (Harrison and Harrison, 1986)

D 5.5–11 mg/kg BW IV, then repeat at 1, 3, 6, or 10 h prn (Kinsell, 1986)

N 1–15 mg/kg BW PO total dose (Melby and Altman, 1976)
1–5 mg/kg BW/day PO (Rosenberg et al., 1987)
10 mg/kg BW IV (Feeser and White, 1992)
Lemur: 10 mg/kg BW IV (Feeser and White, 1992)

Re 5–10 mg/kg BW IM, IV as needed (Frye, 1981)

Prednisone

D 0.5 mg/kg BW PO bid for 1 week, then sid for 1 week, the q48h for 2 weeks (Ferrer et al., 1999)

N 0.5–1 mg/kg BW PO bid for 3–5 days, then sid for 3–5 days, then q48h for 10 days, then ½ dose q48h (Isaza et al., 1992)

Prednisone and azathioprine (respectively)

D 2–4 mg/kg BW IV, IM, PO for 2–3 weeks (then reduce) and 50 mg/m2 PO sid for 2–6 weeks (then reduce) (Michels and Carr, 1997)

Prednisone and chlorambucil (respectively)

D 2–4 mg/kg BW IV, IM, PO for 2–3 weeks (then reduce) and 2 mg/m^2 PO sid or qod (use lowest effective dose for maintenance) (Michels and Carr, 1997)

Prednisone and cyclophosphamide (respectively)

D 2–4 mg/kg BW IV, IM, PO for 2–3 weeks (then reduce) and 50 mg/m^2 PO qod for 1 week, or sid for 4 days then skip 3 days; repeat cycle for 3–4 weeks (Michels and Carr, 1997)

Prochlorperazine

D 0.1 mg/kg BW IM tid, qid (Hoskins, 1997)

Propranolol

C 0.5–1 mg/kg BW PO tid (Jacobs, 1996)
D 0.5–1 mg/kg BW PO tid (Jacobs, 1996)

Ranitidine

C 1–2 mg/kg BW IV, PO bid, tid (Washabau and Hall, 1997)
1–2 mg/kg BW IM, PO bid, tid (Hall and Washabau, 1997)
2.5 mg/kg BW IV bid (Kore, 1997)
3.5 mg/kg BW PO bid (Kore, 1997)

D 2–4 mg/kg BW IV, SC bid, tid (Hoskins, 1997)
1–2 mg/kg BW IV, PO bid, tid (Washabau and Hall, 1997)
1–2 mg/kg BW IM, PO bid, tid (Hall and Washabau, 1997)

Scopolamine

N 0.01 mg/kg BW SC (Domino et al., 1969)

Stanozolol—*See* Winstrol-V

Streptokinase

D 20,000–500,000 U/h diluted in saline, continuous central vein infusion over 4–5 h (Dennis, 1993)
Rb 4000 U/kg BW/h IV (Agnelli et al., 1985)

Streptozotocin

M 200 mg/kg BW IV once (Fromtling et al., 1985)
N 45–55 mg/kg BW IV once (Takimoto et al., 1988)
R 55 mg/kg BW IV (Borchard et al., 1990)
60 mg/kg BW IP (Borchard et al., 1990)
22 mg/kg BW IM (Borchard et al., 1990)
50 mg/kg BW IP (Alder et al., 1992)

Succinylcholine

Am 2.5 mg/kg BW in ventral lymph sac (Lumb and Jones, 1984)
C 0.06 mg/kg BW via continuous IV infusion (Kinsell, 1986)
D 0.07 mg/kg BW via continuous IV infusion (Kinsell, 1986)
M 0.05–0.1 mg/kg BW IV (Lumb and Jones, 1984)
N 2 mg/kg BW IV (Cramlet and Jones, 1976)
Rb 0.5 mg/kg BW IV (Green, 1982)
Re Chelonians: 0.25–1.5 mg/kg BW IM (Page, 1993)

Sh 0.02 mg/kg BW via continuous IV infusion (Kinsell, 1986)
Sw 0.12–0.18 mg/kg BW via continuous IV infusion (Kinsell, 1986)

Sucralfate

C 250 mg/animal PO bid, tid (Kore, 1997)
D 500–1000 mg/animal PO bid, tid (Kore, 1997)
F 125 mg/animal PO qid (Harrenstien, 1994)

Suxamethonium

C 0.2 mg/kg BW IV (Flecknell, 1996)
D 0.4 mg/kg BW IV (Flecknell, 1996)
Rb 0.5 mg/kg BW IV (Flecknell, 1996)
Sh 0.02 mg/kg BW IV (Flecknell, 1996)
Sw 2 mg/kg BW IV (Flecknell, 1996)

Testosterone

Bi 8 mg/kg BW IM, PO once, then weekly as needed (Ritchie and Harrison, 1997)

Tissue plasminogen activator

D 1 mg/kg BW IV over 15–90 min (Dennis, 1993)
1 mg/kg BW IV bolus every hour for 10 doses (Clare and Kraje, 1998)

Tolazoline

Bi 15 mg/kg BW IV (Sinn, 1997)
Bo 0.2 mg/kg BW IV (Schultz, 1989)
0.5 mg/kg BW SC (Schultz, 1989)

Go 2–5 mg/kg BW IV slowly over 1 min (NCSU, 1987)
Sh 2–5 mg/kg BW IV slowly over 1 min (NCSU, 1987)

Tripelennamine

Gp 5 mg/kg BW PO, IM (Melby and Altman, 1976)

Tubocurarine

Am 1.4–7.5 mg/kg BW in ventral lymph sac (Lumb and Jones,1984)
C 0.4 mg/kg BW IV (Flecknell, 1996)
D 0.4 mg/kg BW IV (Flecknell, 1996)
Go 0.3 mg/kg BW IV (Flecknell, 1996)
Gp 0.1–0.2 mg/kg BW IV (Flecknell, 1996)
M 1 mg/kg BW IV (Flecknell, 1996)
0.06–0.09 mg/kg BW IV (Lumb and Jones, 1984)
N 0.09 mg/kg BW IV (Cramlet and Jones, 1976)
R 0.4 mg/kg BW IV (Flecknell, 1996)
0.04–0.06 mg/kg BW IV (Lumb and Jones, 1984)
Rb 0.4 mg/kg BW IV (Flecknell, 1996)
0.09–0.15 mg/kg BW IV (Lumb and Jones, 1984)
Sh 0.4 mg/kg BW IV (Flecknell, 1996)

Vecuronium

C 0.1 mg/kg BW IV (Flecknell, 1996)
0.01–0.1 mg/kg BW IV initial bolus; 0.005–0.04 mg/kg BW IV repeat boluses (Lukasik, 1995)
D 0.1 mg/kg BW IV (Flecknell, 1996)
0.01–0.1 mg/kg BW IV initial bolus; 0.005–0.04 mg/kg BW IV repeat boluses (Lukasik, 1995)
0.1 mg/kg BW IV initial bolus followed by 1.6–1.7 μg/kg BW/min IV infusion (Lukasik, 1995)

Go 0.15 mg/kg BW IV (Flecknell, 1996)
R 0.45 mg/kg IV (Durant et al., 1980)
Sh 0.05 mg/kg BW IV (Flecknell, 1996)
Sw 0.15 mg/kg BW IV (Flecknell, 1996)

Verapamil

D 0.05 mg/kg BW IV slowly over 2–3 min; repeat to total dose of 0.15 mg/kg over 10–15 min (Anonymous, 1994)

Vitamin A

Re 50,000 IU every 2 weeks IM (Snipes, 1984)
Tortoises: 11,000 IU/kg BW IM once (Page and Mautino, 1990)

Vitamin B complex

Bi 10–30 mg/kg thiamine IM every 7 days (Ritchie and Harrison, 1997)
1–2 g/kg food (Ritchie and Harrison, 1997)
Raptors, cranes, and penguins: 1–2 mg/kg sid (Ritchie and Harrison, 1997)
C 1–2 ml IM, IV, 1–2 times/week prn (Kinsell, 1986)
D 1–2 ml IM, IV, 1–2 times/week prn (Kinsell, 1986)

Vitamin B_{12}

Bi 200–500 g/kg BW IM every 7 days (Ritchie and Harrison, 1997)

Vitamin C

Bi 20–40 mg/kg BW IM daily to weekly (Ritchie and Harrison, 1997)

C 100 mg/day PO (Kinsell, 1986)
25–75 mg IM, IV, SC (Kinsell, 1986)
100 mg PO q8h as urinary acidifier (Kinsell, 1986)

D 100–500 mg/day PO (Kinsell, 1986)
25–75 mg IM, IV, SC (Kinsell, 1986)
100–500 mg PO q8h as urinary acidifier (Kinsell, 1986)

Gp 10–30 mg/kg BW IM, PO sid (Harrenstien, 1994)
50 mg/day PO or parenterally (Williams, 1976)
200 mg/l drinking water (Harkness and Wagner, 1977)
10 mg/kg BW IM followed by oral supplementation (Bauck, 1989)

Re 100–250 mg/kg BW IM sid (Messonnier, 1996)
Tortoises: 10–20 mg/kg BW IM sid (Page and Mautino, 1990)

Vitamin D_3

D 1–2 rounded tsp/10 lb BW PO sid; mix with feed or water (as a drench) (Kinsell, 1986)

N 2000 IU/kg BW in diet (Whitney et al., 1973)

Re 7500 IU every 2 weeks IM (Snipes, 1984)
Tortoises: 1650 IU/kg BW IM once (Page and Mautino, 1990)

Vitamin E/selenium (1 mg Se and 50 mg vitamin E/ml)

Bi 0.05–0.1 ml/kg BW IM, SC every 14 days (Ritchie and Harrison, 1997)

Vitamin K_1

Bi 0.2–2.5 mg/kg BW IM prn (Ritchie and Harrison, 1997)
0.2–2.5 mg/kg BW IM for 1–2 injections (Harrison and Harrison, 1986)

Warfarin poisoning: 0.2–2.5 mg/kg BW IM bid for 7 days (Ritchie and Harrison, 1997)

Winstrol-V (stanozolol)

Bi 0.5–1 mg/kg BW IM every 3–7 days (Ritchie and Harrison, 1997)
0.5–1 mg/kg BW IM (Harrison and Harrison, 1986)
C 10–25 mg IM weekly (Kinsell, 1986)
D 10–50 mg IM weekly (Kinsell, 1986)

Yohimbine

Bi 0.1 mg/kg BW IV (Sinn, 1997)
Ch 2.1 mg/kg BW IP (Hargett et al., 1989)
Go 0.2 mg/kg BW IV slowly over 1 min (NCSU, 1987)
Gp 1.0 mg/kg BW IP (Strother and Stokes, 1989)
M 2.1 mg/kg BW IP (Flecknell, 1993)
R 2.1 mg/kg BW IP (Hsu et al., 1986)
Rb 0.2 mg/kg BW IV (Keller et al., 1988)
Sh 0.2 mg/kg BW IV slowly over 1 min (NCSU, 1987)

APPENDIXES

Table A.1. Bleeding Sites

Bird

1) Brachial vein[a]
2) Cutaneous ulnar vein (NAS, 1977)
3) Right jugular vein (NAS, 1977)
4) Cardiac puncture[b]
5) Medial metatarsal vein (NAS, 1977)

Cat

1) Cephalic vein[a]
2) Jugular vein[a]

Dog

1) Cephalic vein[a]
2) Jugular vein[a]

Ferret

1) Cephalic vein
2) Retro-orbital sinus[b]
3) Tail artery
4) Tarsal vein
5) Cardiac puncture[b]
6) Jugular vein[a]

Gerbil

1) Lateral tail vein
2) Retro-orbital plexus[b]
3) Cardiac puncture[b]
4) Abdominal aorta[b]
5) Tail tip amputation[b]

(continues)

Table A.1. Bleeding Sites (*continued*)

Guinea pig

1) Middle ear vein
2) Metatarsal vein
3) Cardiac puncture[a,b]
4) Jugular vein (for exsanguination)[b]

Hamster

1) Retro-orbital plexus[b]
2) Jugular vein
3) Cardiac puncture[b]
4) Tail vein
5) Femoral vein

Mouse

1) Tail veins
2) Carotid artery
3) Retro-orbital plexus
4) Jugular vein
5) Cardiac puncture
6) Ear vein
7) Tail tip amputation[a,b]

Nonhuman primates

1) Femoral vein[a]
2) Tail vein
3) Jugular vein
4) Saphenous vein
5) Cephalic vein[a]

Pig

1) Ear vein (nick or puncture)
2) External jugular vein
3) Cranial vena cava[a]
4) Brachiocephalic vein

Rabbit

1) Marginal ear vein[a]
2) Cardiac puncture[b]
3) Retro-orbital plexus[b] (not recommended by some authors)

Rat

1) Tail veins[a]
2) Sublingual vein
3) Retro-orbital plexus[b]
4) Cardiac puncture[b] (not recommended by some authors)

Source: Adapted from *UFAW Handbook*, 1986, and Joint Working Group, 1993.

[a]Preferred site.

[b]Requires anesthesia or analgesia.

Table A.2. Plasma and Blood Volume

Species	Plasma volume mean (range) (ml/kg)	Blood volume mean (range) (ml/kg)
Cat	41 (35–52)	55 (47–66)
Cattle	38.8 (36.3–40.6)	57 (52–61)
Chicken	—	60
Dog	50.0	86 (79–90)
European rabbit	39 (28–51)	56 (44–70)
Ferret	—	75
Frog	80	95
Gerbil	—	67
Goat	56	70 (57–89)
Guinea pig	39 (35–48)	75 (67–92)
Hamster	—	78
Marmot	51	100
Marmoset		70 (58–82)
Minipig		65 (61–68)
Mouse	—	79 (63–80)
Opossum	38 (30–52)	57 (45–70)
Pig	—	65 (61–68)
Rat	40 (36–45)	64 (58–70)
Cynomolgus macaque		65 (55–75)
Rhesus macaque	36 (30–48)	54 (44–67)
Sheep	47 (44–45)	66 (60–74)

Source: Adapted from Altman and Dittmer, 1974; Joint Working Group, 1993; and Diehl et al., 2001.

Table A.3. Endotracheal tube sizes, laryngoscopic design, and blade size for laboratory animals

Species	Body Weight	Tube Diameter	Laryngoscope
Bird	<500 g	8–12 French feeding tube	
	>500 g	4–6 mm O/D (noncuffed)	
Canine	0.5–5 kg	2–5 mm O/D	MacIntosh size 1–4
	5 kg	4–15 mm O/D	
Feline	0.5–1.5 kg	2–3 mm O/D	MacIntosh size 1
	> 1.5 kg	3–4.5 mm O/D	
Gerbil	70–120 g	Not reported	
Goat	10–90 kg	5–15 mm O/D	MacIntosh size 2–4
Guinea pig	400–1000 g	1.5–2.5 mm O/D	
Hamster	70–120 g	Not reported	
Mouse	25–35 g		
Pig	1–10 kg	2–6 mm O/D	Soper or Wisconsin size 1–4
	10–200 kg	6–15 mm O/D	
Primate	0.5 kg	Not reported	
	0.5–20 kg	2–8 mm O/D	MacIntosh size 1–3
Rabbit	1–3 kg	2–3 mm O/D	Wisconsin size 0–1
	3–7 kg	3–6 mm O/D	
Rat	200–400 g	16–21 gauge plastic cannula	
Sheep	10–90 kg	5–15 mm O/D	MacIntosh size 2–4

Source: From Flecknell, 1987 (reprinted by permission); except "Bird" from Ritchie and Harrison, 1997.

Table A.4. Maximum recommended administration volumes

Species	Route and Volumes (in ml/kg)				
	IM	IP	IV (bolus)	PO	SC
Mouse	0.05–0.1[a]	10–80	5	10–50	2–40
Rat	0.1–0.2[a]	10–20	5	10–40	2–10
Rabbit	0.05–0.5	10–20	2–5	10–15	2
Dog	0.05–0.5	10–20	2.5–5	10–15	2
Macaque	0.05–0.5	10	2–5	10–15	2–5
Marmoset	0.05–0.5	10–20	2.5–5	10–15	2–5
Minipig	0.05–0.5	10–20	2.5–5	10–15	2

Source: Adapted from Joint Working Group, 2001b, and Diehl et al., 2001. In most instances the Joint Working Group reports the more conservative numbers in the ranges above. The Joint Working Group recommends no more than 0.05 ml/kg per site for IM injections, and no more than 10 ml/kg for oral and IP administrations in any species (even for those not listed above). The Joint Working Group also recommends 2–5 ml/kg for SC injections using no more than four sites. For IV infusions, use 4 ml/kg/hr for all species.

[a] Indicates ml per site, not ml/kg per site.

Table A.5. Needle Sizes and Recommended Injection Sites

Species	Injection Site			
	SC	IM	IP	IV
Feline	Scruff, back, 21–23G	Quadriceps/caudal thigh, 23G	21–23G	Cephalic vein, 21–25G
Canine	Scruff, back, 21–23G	Quadriceps/caudal thigh, 21–23G	21–23G	Cephalic vein, 21–25G
Ferret	Scruff, 21–23G	Quadriceps/caudal thigh, 23–25G	21–23G	Cephalic vein, 21–25G
Guinea pig	Scruff, back, 23–25G	Quadriceps/caudal thigh, 25G	23–25G	Ear vein, saphenous vein, 25–27G
Hamster	Scruff, 25G	Quadriceps/caudal thigh, 25G	23–25G	Femoral or jugular vein, 25–27G
Mouse	Scruff, 25G	Quadriceps/caudal thigh, 27G	25–27G	Lateral tail vein, 26–28G
Primate (small)	Scruff, 23–25G	Quadriceps/caudal thigh, 23–25G	21–25G	Lateral tail vein, 21–25G

Table A.5. Needle Sizes and Recommended Injection Sites (*continued*)

Species	Injection Site			
	SC	IM	IP	IV
Primate (large)	Scruff, 21–25G	Quadriceps/caudal thigh, triceps, 23–25G	21–23G	Cephalic vein, recurrent tarsal vein, jugular vein, 21–25G
Rabbit	Scruff, flank, 21–25G	Quadriceps/caudal thigh, lumbar muscles, 25G	21–23G	Marginal ear vein, 23–25G
Rat	Scruff, 25G	Quadriceps/caudal thigh, 25G	23–25G	Lateral tail vein, 21–23G
Bird	Pectroal, interscapular, or inguinal fold 1–3% BW bid or tid<21G	Pectoral/per site 0.2 ml/<100 g BW 0.2–0.5 ml/100–500 g BW 0.5–1.0 ml/>500 g BW <25G	Not applicable	Cutaneous ulnar vein, <25G, short bevel

Source: Adapted from Flecknell, 1987 and Joint Working Group, 2001b; except "Bird" from Ritchie and Harrison, 1997.

Table A.6. Body Surface Area Conversions Including MEEH Coefficients

kg	M^2	kg	M^2
0.5	0.06	26.0	0.88
1.0	0.10	27.0	0.90
2.0	0.15	28.0	0.92
3.0	0.20	29.0	0.94
4.0	0.25	30.0	0.96
5.0	0.29	31.0	0.99
6.0	0.33	32.0	1.01
7.0	0.36	33.0	1.03
8.0	0.40	34.0	1.05
9.0	0.43	35.0	1.07
10.0	0.46	36.0	1.09
11.0	0.49	37.0	1.11
12.0	0.52	38.0	1.13
13.0	0.55	39.0	1.15
14.0	0.58	40.0	1.17
15.0	0.60	41.0	1.19
16.0	0.63	42.0	1.21
17.0	0.66	43.0	1.23
18.0	0.69	44.0	1.25
19.0	0.71	45.0	1.26
20.0	0.74	46.0	1.28
21.0	0.76	47.0	1.30
22.0	0.78	48.0	1.32
23.0	0.81	49.0	1.34
24.0	0.83	50.0	1.36
25.0	0.85		

Note: $M^2 = \text{weight (g)}^{2/3} \times K \times 10^{-4}$; where M = meters, K = Meeh coefficient (Bat = 57.5, Bird = 10.0, Cat = 10.0, Cattle = 9.0, Dog >4 kg = 11.2, Dog <4 kg = 10.1, Fish = 10.0, Frog = 10.6, Guinea pig = 9.0, Monkey = 11.8, Mouse = 9.0, Rabbit = 9.75, Rat = 9.1, Sheep = 8.4, Snake = 12.5, Swine = 9.0) from Schmidt-Nielsen, 1984.

Table A.7. Safe Bleeding Volume

Species	One bleeding (maximum) (ml/kg)	Species	One bleeding (maximum) (ml/kg)
Cat	7.7	Horse	8.8
Cattle	7.7	Monkey (Macaque)	6.6
Chicken	9.9	Mouse	7.7
Dog	9.9	Pig	6.6
Goat	6.6	Rabbit	7.7
Guinea pig	7.7	Rat	5.5
Hamster	5.5	Sheep	6.6

Source: Adapted from Mitruka and Rawnsley, 1977.

Note: If the amount of blood volume removed is 7.5% of total blood volume (see Table A.2.), allow 1 week recovery; if amount removed is 10%, allow 2 weeks recovery; if amount removed is 15%, allow 4 weeks recovery (Diehl et al., 2001).

Table A.8. Toxic Doses of Antibiotics in Rodents

Antibiotic	Mouse	Rat	Guinea pig	Hamster
Penicillin			5,000 IU IP: 60% mortality, 10,000 IU PO: 20% mortality 100,000 IU IM, two doses in 24 hours: 7/8 died.	100 mg PO, 600 mg SC: 100% mortality within 5 days
Procaine	0.3 mg/kg: 90% mortality		0.4 mg/kg, 125 mg/kg: 100% with convulsions	
Ampicillin			8 mg/kg SC tid for 5 days: 20% mortality by day 8	5 mg PO tid 5 days: 90% mortality
Cephalosporins			Cefazolin, 100 mg IM qid 5 days: 3/12 died	Cephalexin, 5 mg PO tid 5 days: 90% mortality, Cefoxitin 10 mg IM tid 5 days: 100% mortality, Cephalothin 20 mg IM tid 5 days: 80% mortality
Carbenicillin				100 mg/kg PO: 9/10 animals died within 8 days
Ticarcillin				10 mg/kg PO: 10/10 animals died within 8 days

Table A.8. Toxic Doses of Antibiotics in Rodents (*continued*)

Antibiotic	Mouse	Rat	Guinea pig	Hamster
Lincomycin			30 mg/kg SC on alternate days: most animals died 5–14 days after treatment started	>10 mg/kg SC: 20/24 animals died with enteritis
Clindamycin			75 mg/kg IP sid: 100% mortality in 6–8 days	3 mg PO tid 5 days: 100% mortality
Streptomycin	6 mg/kg IM: acutely 100% mortality		60 mg per animal once PO: 60 mg per animal once PO: days	Acutely lethal at *therapeutic* dose rates
Gentamicin				1 mg PO tid for 5 days: 20% mortality
Neomycin				285 mg/kg PO: death within 5 days
Chloramphenicol				10 mg PO tid for 5 days: 20% mortality, ≥300 mg/kg PO: enteritis

(*continues*)

Table A.8. Toxic Doses of Antibiotics in Rodents (*continued*)

Antibiotic	Mouse	Rat	Guinea pig	Hamster
Erythromycin			Oral ≥33 mg/kg for 3 days: 40% mortality 33 mg/kg IP: 100% mortality	20 mg PO tid 5 days mortality 30–200 mg/kg IP: 100% mortality
Aureomycin			5 mg/kg PO: 100% mortality 100 mg/kg diet: 8/9 died	
Tetracycline	150 mg/kg		50 mg/kg in diet	100 mg/kg PO: majority of animals died within 3–4 days
Chlortetracycline			20 mg/animal PO: mortality: % not given	
Vancomycin				5 mg PO tid 5 days: 90% mortality
Bacitracin			2,000 IU/animal: 80% mortality	
Spiramycin	3.13 g/kg: acute oral LD_{50}	4.85 g/kg: acute oral LD_{50}	3.5 g/kg: acute oral LD_{50}, 0.25 g/kg: chronic oral LD_{50} with enteritis	

Table A.8. Toxic Doses of Antibiotics in Rodents (*continued*)

Antibiotic	Mouse	Rat	Guinea pig	Hamster
Trimethoprim-sulfamethoxazole			75 mg/kg IP sid: 100% mortality in 6–8 days	33 mg trimethoprim, 167 mg sulfamethoxazole/kg PO: 6/20 animals died

Source : Morris, 1995 (reprinted by permission); see Morris, 1995, for references.

Table A.9. Adverse Effects of Antibiotic Treatment in Rabbits

Antiobiotic	Toxic dose	Toxic effects
Ampicillin	25 mg/kg IM for 2 days	Fatal enteritis
	5 mg/kg IM for 2 days	Weight loss
	40 mg/kg SC for 4 days	40% fatal enteritis over next month
	10 mg/kg PO for 6 days	50% fatal enteritis over next month
	8 mg/kg bid SC	Enteritis, previously also had penicillin
	>5mg/kg PO antibiotic treated water for 3 days	Fatal enteritis in 7/11 rabbits
Penicillin	LD_{50} 5.25 g/kg PO	Both acute and chronic toxicity (enteritis)
Cephalexin	200 mg/rabbit for 7 days	Diarrhea
Lincomycin	100 mg PO single dose in 1.5–2.0 kg rabbits	66% mortality with enteritis
	24 mg/kg PO antibiotic treated water	90 % mortality with enteritis
	30 mg/day PO in 2.0–2.5 kn rabbits	100% mortality with enteritis by 3 days
	1.3 mg/adult rabbit in feed for 3 days	20/130 rabbits died with enteritis
	0.2 mg/kg IM for 2 days	33% mortality in 2 days
Clindamycin	15 mg/kg PO for 3 days	100% mortality with enteritis
	5 mg/kg PO for 2 days	50% mortality with enteritis within 72 hours
	Single IV dose of 30 mg/kg	4/6 rabbits had fatal enteritis 12–14 days after treatment
Tylosin	100 mg/rabbit for 7 days	Diarrhea

Table A.9. Adverse Effects of Antibiotic Treatment in Rabbits (*continued*)

Antiobiotic	Toxic dose	Toxic effects
Erythromycin	3 g/L in drinking water for 7 days	Diarrhea
Spectinomycin	1 g/L in drinking water for 7 days	Diarrhea
Vancomycin	75 mg/kg IV	Acute toxicity with 100% mortality
Minocycline	30 mg/kg IM for 3 days	Reduction in growth rate
Spiramycin	Acute oral LD_{50} 4.85 g/kg	Nervous signs

Source: Morris, 1995 (reprinted by permission); see Morris, 1995, for references.

Table A.10. Heat Dissipation Levels for Various Species

Species	Activity level	Body weight (kg)	Heat dissipated (kcal/day)
Chicken	Caged	1.8	210
Dog	Basal	25	874
Dog	Basal	14	533
Rabbit	Basal	2.5	120
Rabbit	Caged	2.6	381
Rat	Basal	0.28	28
Rat	Caged	0.26	50
Swine	Grouped	68	4008

Source: Besch and Woods, 1977.

Table A.11. Long-Term Anestesia Protocols

Saffan (alfadolone/alfaxalone)	
C	9–12 mg/kg BW IV then 0.2–0.3 mg/kg/min IV
M	15–20 mg/kg BW IV then 0.25–0.75 mg/kg/min IV
N	10–12 mg/kg BW IV then 0.3–0.6 mg/kg/min IV
R	10–12 mg/kg BW IV then 0.2–0.7 mg/kg/min IV
Sh	2–3 mg/kg BW IV then 0.1–0.2 mg/kg/min IV
Sw	2 mg/kg BW IV then 0.1–0.2 mg/kg/min IV
Propofol	
C	7.5 mg/kg BW IV then 0.2–0.5 mg/kg/min IV
D	5–7.5 mg/kg BW IV then 0.2–0.4 mg/kg/min IV
M	26 mg/kg BW IV then 2–2.5 mg/kg/min IV
N	7–8 mg/kg BW IV then 0.2–0.5 mg/kg/min IV
R	10 mg/kg BW IV then 0.5–1 mg/kg/min IV
Sw	2–2.5 mg/kg BW IV then 0.1–0.2 mg/kg/min IV, after ketamine premedication (10 mg/kg IM), then add alfentanil 20–30 μg/kg IV then 2–5 μg/kg/min IV
Midazolam combinations	
D	Midazolam at 50–100 μg/kg BW IV plus alfentanil at 10–20 μg/kg IV, then midazolam at 5 μg/kg/min IV with alfentanil at 4–5 μg/kg/min IV
Rb	Midazolam at 1–2 mg/kg IV plus fentanyl/fluanisone at 0.3 ml/kg IM, then fentanyl at 2–5 μg/kg/min IV

Source: Flecknell, 1996.

Table A.12. IP or SC Fluid Replacement Recommendations

Species	SC (ml/kg)	IP (ml/kg)
Cat	17	5.6–11.2
Gerbil	17–33	50
Guinea pig	10–20	20
Hamster	30	30
Mouse	17–33	33
Rabbit	10–17	17
Rat	25	25

Source: Flecknell, 1996.

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