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Rhinoceroses

Drug name	Drug dose	Species	Comments
Antimicrobials and Antifungals			
Amikacin	5 mg/kg IV or SC BID × 6d [1]	White rhinos	n = 1, 3-day-old calf with apparent septicemia and hypoglycemia.
Ceftiofur Crystalline Free Acid (Excede)	6.6 mg/kg SC × 2 doses [2]	White rhinos	n = 1 calf with repaired patent urachus.
Enrofloxacin	5 mg/kg PO SID [3]	Black and White rhinos	n = 2 Black rhinos with 25 prescriptions and 5 White rhinos with 10 prescriptions and no adverse effects noted.
	8.75 mg/kg PO SID × 60d [4]	Eastern black rhinos	n = 1 animal with osteomyelitis.
Metronidazole	55 mg/kg PO BID × 7 wks [5]	Eastern black rhinos	n = 1 animal, assumed 455 kg, with necrotic laminar disease that was treated chronically and successfully.
Procaine penicillin G with benzathine	30 000 IU/kg IM [2]	White rhinos	n = 1 calf with repaired patent urachus.
Sodium benzyl penicillin	22 000 IU/kg IV [6]	White rhinos	n = 1 animal, captive, 2 yr old male, with an osteochondroma of the distal third metacarpal bone removed successfully. Antibiotic given perioperatively.
Trimethoprim sulfadiazine	20 mg/kg PO SID × 14d [4]	Eastern black rhinos	n = 1 animal with osteomyelitis.
	34 mg/kg PO BID × 7 wks [5]	Eastern black rhinos	n = 1 animal, assumed 455 kg, with necrotic laminar disease that was treated chronically and successfully.
	20 mg/kg PO BID × 10d [1]	White rhinos	n = 1, 3-day-old rhino with dermatitis and wounds.

(*Continued*)

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Drug name	Drug dose	Species	Comments
	25–30 mg/kg PO SID [3]	Black rhinos	n = 5 animals, 15 prescriptions, tablets crushed and misted grain lightly with water then coat with powder from crushed tablets. One adverse reaction: some skin sloughing on medial aspect of hind limbs, resolved with discontinuation of medication.
	25–30 mg/kg PO SID [3]	White rhinos	n = 11 animals with 41 prescriptions, no adverse effects noted.
	33 mg/kg PO SID × 7d [7]	Black rhinos	n = 1 calf, 2–3 mo old, with diarrhea with positive salmonella culture, successfully treated.
Analgesia			
Butorphanol	0.05–1 mg/kg PO BID [8]	White and Black rhinos	n = Retrospective results of 3/33 institutions contacted regarding analgesic use in Rhinos: 3/3 institutions felt this provided good to excellent analgesia subjectively. Sedation, and anorexia (at highest dose) noted.
Carprofen	1 mg/kg IM once [9]	White rhinos	Pharmacokinetic, not dynamic, study of 6 White Rhino – resulted in serum levels that may be effective for up to 48 hrs in most animals.
Firocoxib	Reaction noted: 0.06 mg/kg PO SID × 6d then 0.03 mg/kg PO SID × 14d, then a few yrs later 0.06 mg/kg PO SID × 12d [10, 11]	White rhinos	Resulted in generalized vesiculobullous dermatitis coinciding with 2nd treatment of firocoxib.
	0.088–0.1 mg/kg PO SID [8]	White rhinos	n = Retrospective results of 4/33 institutions contacted regarding analgesic use in Rhinos: 4/4 institutions felt this provided good to excellent analgesia subjectively. No adverse effects were reported.
Flunixin meglumine	0.2–1.6 mg/kg PO SID or EOD [8]	White, Black, Indian, and Sumatran rhinos	n = Retrospective results of 24/33 institutions contacted regarding analgesic use in Rhinos: 20/24 institutions felt this provided good to excellent analgesia subjectively. Taste aversion was noted with some animals.
Flunixin meglumine	1.1 mg/kg PO SID × 2d [7]	Black rhinos	n = 1 calf, 2–3 mo old, with diarrhea with positive salmonella culture, successfully treated.
Flunixin meglumine (Finadyne)	1.1 mg/kg IV BID × 3d [12]	White rhinos	n = 1, 10 mo old, 580 kg juvenile, with colonic impaction and celiotomy.

Drug name	Drug dose	Species	Comments
Gabapentin	1–8.5 mg/kg PO BID [3]	Black rhinos	n = 1 animal, under treatment for chronic foot abscess, started low and increased until pain control perceived without sedation, used with and without phenylbutazone, used continuously for >3 yrs, no adverse effects noted.
	2.5–5 mg/kg PO SID [8]	Black rhinos	n = Retrospective results of 4/33 institutions contacted regarding analgesic use in Rhinos: 2/4 institutions felt this provided fair to good analgesia subjectively.
Glucosamine Chondroitin	1.1–4 mg/kg PO SID to BID [8]	White and Indian rhinos	n = Retrospective results of 7/33 institutions contacted regarding analgesic use in Rhinos: 4/7 institutions felt this provided fair to good analgesia subjectively.
Ketoprofen	0.5 mg/kg PO SID to BID [8]	White and Black rhinos	n = Retrospective results of 3/33 institutions contacted regarding analgesic use in Rhinos: 2/3 institutions felt this provided good to excellent analgesia subjectively.
Lidocaine	IV regional perfusion 2%: 30 ml Given IV after tourniquet placed on foot. Then L: 50 ml + 50 ml of 0.75% bupivicaine given topically into the wound [4]	Eastern black rhinos	n = 1 animal with osteomyelitis and digit amputation.
Meloxicam	0.2 mg/kg PO BID × 4d [12]	White rhinos	n = 1, 10 mo old, 580 kg, juvenile with colonic impaction and celiotomy.
	0.6 mg/kg IV [6]	White rhinos	n = 1 animal, captive, 2 yr old male, with an osteochondroma of the distal third metacarpal bone removed successfully. meloxicam given perioperatively.
Phenylbutazone	2–4 mg/kg PO or IV SID [3]	Black rhinos	n = 2 animals, with 66 total prescriptions, one on long-term treatment for chronic foot abscesses with fecal occult blood check every other month with no adverse effects noted.
	2–4 mg/kg PO or IV SID [3]	White rhinos	n = 9 animals, with 28 prescriptions, no adverse effects noted.

(*Continued*)

Drug name	Drug dose	Species	Comments
	3–10 mg/kg PO SID to BID (>4 mg/kg not given for more than 3 d) [8]	White, Black, and Indian rhinos	n = Retrospective results of 25/33 institutions contacted regarding analgesic use in Rhinos: 21/25 institutions felt this provided good to excellent analgesia subjectively. Taste aversion was noted with some animals.
	6 g PO SID × 5d [5]	Eastern black rhinos	n = 1 animal with necrotic laminal disease that required chronic foot trimming and after each immobilization and trim was started on phenylbutazone for 5 days. Assumed 1000 lb animal.
	4.7 mg/kg PO EOD × 28 doses [4]	Eastern black rhinos	n = 1 animal with osteomyelitis.
Tramadol	0.8–3 mg/kg PO BID [8]	White and Black rhinos	n = Retrospective results of 4/33 institutions contacted regarding analgesic use in Rhinos: 3/4 institutions felt this provided good to excellent analgesia subjectively. Mild to moderate sedation was noted.
Anesthesia and Sedation			
Azaperone	A: 80–200 mg IM [10]	Rhinos	Sedation for 2–4 hrs.
	100–250 mg IM q6 hrs [13]	Black rhinos	To facilitate transport.
Butorphanol	Calf 66–159 kg: 10–20 mg butorphanol IV or 0.13–0.15 mg/kg IV [14]	White rhino calves (likely Greater one-horned rhino calves, too)	Captive calves. Antagonize with naltrexone at 5 mg per mg butorphanol.
	B: 25 mg IV for a 500 kg subadult calf [14]	Black rhinos	Captive calves, heavy standing sedation. Antagonize with naltrexone at 5 mg per mg butorphanol.
	B: 25–40 mg IM [10]	Greater one-horned rhinos	Standing sedation, captive animals.
	B: 25–50 mg IV or IM; antagonize with 2.5 mg naltrexone per mg butorphanol IM or IV [10, 14]	Black rhinos	Standing sedation, captive animals.
	B: 25–40 mg IM; antagonize with 2.5 mg naltrexone per mg butorphanol IM or IV [14]	Sumatran rhinos	Captive animals, Standing sedation. May be able to train with food to crate without any medication.

Drug name	Drug dose	Species	Comments
Butorphanol + azaperone	B: 30–50 mg + A: 50–60 mg IM; antagonize with 2.5 mg naltrexone per mg butorphanol IM or IV [10, 14]	Sumatran rhinos	Captive animals, Higher doses for recumbency.
Butorphanol + azaperone	B: 80 mg + A: 80 mg total IM; antagonize with 2.5 mg naltrexone per mg butorphanol given [13].	Sumatran rhinos	
	B: 50–70 mg + A: 100 mg IM [10, 13, 14]	White rhinos	Captive animals, Standing sedation or for transport of calm, captive rhinos. Use a CRI of drug combo for long procedures.
	B: 70–120 mg + A: 100–160 mg IM; antagonize with 2.5 mg naltrexone per mg butorphanol IM or IV [10, 14]	White and Black rhinos	For recumbency, captive animals.
	B: 80 mg + A: 80 mg IM; antagonize with 2.5 mg naltrexone per mg butorphanol, IV or IM [14].	Sumatran rhinos	Wild animals, if can approach give 25–40 mg IV butorphanol instead.
	B: 100 mg + A: 100 mg IM; antagonize with 2.5 mg naltrexone per mg butorphanol IM or IV [10, 14].	Greater one-horned rhinos	Standing sedation. Captive animals.
Butorphanol + detomidine	B: 0.015 mg/kg + D: 0.015 mg/kg IM [15]	White and Greater one-horned rhinos	n = 12 White and 4 Indian rhinoceros, captive animals, standing sedation.
	Calf: 69–122 kg: B: 2.5–5 mg + D: 1.5–1.8 mg IM (B: 0.03 mg/kg + D: 0.07 mg/kg) [14]	White rhinos	Captive calves. Surgical anesthesia. Antagonize with naltrexone at 4 mg per mg butorphanol, and yohimbine 0.125 mg/kg.
	B: 20–30 mg + D: 20–50 mg IM [10]	Black rhinos	Standing sedation, captive animals.
	B: 120 mg + D: 80 mg IM [10]	Greater one-horned rhinos	Immobilization of captive animals.
Butorphanol + detomidine + etorphine + acepromazine	Initial dart B: 10 mg + D: 10 mg-wait 20 min, then give E: 1.2 mg + Ace: 5 mg IM via 2nd dart [10, 14]	Sumatran rhinos	Captive animals, antagonize with naltrexone 150 mg IV and atipamezole 20 mg IV, use 50 mg ketamine boluses to extend anesthesia.
	E: 1.1 mg + Ace: 5 mg + B: 15 mg + D: 15 mg [10]	White rhinos	Standing sedation, captive animals.

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Drug name	Drug dose	Species	Comments
Butorphanol + medetomidine	B: 120–150 mg + M: 5–7 mg IM via dart; then give 1–2 mg nalorphine IV to keep standing [10, 14]	White, Black, and Greater one-horned rhinos	Captive animals, standing sedation. Antagonize with naltrexone 1 mg per mg butorphanol, and atipamezole 5 mg per mg medetomidine.
	B: 120–150 mg + M: 5–7 mg IM via dart; ± 5% guaifenesin drip [10, 14]	White rhinos	Captive animals, recumbency in 20 min. Improved analgesia for surgery. Antagonize with naltrexone 1 mg per mg butorphanol, and atipamezole 5 mg per mg medetomidine.
	B: 160 mg + M: 10 mg; ketamine 200–400 mg IV can induce recumbency if still standing; antagonize with IV naltrexone and atipamezole [16]	White rhinos	Adult and compromised adult animals, standing sedation at 6–8 min, recumbency in 12–15 min.
Butorphanol + midazolam + propofol + sevoflurane	B: 0.04 mg/kg + Mid: 0.1 mg/kg IM, 30 min later induced with P: 4 mg/kg IV and maintained with S [17].	Black rhinos	n = 1, 53 kg, 30-day-old calf anesthetized 3 times successfully for MRI and evaluation.
Carfentanil	C: 0.7–1 mg IM; antagonize with 100 mg naltrexone per mg carfentanil [10, 14]	Greater one-horned rhinos	For wild animals, immobilization, induction times longer for breeding males.
	C: 1.2 mg IM; antagonize with naltrexone 100 mg per mg carfentanil [10, 14]	White rhinos	Recumbency.
	C: 3 mg total IM; antagonize with naltrexone 300 mg [13]	Black rhinos	Add 5000 IU hyaluronidase to hasten induction. Consider supplemental oxygen 15–30 l/min or doxapram 200 mg IV.
Carfentanil + azaperone	C: 0.001 mg/kg + A : 0.1 mg/kg IM; antagonize with naltrexone 0.1 mg/kg [13]	White rhinos	
Carfentanil + midazolam	C: 0.7–1.2 mg ± Mid: 10 mg [10]	Black rhinos	Immobilization of captive animals.
Diazepam	5–20 mg IV (or the same mg midazolam IV) [14]	White rhinos	To decrease muscle tremors.
Diazepam or midazolam	D: 10–30 mg IM or Mid: 5–50 mg IM [10]	Rhinos	Sedation for 2–6 hrs.

Drug name	Drug dose	Species	Comments
Etorphine + butorphanol	Newborn or very small: B: 20 mg IM, For older calves: E: 0.1 mg for every month of age up to one yr, combined with IM butorphanol at 10–20× E dose in mg [16].	White rhinos	Calves, dart cow 2–3 min prior to calf, do not calf once cow is recumbent.
Etorphine	Calf: 0.1–1 mg; Juvenile: 1–2.5 mg; Subadult: 2.5–3.5 mg; once recumbent give butorphanol 10–20 mg/mg etorphine for respiratory support [14].	White rhinos	Antagonize with diprenorphine 2.5 mg IV per mg etorphine for transport. Full reversal 40 mg naltrexone per mg etorphine. Always dart mother 30–60 sec prior to calf – most important for black rhino calves.
	Calf: E: 0.1–1 mg; Subadult: E: 2.5–3.5 mg; antagonize with 40 mg naltrexone per mg etorphine, IV [14]	Black rhinos	Wild calves.
	Adult: E: 0.5–0.85 mg IM [10]	Black rhinos	Standing sedation. Doses as low as 0.25 mg etorphine have been used to walk animal into a crate.
	Adult: E: 0.5–1.5 mg IM [10]	Greater one-horned rhinos	Standing sedation. Captive animals.
	Adult: E: 0.8–1.5 mg IM [10]	White and Greater one-horned rhinos	Standing sedation. Captive animals.
	Adult 1.5 mg; Sub-adults 3 mg; Juveniles 2 mg; Calves 1 mg IM [13]	White rhinos	Calm captive animals may require less etorphine than wild/ free-ranging.
Etorphine	E: 0.8–1.5 mg IM; antagonize with naltrexone at 40 mg per mg etorphine [14]	White rhinos	Captive animals, standing sedation.
Etorphine hydrochloride + acepromazine maleate (Large Animal Immobilon)	Drug solution is E: 2.45 mg/ml + A: 10 mg/ml) Give 1.6 ml IM; antagonize with 2 mg diprenorphine per mg of etorphine given [13]	White rhinos	

(*Continued*)

Drug name	Drug dose	Species	Comments
Etorphine + acepromazine	E: 2.25 mg + Ace: 10 mg total; antagonize with 2 mg diprenorphine per mg etorphine given [10, 13].	Indian rhinos	Supplement with 2 mg etorphine as needed, for wild animals.
Etorphine + azaperone	Calf: E: 0.1–1 mg + A: 5–20 mg; Subadult: E: 2.5–3.5 mg + A: 30–60 mg [14]	White rhinos	Wild calves, antagonize with diprenorphine 3 mg IV per mg etorphine.
	Calf: E: 0.1–1 mg + A: 10–50 mg; Subadult: E: 1.75–3.5 mg + A: 100 mg [14]	Black rhinos	Wild calves, antagonize with diprenorphine 3 mg IV per mg etorphine. Always dart mother 30–60 seconds prior to calf. Could add 5 mg butorphanol or nalorphine IV, titrate to effect to prevent arousal, for respiratory support.
	Calf: E: 0.5–1 mg + A: 5 mg; Subadult: E: 2–2.5 mg + A: 10 mg [14]	Black rhinos	Wild calves, antagonize with diprenorphine 2.5 mg IV per mg etorphine. For subadults, use adult doses.
	E: 1–1.5 mg + A: 60 mg IM; antagonize with 50 mg naltrexone per mg etorphine half IV and half IM [10, 14]	Sumatran rhinos	Captive animals, recumbency.
	E: 1–1.5 mg + A: 100 mg IM; antagonize with 50 mg naltrexone per mg etorphine half IV and half IM [14]	Black rhinos	Recumbency, lower doses can be used for hand injections.
	E: 2–3 mg + A: 20–40 mg IM; antagonize with naltrexone at 40 mg per mg etorphine [10, 14]	White rhinos	Recumbency, captive animals.
	E: 2 mg + A: 80 mg + 5000 IU hyaluronidase; antagonize with 50 mg naltrexone per mg etorphine given [13, 14].	Sumatran rhinos	
	E: 2.5–3 mg + A: 60 mg IM; antagonize with 20–40 mg naltrexone per mg etorphine [10, 14].	Black rhinos	Recumbency, captive animals.
	E: 4 mg + A: 250 mg total; antagonize with naltrexone 160 mg IV [13]	Black rhinos	If no signs of drug effect develop in 6 min, repeat full dose. Add 5000 IU hyaluronidase to hasten induction. Consider supplemental oxygen 15–30 l/min or doxapram 200 mg IV. In captive Rhinos may be able to use 1–1.5 mg etorphine.

Drug name	Drug dose	Species	Comments
Etorphine + azaperone or detomidine ± midazolam	E: 3–4.5 mg + A: 40–60 mg if transporting. If not transporting substitute 20 mg Det for azaperone. Consider 5–20 mg Mid IV slowly for muscle relaxation [14]	White rhinos	Wild/Free-ranging animals, standard translocation protocol. For crate reversal: 2–4 mg diprenorphine per mg etorphine plus 1–2 mg naltrexone IV if pushing. For Full reversal 40 mg naltrexone per mg etorphine IV. For respiratory support, butorphanol 20 mg per mg etorphine (or reduce to 10–15× etorphine if animal is light) or could be used instead 20–30 mg nalorphine IV OR 20–40 mg nalbuphine IV, and/or 1 mg diprenorphine.
	E: 4 mg + A: 40–60 mg (or Det: 10 mg or xylazine 100 mg) + 5000 IU hyaluronidase [14].	Black rhinos	Wild/Free-ranging animals. Could increase azaperone to 200 mg for a quicker induction if not transporting or could combine with the alpha-2 agonists. For crate reversal: 20 mg butorphanol per mg etorphine, or 5–20 mg nalorphine per mg etorphine or 1–1.8 mg diprenorphine IV. For field or boma reversal: naltrexone 40 mg per mg etorphine IV (full reversal).
Etorphine + butorphanol + midazolam	E: 2–3.5 mg + B: 40–90 mg + Mid: 25–50 mg IM; antagonize with 40 mg naltrexone per mg etorphine (full reversal) or 2–2.5 mg diprenorphine per mg etorphine, IV [14].	White rhinos	Wild/Free-ranging animals. Avoid butorphanol in combination with etorphine in rough terrain where a quick induction is preferred. Produces respiratory depression, hypoxia, tachycardia, muscle rigidity, and tremors, but with slower induction and animal may stay on its feed.
Etorphine + detomidine	Female: E: 3 mg + D: 12 mg IM; Male: E: 4 mg + D: 20 mg IM; antagonize with naltrexone 150 mg and atipamezole 60 mg [13]	White rhinos	If no signs of drug effect develops in 6 min, repeat full dose.
Etorphine + detomidine + butorphanol	E: 2–2.5 mg + D: 10 mg + B: 15 mg IM [14]	Black rhinos	Standing sedation. Captive animals. Antagonize with 40 mg naltrexone per mg etorphine and 5 mg atipamezole per mg detomidine.
Etorphine + detomidine + butorphanol + acepromazine + ketamine	E: 2.5–3.7 mg + D: 8–12 mg + B: 10 mg + A: 10–15 mg IM and as needed K: 200–400 mg IV [18]	White rhinos	n = 20 events with 11 animals for reproductive evaluation, xylazine 20–40 mg IV allowed for semen collection. Duration of 28–124 min.; antagonized with naltrexone 250 mg and atipamezole 20 mg IV. Smooth reversal, all standing and alert within 2 min.

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Drug name	Drug dose	Species	Comments
Etorphine + detomidine + ketamine	E: 3.5–3.8 mg + D: 14 mg + K 400 mg; antagonize with naltrexone 150–300 mg half IV and half IM. No reversal for detomidine [10, 13, 14].	Indian and Greater one-horned rhinos	Recumbency, captive animals.
Etorphine + medetomidine	E: 1.5–2 mg + M: 2–3 mg total IM; then give 1–2 mg nalorphine IV to keep standing [10, 14]	Black rhinos	Standing sedation, captive animals, antagonize with 30 mg naltrexone per mg etorphine, and 5 mg atipamezole per mg medetomidine.
Etorphine + medetomidine	E: 1.5–2 mg + M: 2–3 mg total IM; antagonize with 30 mg naltrexone per mg etorphine, and 5 mg atipamezole per mg medetomidine [14].	Black rhinos	Captive animals, recumbency in 15 min, enhanced analgesia for dental surgery.
Etorphine + medetomidine + ketamine + guaifenesin	E: 1.5–2 mg + M: 2–3 mg + 1 g/l ketamine in a 5% guaifenesin bag as CRI [10]	Black rhinos	Recumbency and maintenance as CRI.
Etorphine + Thiafentanil	E: 2.5 mg + T: 2.5 mg total IM; antagonize with naltrexone 100 mg IV [13, 14]	Black rhinos	In captive rhino may be able to use 1–1.5 mg etorphine. Add 5000 IU hyaluronidase to hasten induction. Consider supplemental oxygen 15–30 l/min or doxapram 200 mg IV. In wild animals could use thiafentanil alone, up to 5 mg, but watch respirations.
Etorphine + xylazine	E: 4 mg + X: 100 mg; antagonize with naltrexone 160 mg IV [13]	Black rhinos	Add 5000 IU hyaluronidase to hasten induction. Consider supplemental oxygen 15–30 l/min or doxapram 200 mg IV.
Ketamine + diazepam (+ CRI ketamine + medetomidine)	K: 0.5 mg/kg + D: 0.05 mg/kg IV in 3 aliquots at 3 min intervals given IV. Total of K: 300 mg, D: 30 mg. Two additional boluses of K: 100 mg and D: 10 mg were required in addition to isoflurane 5% and a CRI of K: 1.6 mg/kg/hr + M: 0.016 mg/kg/hr [12]	White rhinos	n = 1, 10 mo old 580 kg juvenile with colonic impaction and celiotomy.

Drug name	Drug dose	Species	Comments
Perphenazine (Trilafon-LA)	100–200 mg IM [10]	Rhinos	Onset in 12–18 hrs duration of 7–10 days.
Perphenazine	Adult 300 mg; Subadult 100 mg; Juveniles 50 mg [13]	Black and White rhinoceroses	
Zuclopenthixol	60–200 mg [10]	Rhinoceroses	Sedation for up to 3 d.
	300 mg Adults [13]	Black and White rhinoceroses	
Antiparasitic			
Praziquantel	3 mg/kg PO [19]	Sumatran rhinoceroses	Slight decrease in Fasciola eggs in feces.
Other			
Diphenhydramine	2 mg/kg PO TID [1]	White rhinos	n = 1 calf, treated for urticaria of unknown cause.
Di-Tri-octahedral smectite (Equine Biosponge)	PO BID [1]	White rhinos	n = 1 calf treated for diarrhea in conjunction with probiotic PO SID.
Dobutamine	0.7 µg/kg/min or 10 ml/kg/hr, then increased up to 22 ml/kg/hr [20]	White rhinos	n = 1, 10 mo old 580 kg juvenile with colonic impaction and celiotomy. Used in an attempt to maintain a MAP of 8 kPa–9.33 kPa. Phenylephrine also used.
Fractionated vegetable fat (Manna Pro's Cool Calories Equine Fat Supplement)	30 g per animal sprinkled on food SID [3]	Black rhinos	Used for assistance with weight gain in thin animals. Start at 10 g for 3–5 days then 20 g for 3–5 days then full 30 g/day to prevent diarrhea.
GnRF vaccination (Improvac Zoetis)	Vaccinated at 0,4,16 wks and q6–8 months [20]	White and Greater one-horned rhinos	n = 4 White and 3 Greater one-horned rhino females with repro tract tumors that decreased by approx 50% in size after 3 months post vaccine.
Hydroxyzine pamoate	Initially 0.5 mg/kg PO BID × 3d, then 0.75 mg/kg PO BID × 3d then 1 mg/kg PO BID continuously [21]	Black rhinos	n = 2 animals with chronic eosinophilic granulomas managed successfully with chronic or continuous hydroxyzine.
Monosodium phosphate (equine powdered product 26%)	12 g powder PO SID [3]	Black rhinos	n = 2 animals with 23 prescriptions, for hypophosphatemia, no adverse effects noted, treated until phosphorus levels were again within normal limits.
Omeprazole	2 mg/kg PO SID × 3–5d [3]	Black rhinos	n = 1 animal with 13 prescriptions, no adverse effects noted.
Oxytocin	100 IU [10]	Rhinos	Captive species with dystocia, given if no signs of labor for 4–6 hrs after rupture of fetal membranes.

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Drug name	Drug dose	Species	Comments
Phenylephrine	10 mg added to a fluid bag for dilution of 33 µg/ml [20]	White rhinos	n = 1, 10 mo old 580, kg juvenile with colonic impaction and celiotomy. Resulted in increased heart rate from 50 to 65 beats per minute.
Phosphorus (Equiphos)	1–4 oz per day PO [19]	Sumatran rhinos	n = 1, 30 yr old male with renal disease, azotemia, hypercalcemia, and hypophosphatemia. Fed daily, increased by 1–2 oz per day when Ca:Phos ratio exceeded 5:1, managed for 5 yrs thus.
Reported Toxicities			
Kale		Hemolysis	
Onions		Hemolysis	
Red maple		Hemolysis	
Brassica plants		Hemolysis	
Creosote		Causes liver dysfunction [10]	

Species	Weight [1, 20]
Rhinoceros, Black *(Diceros bicornis)*	800–1400 kg
Rhinoceros, Indian *(Rhinoceros unicornis)*	1600–2200 kg
Rhinoceros, Sumatran *(Dicerorhinus sumatrensis)*	800–1000 kg
Rhinoceros, White *(Ceratotherium simum)*	Female: 1400–1700 kg; Male: 2000–2300 kg

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