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Tips and Tricks

Care of
Bearded Dragons



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WHAT VETERINARIANS NEED TO KNOW ABOUT Bearded Dragons*



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Bearded dragons, or “beardies,” are native to central Australia. The most common species is the inland bearded dragon, *Pogona vitticeps*. They are semi-arboreal and live in a range of habitats from desert to dry forests and scrublands. In the wild, they spend the mornings and afternoons foraging and the hottest part of the day in underground burrows. They are well adapted to cool desert nights.

Pet Appeal and Behavior

Bearded dragons usually thrive in captivity and have become one of the most popular pet lizard species. They are relatively hardy and easy to maintain. In most cases they are calm and rarely bite, scratch or whip with their tails. They usually do not exhibit signs of stress from handling, and they may feed from the hand or rest on the lap of their caretakers. They make good pets, even for children, due to their docile and social nature. Children must

be taught to thoroughly wash their hands following every encounter to reduce the potential for salmonellosis. Most bearded dragons available in the pet market are captive bred.

Bearded dragons are moderately sized, and several attractive color and pattern varieties are available. The characteristic beard is an expandable throat pouch with spikey scales.

Table 1. Vital Statistics

Adult length	Up to 18-22 inches (45-56 cm) from nose to tail tip
Average weight	285-510 g (10-18 oz)
Age of sexual maturity	1-2 years
Length at sexual maturity	12-16 inches (30-40 cm)
Eggs per clutch	Average 15-25 eggs per clutch; multiple clutches per breeding season are possible
Life span	10-15 years

*As presented at 2006 International Conference on Exotics

Table 2. Formulary

The dosages recommended below are those most commonly used by the author in this species and do not have pharmacokinetic studies to support them. Bearded dragons should be hydrated, and dosages should be adjusted for some drugs based on the health status of the lizard.

Antibiotics*	
Amikacin	5 mg/kg IM q48h
Ampicillin	20 mg/kg SC, IM q24h
Chloramphenicol	50 mg/kg PO q24h
Enrofloxacin	10 mg/kg PO q24h; 5 mg/kg IM q24h
Metronidazole	20 mg/kg PO q24h
Piperacillin	50-100 mg/kg IM q24-48h
Trimethoprim/sulfa	15-30 mg/kg PO q24h
*Enrofloxacin and amikacin are often used in conjunction with metronidazole or ampicillin.	
Antifungals	
Itraconazole	23.5 mg/kg PO q24h x 3 days, stop 6 days, then repeat until illness is resolved
Ketoconazole	15-30 mg/kg PO q24h for 2-4 weeks
Antiparasitics	
Fenbendazole	50 mg/kg PO q10 days for 2-3 treatments
Metronidazole	100 mg/kg PO q10 days for 2-3 treatments
Sulfadimethoxine	50 mg/kg PO q24h x 5 days then q48h until resolution
Trimethoprim/sulfa	30 mg/kg PO q24h x 5 days then q48h until resolution
Anesthetics/Analgesics	
Buprenorphine	0.01 mg/kg IM
Butorphanol	0.5-1.0 mg/kg IM (lower dose when used in combination with ketamine)
Ketamine	10-20 mg/kg IM (sedation, used most often in combination with butorphanol)
Meloxicam	0.2 mg/kg IM once or PO q24h
Propofol	5 mg/kg IV
Miscellaneous	
Silver sulfadiazine	Topical q24-72h (combined with enrofloxacin [Baytril® Otic] frequently for skin lesions)
Oxbow Critical Care for Herbivores	10 ml/kg PO q24h

Table 3. Hematology Reference Ranges²

Azurophils	%	0-9
	x 10 ³ /μl	0-1.1
Basophils	%	2-18
	x 10 ³ /μl	0.2-3.2
Hematocrit	%	17-50
Heterophils	%	17-43
	x 10 ³ /μl	1.6-7.3
Lymphocytes	%	47-69
	x 10 ³ /μl	4-12
Monocytes	%	0-4
	x 10 ³ /μl	0-0.5
Total solids	g/dl	4.5-9.5
WBC	x 10 ³ /μl	6.7-19.9

Table 4. Blood Chemistry Reference Ranges²

ALT	U/L	<3-5
AST	U/L	4-40
BUN	mmol/L	<0.7-1.4
	mg/dl	<1-2
Calcium	mmol/L	2.2-6.8
	mg/dl	8.6-27.2
Calcium:phosphorus ratio		0.9-3.8
Chloride	mmol/L	80-140
	or mEq/L	
Cholesterol	mmol/L	8.07-31.7
	mg/dl	312-1224
Glucose	mmol/L	7.72-16.2
	mg/dl	139-291
Phosphorus	mmol/L	1.1-3.2
	mg/dl	3.5-9.8
Potassium	mmol/L	1.0-6.5
	or mEq/L	
Sodium	mmol/L	141-190
	or mEq/L	
Uric acid	mmol/L	95-678
	mg/dl	1.6-11.4

Housing

It is best to house only one male bearded dragon per enclosure, but one or more females may be present. Larger enclosures can accommodate more than a single male in the group. Breeders often house 2 males and 3 or more females together for the breeding season. Having more than one male present can stimulate male reproductive activity. Similar-sized dragons can be housed together, but

hatchlings should be maintained separately from adults. If multiple individuals are housed together, their body conditions should be monitored closely. Signs of stress include low body weight and poor condition. Dominance problems are not uncommon. Hungry juveniles housed together can bite off the toes and tail-tips of their cage mates.

An enclosure for 1-2 adult bearded dragons should be at least 2 x 4 feet

(61-122 cm) in size, be easy to clean and have smooth sides to prevent rostral abrasions. A10-gallon aquarium is suitable only as short term housing for juveniles.

■ Substrate

Acceptable substrates include soil, newspaper, alfalfa pellets, cypress mulch and sand. Cat litter, corn cob, walnut shell and wood shavings are not suitable substrates. Care should be taken to avoid placing food items

directly onto substrates that can cause impactions if ingested. Care should also be taken to ensure proper hydration if a substrate is used that results in lowered cage humidity, e.g., sand or newspaper. Burrows/hiding areas should be kept slightly more humid than the rest of the enclosure. This can be accomplished by using substrate that retains moisture, such as cypress mulch, or by using a wood shelter and periodically soaking it in water.

▪ **Water**

A shallow water bowl may be provided for drinking; however, many bearded dragons get sufficient water from their diet and do not drink from bowls. Bearded dragons may soak and defecate in the drinking water, creating an unhealthy environment if the bowl is not cleaned frequently. Ways to successfully keep bearded dragons from becoming dehydrated while eliminating the need for water in the enclosure include: providing a shallow pan for soaking 1-2 times weekly as needed, ensuring increased humidity in a shelter/hiding area, and rinsing dietary greens with water prior to feeding.

▪ **Light and Temperature**

Unfiltered sunlight or high-output UV lighting (fluorescent bulb or mercury vapor lamp), such as ZooMed ReptiSun 5.0,™ ZooMed PowerSun™ (www.zoomed.com) or T-Rex Active IV Heat™ (www.t-rexproducts.com), should be positioned out of reach of the lizard with no glass or plastic between the bulb and the reptile. Fluorescent UV lights should be placed within 18-20 inches (45-50 cm) and mercury vapor bulbs can be (and in some cases should be) somewhat beyond that distance. Fluorescent bulbs should be changed every 6 months for juvenile lizards and yearly for adults. The mercury vapor bulbs should be changed at least yearly.

Bearded dragons thrive in a well-

ventilated, low humidity environment. A daytime temperature gradient, from 80°F (27°C) on the cool side of the vivarium to 90-95°F (32-35°C) at a basking site, should be maintained. Nighttime temperatures can drop to 70°F (21°C). Dragons should be protected from coming into direct contact with heating elements.

▪ **Environmental Enrichment**

Bearded dragons are most active during the day and are adept climbers. In addition to providing the basking site and shelter/hiding area, the housing environment should include thick branches or rocks for climbing. Bearded dragons should not be allowed free roam of the house in order to prevent chilling, trauma, escape, ingestion of foreign materials, such as potentially toxic live plants, and the risk of spreading *Salmonella* in the house.

Diet

Bearded dragons are omnivorous as juveniles; adults are predominantly herbivorous with occasional insects in their diet. As they mature, the intake of greens increases as does the size of insect prey.

▪ **Hatchlings**

Hatchlings should be fed daily with small insects, such as crickets, phoenix worms, mealworms or other nontoxic collected grasshoppers, grubs, flies and moths. Greens and some vegetables should also be provided daily. Insects cultivated for feeding (e.g., crickets and mealworms) are deficient in calcium and other nutrients. These need daily dusting with mineral and calcium supplements. Vitamin supplementation is needed only weekly.

▪ **Adults**

Adults may be fed every 24-48 hours. The diet should consist primarily of leafy greens, including romaine, dandelion, turnip greens, mustard greens, beet greens, kale, collard greens, bok



The housing environment should include thick branches and rocks for climbing as well as a basking site and a shelter/hiding area.

choy, Swiss chard, escarole, spinach and cilantro. Other vegetables can provide nutritional variety but should be limited, as should occasional flower blossoms and leaves from nontoxic plants. Fruits can be fed sparingly as treats. Commercial bearded dragon pelleted diets are available and can be fed as part of the diet. Dog and cat foods are not recommended.

Insects fed to adults may include crickets, superworms (*Zophobas*), mealworms, wax worms, locusts, grasshoppers and roaches. Pinkie mice may be fed in small amounts to breeding females. Insects, dusted with a mineral supplement containing calcium, are limited to twice weekly feeding for adults. To avoid over-supplementation, vitamins should be applied to the diet only every 1-2 weeks. Home-raised insects should be fed a “gut-loading” diet of fresh greens for several days before feeding out to bearded dragons. A wet sponge is the best water source for insects rather than fruit or potatoes that are ingested. Lightning bugs can be toxic to bearded dragons and should not be offered.



Adult bearded dragons are predominantly herbivorous.



A male bearded dragon has a hemipenile bulge on its tail and enlarged femoral pores along the inner thighs.



During handling, the body should be fully supported in the palm of the hand with fingers gently curled over the back.

Sexing and Reproduction

Juvenile bearded dragons are difficult to sex. Morphologic differences become more apparent as they mature: males are usually larger and have a broader head, thicker tail with hemipenile bulges and enlarged femoral pores along the inner thighs. During the breeding season dominant males develop a large black “beard.” Some behavioral differences between males and females may be observed, but these are not always conclusive for sexing. Females also have femoral pores and their beard can turn black when stressed, making them difficult at these times to differentiate from males.

Reproduction usually occurs following a winter cool-down period of 2-3 months, known as brumation. Although most bearded dragons will breed without any type of brumation period, low fertility rates have been reported in both males and females that were not allowed to cool. Brumation can be accomplished by cooling temperatures to 75-80°F (24-27°C) and decreasing daytime light cycles to approximately 10 hours.

Successfully bred gravid females will often develop a distended coelomic cavity and lose some body mass over the back, pelvis and tail. Eggs can be palpated during coelomic palpation of most gravid females. An

appropriate nest site of deep, moist soil is necessary for the female to lay the eggs. Females may produce 3-5 clutches of eggs through the breeding season. Dystocia can occur due to improper nutrition and husbandry or other health-related issues.

Restraint

When holding or carrying a bearded dragon, the body should be fully supported in the palm of the hand with fingers gently curled over the back. They should not be caught or lifted by the tail. Most bearded dragons are more tolerant of being restrained from the ventral rather than the dorsal aspect of their body. Simple procedures, such as blood sampling, radiography and general physical examination, can be performed without anesthesia.

Preventive Medicine

Newly acquired bearded dragons should be quarantined in an area separate from existing pet dragons for 3-6 months. Following purchase, they need a general health check by a qualified reptile veterinarian and 2-3 fecal examinations, which are repeated annually. Feces can often be obtained by swabbing the cloaca with a moistened cotton swab. This action will frequently induce defecation when feces are present.

Blood Collection

The ventral caudal tail vein is located just ventral to the vertebral bodies of the tail. A needle is placed between the scales and perpendicular to the tail until it meets resistance from bone. Negative pressure is applied and the needle is slowly withdrawn and advanced cranially or caudally until blood is seen in the hub. Blood should be placed in lithium heparin tubes. The use of EDTA may cause hemolysis and should be avoided. Sample size may be up to 0.5% of the total body weight. On average 0.5 ml per 100 grams body weight can be collected. Blood smears can be evaluated in-house for parasites, estimated or total white cell counts or toxic changes in the white blood cells.

Injection Sites

IM	Foreleg and hind leg muscles, tail muscles
SC	Loose skin over the sides of the body
IV	Ventral caudal tail vein
IO	Distal femur

Anesthesia Protocols

Anesthesia is required for invasive procedures. The patient may be induced with IV propofol or with anesthetic gas via face mask, then intubated and maintained with anesthetic gas. Intubation is easy with the glottis highly visible at the base of



Kevin Wright, DVM

Intubation is easy with the glottis highly visible at the base of the tongue.



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Clinical signs of illness in bearded dragons include depression, sunken eyes, poor body condition and weakness.



Coccidia are commonly diagnosed parasites.

the tongue. Isoflurane and sevoflurane are most commonly used. Sevoflurane has the advantage over isoflurane of being less noxious and more readily inhaled with less breath holding. A red rubber catheter or tomcat catheter may be attached to the head with tape. The heart rate is monitored using an ultrasonic Doppler unit with the crystal positioned in the thoracic inlet towards the heart.

Adequate hydration may be ensured prior to surgery by soaking the dragon or by administration of parenteral non-lactated fluids (see Veterinary Care section). Intraoperative fluid therapy may improve patient health and reduce anesthetic recovery time.

Radiographic Positioning

A patient that is not sedated may be placed in a box or bag for radiography. Alternatively, the animal can be taped into position on the cassette. Dorsoventral and lateral views are obtained as with mammals. The organs may be assessed by their position, shape, size, density and homogeneity; the state of nutrition is evaluated specifically by the skeletal density and gastrointestinal organs and contents. The bone/soft tissue contrast in normal lizards is similar to mammals.

Common Medical Problems

Clinical signs of illness in bearded

dragons include depression, sunken eyes, poor body condition and weakness. Loss of appetite often indicates illness; however, some adults will have periods of anorexia due to seasonal or behavioral changes.

Endoparasites

Endoparasites are common, and veterinary visits should include fecal examinations. The most commonly seen intestinal parasites are oxyurids (pinworms), coccidia and flagellated protozoans. Oxyurids occur in most bearded dragons, are likely not pathogenic and are rarely treated. Coccidia are commonly diagnosed parasites, and clinical signs may or may not be evident. If clinical signs of illness are present and moderate-to-large numbers are present, treatment should be initiated.

Flagellated protozoan parasites in moderate-to-large numbers frequently cause gastrointestinal disease and should be treated. Low numbers of protozoans can also be "normal" if no clinical signs are present. It is often difficult to eradicate flagellated or coccidian protozoan parasites, and low numbers should be monitored twice yearly to ensure they are not increasing to levels that will affect health.

Other diagnosed parasites should be treated according to usual standards for reptiles. Cage disinfection and cleaning protocols should be stressed

to clients in order to eradicate or minimize parasite infections. For differentials, other causes of gastrointestinal disease include cryptosporidium, microsporidium, fungal, viral and bacterial infections.

GI Impactions

Constipation/cloacal impaction is frequently encountered and is usually due to mild chronic dehydration. Most commonly, the cloaca becomes impacted with a large urate plug. Dragons frequently present for a distended caudal coelomic cavity, tenesmus and hyporexia. When mild, a few milliliters of warm water enema followed by cloacal swabbing will allow for passage of the obstructing urate or feces. In more severe cases, rehydration, multiple enemas, cloacal lubrication and physical breakdown of the blockage with a cotton swab may be required over several days. Changes in husbandry and routine soaking should be initiated when this problem occurs.

Intestinal impactions can occur from ingestion of sand, gravel, walnut shell bedding or other substances. Treatment with fluids and laxatives may be successful in allowing passage. Surgery is necessary if medical management is unsuccessful.

Nutritional Disorders

Metabolic bone disease is most



Anal probing should be performed on all ill bearded dragons.



Bearded dragon receiving an enema.



Physical breakdown of constipated feces with a cotton swab may be required over several days.

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frequently caused by nutritional secondary hyperparathyroidism, but other causes can occur. Softened bones, weakness, anorexia, constipation, fractures, scoliosis and kyphosis are most commonly seen. Plasma chemistries, including calcium, phosphorus and uric acid, should be evaluated. In mild-to-moderate cases, treatment with parenteral and oral calcium supplementation, along with correction of the diet and husbandry, are usually sufficient to resolve the problem. In severe cases where renal failure is suspected, ongoing orthopedic pain is anticipated, or proper care cannot be ensured to resolve the condition, euthanasia should be performed.

▪ Reproductive Disorders

Because the reptile-owning public has become more aware of proper husbandry techniques, dystocia and pre-ovulatory follicular stasis are seen less frequently than in the past. Dragons often present anorexic and have a distended coelomic cavity. Eggs and large follicles can often be palpated in lean females. Dystocia can result from small or malformed pelvic bones, hypocalcemia, eggs larger than the pelvic canal, dehydration and lack of a proper nesting area. Pre-ovulatory follicular stasis is not fully understood but is likely the result of improper hormonal cycles secondary to stress or husbandry problems or infections.

Dystocia should be differentiated from follicular stasis. The workup should include radiography, possible ultrasound, a complete blood count (CBC) and plasma biochemistries. Surgery is often necessary for anatomic causes of dystocia. Rehydration, improvement of husbandry, and providing a suitable nesting area may be successful if no abnormalities are found on workup. Calcium supplementation is necessary for dragons with hypocalcemia. Aggressive antibiotic therapy and surgery are necessary for dragons with follicular stasis that show clinical signs of illness. Some females will produce large follicles that are not ovulated but are then resorbed. These females are often hyporexic for a few weeks, and body weight and overall health should be closely monitored during the process.

▪ Eye Problems

Conjunctivitis and blepharospasm are common sequelae to infections or sand or foreign body irritation. If ulceration of the cornea is evident upon staining, topical antibiotic ophthalmic ointment should be applied. If no ulceration is present, frequent flushing with saline and application of an anti-inflammatory ophthalmic solution are recommended.

Buophthalmus due to retrobulbar swelling may also be seen. The most common causes include abscesses and

hypertension. Fluid aspirated from the retrobulbar space should be evaluated microscopically. A high number of heterophils in the blood or aspirate is suggestive of infection. If aspirates resemble peripheral blood, further evaluation, including radiographs of the heart, is indicated. Calcification of the greater vessels and muscles of the heart may be seen. Hypertension is often bilateral and retrobulbar abscesses are unilateral.

▪ Dermatitis

Bacteria and fungi are the most common causes of dermatitis. Husbandry and individual stress may play a large factor in susceptibility. Bacterial infections often respond well to topical antiseptic and systemic antibiotic therapy. Treatment of fungal dermatitis is usually successful with oral itraconazole and topical application of betadine and silver sulfadiazine.

One fungal disease in particular, *Chrysosporium* anamorph of *Nannizziopsis vriesii*, or "yellow fungus disease," has received much publicity in recent times. It causes a severe, necrotizing, yellow-colored, granulomatous dermatitis. Prognosis is guarded to poor for this condition. Some dragons may improve only for a short time with the above treatment and many dragons are unable to recover.



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One fungal disease is *Chrysosporium anamorph* of *Nannizziopsis vriesii*, or “yellow fungus disease.”



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Forelimb fractures often result from falls from branches or during handling.



Bite wounds may occur from fighting between adults.

▪ **Trauma**

Rostral abrasions and burns from hot rocks and heating elements can occur if proper husbandry is not provided. Fractures may result from subclinical hypocalcemia, fighting, trauma from cage rocks and branches or falls during handling. Fighting may occur between adults but is not common if adequate space is provided.

Zoonoses

Salmonella sp. is the most common organism of zoonotic concern in bearded dragons.

Veterinary Care

Along with proper medical and

surgical treatments for illnesses, hydration and nutritional support must be addressed. A 50/50 mixture of Normasol/Plasmalyte and 0.45% saline + 2.5% dextrose is recommended for reptile fluid therapy. A maintenance guideline is 20-30 ml/kg/day. At-home soaking and/or administration of water per os can be performed. Nutritional support is critical for proper recovery. Oxbow Critical Care for Herbivores (www.oxbowhay.com), fed at 10 ml/kg/day, is recommended for adults. Juveniles should also be assisted with crickets or cricket juice. To make cricket juice, place crickets in a 3 ml

syringe and apply pressure to the plunger, pushing the liquid and smaller portions of the crickets through the tip.

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What to Look for in a Healthy Bearded Dragon



RESOURCES

A client education brochure on bearded dragons is available from Zoological Education Network - 800-946-4782 www.exoticdvm.com





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Results

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*Case result documented by Dr. Thomas Bankstahl after only 4 weeks on AVIx Sunshine Factor



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