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WILDLIFE JOURNAL

Journal of the Wildlife Rehabilitation Council Summer, 1983



New Songbird Diets . . . page 11

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REHABILITATION WILDLIFE COUNCIL

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EDITORIAL. . .

"Why don't they leave those poor condors alone and let them pass out of these troubled times in peace and with dignity?"

The question relates, of course, to recent widely-publicized attempts being made to save the California Condor from extinction. Someone asked me that very question recently and it's an important one to answer, because in its own way, the answer relates to just about everything we do as rehabilitators of distressed wildlife.

I am a person who is intimately involved in this youthful field of wildlife rehabilitation. The sight and sound of a wild creature in distress is more than I can bear, and I must do what I can to help. In most cases I am talking about the deer hit by a car, or the sea lion shot by fishermen, or the baby starling that has tumbled in dizzy circles from its nest because of the cat that is climbing the tree after its mother.

These are man-caused problems—either directly or indirectly—and if man is the cause of the problem, then I strongly feel that man should also try to fix it.

Wildlife rehabilitation centers across the country (there are more than 1,000 now, you know) keep careful records of the thousands of wild animals they treat each year. Where they come from, cause of sickness or injury, etc. So we know that between 80 percent and 90 percent of the animals we see come in because of man.

I do not consider this to be "interfering" with nature. In fact, we are now so intimately involved with our environment, I wonder if we are not interfering just by living? But then, one could also say that we are simply another part of the system, so how can we interfere? Needless to say, we could argue either point far into the nights of time.

Let us consider the California Condor.

Why are we down to less than 20 birds? Is it because these great ancient creatures, with all their stoic dignity, have decided they have reached the end of their time? Or is it because Man has endroached upon their environment, their range, their lands, so much that there is no longer room for these solitary birds to tolerate life?

It is a massive oversimplification to pick any single cause, but I think it safe to say that man is the top contender for the role that has contributed to their demise.

We have an Endangered Species Act in the U.S. (At least we are trying to keep one, in spite of Reagan and Watt). And we try to protect animals that are in danger of extinction. Around this old world, many species become extinct every year, and in modern times these numbers have been accelerating higher and higher because of our greed.

Man should do everything he can to save ANY species from its final ends, because life is so inter-woven, so inter-related with each other living thing, that we might never know what long-terms effects the loss of one simple, single-celled animal might have on the most complex creature of all. Ourselves.

California Condor, Peregrine Falcon, Pigeon, Sparrow, Starling. Black-footed Ferret, Wolf, pesky ground squirrel, gopher.

We owe it to them all. . . we owe it to ourselves. . . to do our very best.

—Gary Bogue

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Rehabilitation Notes: Nine-Banded Armadillo *(Dasypus novemcinctus)*

By Debbie Marcum, Associate Editor

Austin, Texas

INTRODUCTION

The following information represents a sampling of substitute formulas, diets, caging facilities, release criteria, and specialized care for the Nine-Banded Armadillo. It is meant to be used as a guideline, not an absolute. For any mammalian species, substitute formulas and diets should be based on what is already known about the species via research data. All mammalian species should receive a balanced dietary staple, and supplemental food items, such as fruits and vegetables, should be limited to 10% of the total diet. Although a vitamin-mineral supplement is often used, care should be taken not to overdose Vitamins A and D. A salt spool can be made available after the animal is weaned. This species does not require special skill instruction or vaccinations.

DESCRIPTION

- *Adult:* Head and body 381–432mm (15–17 in); tail 356–406mm (14–16 in); 3.6–7.7kg (8–17 lb); brownish. Head, body, and tail covered with bony material that protects the animal. No incisors or canines; 32 peg-like molars. Two retractable anal scent glands. Physiologically equipped for burrowing and rooting.
- *Normal Body Temperature:* 84°–92°F. Unable to perspire; heat stress is more serious than cold stress.
- Omnivorous, but chiefly insectivorous.
- *Senses:* Sense of smell most developed; average hearing; rudimentary eyes.
- *Activity Patterns:* Summer—active during the early morning, evening, night; winter—during the warmest part of the day, generally midafternoon.
- Purported to be solitary in the wild, but has been known to congregate during foraging. In captivity, appears to be gregarious.
- Able to locate insects 5 or 6 inches underground.
- Jumps upward when startled or frightened.
- *Life Span in the Wild:* At least 10 years.

BIRTH & YOUNG

- *Gestation:* Approximately 150 days; also, delayed implantation. Young generally born March–April.
- *Litter Size:* Normally identical quadruplets.
- *Appearance of Newborn:* Eyes open; physically appears to be a miniature of the adult except that the shell is soft and pinkish-gray/brown. Shell hardens with age. Walks within a few hours after birth.
- *Approximate Birth Weight:* 51–150gm (1.8–5.3 oz).
- *Approximate Birth Length (tip of snout to end of tail):* 249–300mm (9.8–11.8 in).
- In the wild, this species eats insects while on formula.
- *Age Weaned in the Wild:* Generally by 8 weeks of age.

FORMULA-FEEDING

- Although there is no known milk analysis for this species, there is analytical data available for the milk of a closely related edentate—the anteater. Based on this information, coupled with the fact that the natural diet of the armadillo is known to be approximately 90% insects, indicating that the milk is relatively high in protein, substitute formulas were developed, and are listed in descending order of nutritional value. A Prosobee formula, given in the literature, did not appear to be nutritionally adequate and is not included.
- *Substitute Formulas:* (1) 3 parts Esbilac 1:2 (mixture of 1 part powdered Esbilac and 2 parts water) and 1 part whipping cream; (2) Esbilac 1:2 Note: One egg yolk or 1 T pure vegetable oil per cup of formula may be added to either of the above formulas to improve the fat content. Use of a vitamin-mineral supplement is discretionary.
- *Feeding Intervals and Amounts:* Every 4–5 hours; no night feeding unless animal's conditions warrants it. The amount fed will depend upon the size of the animal and the formula being fed. High caloric diets require less quantity intake. The stomach should appear gently rounded, not taut, after eating. It is better to underfeed than overfeed.
- *Feeding Instruments.* Curved anal syringe (cut and filed); tuberculin syringe, pet nurser; plastic eyedropper; edentate feeding implement used by zoos.
- Although hand-feeding this species is generally difficult and frustrating, feedback regarding stomach intubation (tube-feeding) indicates that its use is questionable.
- *Stimulation and Elimination:* Species usually eliminates on its own and resists manual stimulation. Prefers to eliminate in dirt, and it is to the animal's physical well-being to be able to root in this material.
- *Weaning Formula:* Substitute formula mixed with Gerber High Protein Cereal or Gerber Rice Cereal; gradually replace the cereal with softened Purina Kitten Chow. If necessary, add just enough water to facilitate lapping.
- *Weaning:* Wean when the *body* length is approximately 153–178mm (6–7 in).
- *Post-Weaning Diets:* (1) Purina Kitten Chow (ground and soaked in water) mixed with enough water to create a pudding-like consistency that can be easily slurped. A small amount of pureed banana or sweet potato can be used as a mixer. (2) Zu-Preem Feline or Science Diet Exotic Feline (canned; equiva-

lent to Zu/Preem; sold in pet stores or through veterinarians) mixed with enough water to create a pudding-like consistency; some mixer as above. Use of a vitamin-mineral supplement is discretionary. Note: Vitamin K (see "Specialized Care" elsewhere in this paper) does not need to be added to either of these diets since the products already contain Vitamin K. (3) ¼ lb lean, ground horsemeat, ¼ lb Purina Mink Developer Chow or comparable product, 5 drops cod-liver oil, ¼ hard-boiled egg with shell, 1 tsp molasses, ¼ tsp honey, ¼ tsp VPC-Dynafos, 18 drops liquid multivitamins (Vipenta). Blend all of the above (add a small amount of water if needed to facilitate blending), and add 1 piece of ripe banana, 1 piece of cooked sweet potato, and a small amount of ground hard-boiled egg. Sprinkle with Paltone and K-Sol powder. Feed ¼ cup per kg body weight. Can be refrigerated for one additional day (Chicago Lincoln Park Zoo). (4) ¼ cup softened Purina Cat Chow, a mixture of 1/16 tsp Paltone, .25mg calcium gluconate, .125mg K-SOl; 25mg Gevral is sprinkled on the food three times weekly; fruits such as banana or melon can be added occasionally (Storrs).

- Feed in late afternoon or evening; do not allow food to spoil. To prevent spillage, food and water should be given in heavy crock dishes that are partially recessed in dirt.

CAGING

- The armadillo is a burrowing animal, and will be most comfortable in a cage or pen that contains enough dirt to satisfy that instinct.
- *Up to 102mm (4 in) Body Length (base of head to base of tail):* Inside. Caging such as a large aquarium, sturdy tub, or comparable sturdy enclosure that has several inches of dirt (pesticide-free) at one end and abundant non-abrasive nesting material, such as shredded kleenex or shredded paper towels, at the other; heating pad under a *portion* of the nest area (discontinue when the animal is self-feeding). Cover the cage securely with wire in order to keep the animal from jumping out.
- *102–178mm (4–7 in) Body Length:* Inside. Large, plastic airline kennel cage that can be taken apart and the two halves placed end-to-end and secured, or comparable setup equipped and covered per above.
- *178mm (7 in) Body Length-Release (body length approximately 228–254mm or 9–10 in; approximately 0.9kg or 2 lb):* Outside. Minimum wire cage—2′h×3′w×2′d with largest side down. Recess in dirt or cover the bottom of the cage with at least 4 or 5 inches of dirt. Insects and earthworms can be added on occasion. If a pen is used instead of a cage, it should have a bottom in order to keep the animal from digging out. Equip with a wooden nest box, natural bedding material such as leaves, grass, corn shucks (hay, straw, and sawdust can cause impaction), and a litter tray of water (approximately 2½″ deep) for bathing and swimming. A log and rock can be added for body scratching, but should be placed in the middle of the rear of the cage since the armadillo is prone to climbing and falling, and generally climbs on the front or sides. Protect the cage/pen from the elements and other animals.
- Since armadillos eliminate by digging trenches in dirt, the dirt used in indoor cages should be turned every few days and replaced periodically. Once the animal is caged outside, it will generally eliminate in one area of the cage. Turn dirt once a week, and replace part of it periodically.
- Cage height should be no more than 2′. If it is, attach a flashing to prevent the animal from climbing higher. Although able to climb easily, it generally lets go of the wire rather than climb down, and injuries can result from falling.
- When caged outside, the armadillo will benefit from being taken out of its cage daily and allowed to forage on its own. A compost pile is ideal.

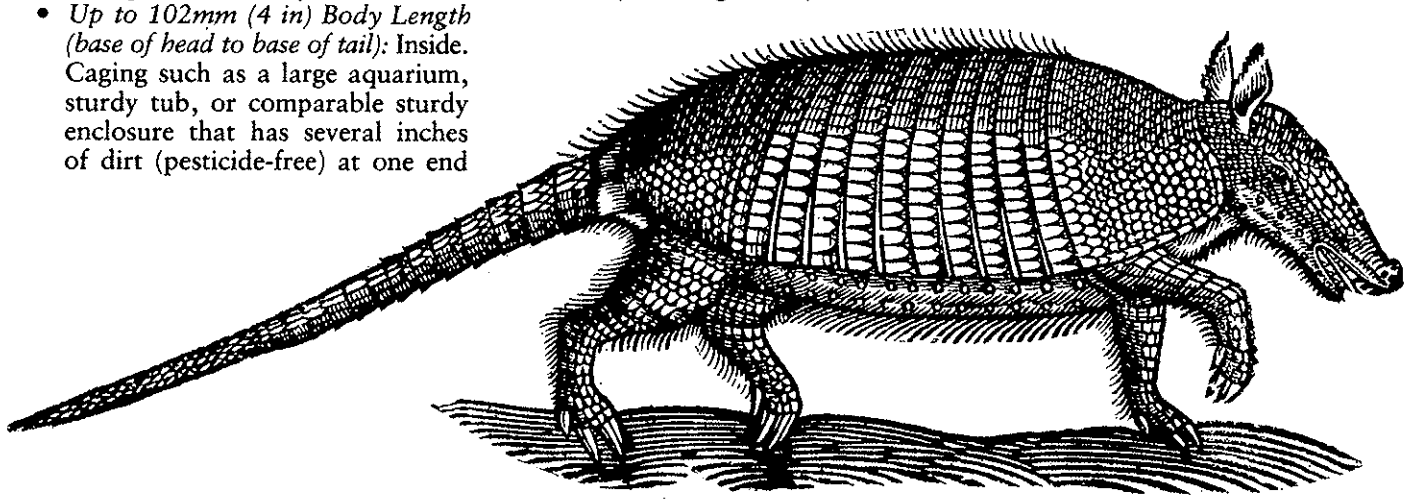
RELEASE

- Other than routine acclimation, this species does not require any special release preparation.
- *Habitat:* Rocky outcrops and cliffs, thickets, tall grass, brushy areas, woodlands; avoid marshy areas.
- *Normal Population:* One armadillo per 1–10 acres.
- Release at dusk.

SPECIALIZED CARE

- Can become stressed easily.
- *As an Adjunct to the Treatment of Foot Problems, Superficial Wounds and Infections:* Consult a veterinarian regarding a mixture of 1% Furacin (2.5gm Furacin Mix/liter water) or 2.5% Tetracycline (100mg Tetracycline HC1/gal water) which can be added to the outside bath/Swimming water (Fowler, *Zoo and Wild Animal Medicine,* p. 442).
- *Subject to Subcutaneous Hemorrhage and Blood Loss from What May Appear to be a Superficial Injury:* The addition of Vitamin K has been purported to be a success-

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Emaciation: A protocol for recovery

by Jan White, Director, Wildlife Rehabilitation Service, Fairfield, Ca.

and Sandra Emanuelson, D.V.M., Cottage Veterinary Hospital, Walnut Creek, Ca.

Emaciation, the prolonged absence of nutrition, is a common presenting problem or complication in wildlife care. Many animals do not reach wildlife care facilities until a significant amount of time without food has passed. This is often due to the fact the animal is unable to acquire food because of some other injury or illness. It is important that rehabilitators be trained to look past the presenting injury so that this important health problem will be included in the treatment protocol.

Emaciation is usually found during physical examination by checking for pronounced keel bone in birds or an absence of lumbar or other back muscles on a mammal. Weighing the animal and checking it against the normal for that species (considering its age & sex) will generally confirm the problem. Initial assessments must include a check for the state of nutrition so that animals will be fed in a form that they can utilize without further deteriorating their own physical state. While some animals arrive weighing normally, all too often they come in at 50%, 60%, 75%, or 85% of their normal body weight. When an animal has lost 30–35% of its body weight, to offer it regular food may result in the animal using the last calories available to it on a cellular level. Rehabilitators can mediate for this reduced ability by providing food that is easier to utilize. In the case of moderate emaciation, food can be ground up physically as in tube mixes or it can be made up of items that have simple molecular structures. For severely emaciated animals, using solutions with simple molecular structures such as amino acids (the building blocks of proteins) and dextrose (simple sugars) is recommended. These solutions are not meant for long term usage and are replaced with more balanced feeds. Rehabilitators must be able to roughly calculate the caloric requirements of the animal in order to insure that the animal will get adequate calories and gain weight. Sick and debilitated animals require more calories to gain weight than do healthy ones.

One ingredient common in tube mixes for animals that are capable of breaking down complex molecules is dog food. They are relatively high in calories, have a goodly amount of calcium as well as a balanced calcium-phosphorous ratio. They are made for mammals and consequently may have more fat soluble vitamins (A,E) than birds require. While water soluble vitamins (B,C) are excreted by the body when in excess, the fat soluble ones are not. Consequently, caution should be exercised when using dog food over an extended period of time in avian species, although it has been done successfully. It is a good product made of known ingredients and is economical to use. Stay with quality food and away from generic brands.

ESTIMATING CALORIC CONTENTS OF DOG FOOD

The minimum amount of fat and the maximum amount of ash and moisture can be used to estimate the approximate metabolizable energy in Kcal per ounce. This information is readily available by checking the pet food label. The calculations are as follows:

1) Add the percentages of fat, moisture and ash.[1] (If for some reason the ash percentage is not given on the label. use the figures of 2.4, 3.1, 8.4, and 9.6, respectively for canned meat, canned meat and cereal, semi-moist, dry food and dry "high protein" diets.)
2. Subtract the total of (1) above from 100.
3) To the remainder from (2) above, add 2.5 times the fat percentage.

This gives kilocalories per ounce of dog food.

EXAMPLE:

Nutrients	%	
		(1) Add: % fat, moisture, & ash. 13 + 10 + 6.5 = 29.5
Fat	13.0	(2) Subtract: Results of (1) above from 100. 100 – 29.5 = 70.5
Ash	8.5	(3) Multiply: Fat % by 2.5 13 × 2.5 = 32.5
Moisture	10.0	(4) Add: The results of (2) & (3) above. 70.5 + 32.5 = 103.0 K/Cal/oz.

Calculating Calories in the Tube Mixes Containing Dog Food

Once it is known how many calories there are per ounce of dry weight, measure how many ounces in one cup of dry food by weighing on a scale. With the Science Diet listed above, there are three ounces of dog food in one cup. In this particular recipe 5% dextrose in Lactated Ringers is used instead of water. Mixing one cup of this dog food with one cup (240 ml) of 5% dextrose in Lactated Ringers will yield 309 Kcal (3 × the figure in 4 above) + 43 Kcal (D5%W) = 352 Kcal/cup. This makes one cup of mixture which is convenient because dry volume and wet may not always be the same. Since many rehabilitators feed in metrics, one must convert by dividing the 352 Kcal/cup by 8 (oz.) to get 44.0 Kcal/oz. (1 oz. = 30 ml or cc's). From here the amount of calories required by the animal can be garnered from the table provided (Table 1) and compared to the amount in the tube mix to see if it will supply the necessary energy for that size animal. If the calories/oz. is too low, the ml required to get that amount in the bird (i.e., 50 ml for a blackbird) will be high. In this case, products like Osmolyte, Portagen, or Nutramigen can be added to raise the caloric content.

Caloric Content of Selected Nutritonal Supplements

Nutrical	140 Kcal/oz.
Sustagen	30 Kcal/tablespoon
Portagen	40 Kcal/tablespoon
Nutramigen	40 Kcal/tablespoon
Vegetable Oil	125 Kcal/tablespoon
Osmolyte	31 Kcal/oz.
50% Dextrose	102 Kcal/oz. or 3.4 Kcal/ml

EXAMPLE:

A 50 g. Robin is presented with trauma and refuses to eat. How many calories would it need to maintain its current body weight in a thermal neutral state? Answer: 44 calories.

The tube mix currently being used has 44.0 Kcal/oz. How much will the bird have to get down to get his/her 44 calories?

$$44 \frac{\text{kcal}}{\text{oz.}} \times \frac{1 \text{ oz.}}{30 \text{ ml}} = 1.46 \text{ Kcal/ml}$$

$$44 \text{ Kcal} \times \frac{\text{ml}}{1.46 \text{ Kcal}} = 30 \text{ ml daily}$$

Answer: 30 ml per day divided into 2–4 administrations (7.5–15cc at a time)
Note: 1 cc = 1 ml
1 oz. = 30 ml

These give a ball park estimate, not exact figures. These calculations will enable rehabilitators to evaluate roughly the caloric content on tube mixes and compare them to the metabolic needs of the animal. It is imperative that the animal be weighed daily to see if the amount given is adequate. The metabolism of each animal will vary depending on its problems and whether or not it has to maintain its own body temperature in the face of a differential room or outside temperature.

Feeding Regimen for Emaciated Animals

There is a lot of difference in the ability to assimilate food in an animal that weighs 85% of normal for that species and one that weighs 65% of normal. It is imperative that weights be taken and compared with normals. While the degree of muscle wasting is a valuable tool in evaluation of these animals, in birds who have not flown for whatever reason, it may not be diagnostic. Weights will tell the story. Any center that routinely weighs their animals will in a years time get a set of normals for the common species in their area. While the information is hard to reliably gleen from other sources, it can be done for the animals not commonly received by consulation with centers that receive that type of animal. See Table II for a list of selected normal weights.

For the purposes of our discussion, we shall grade the degree of emaciation into three major categories. First, we have animals presented that are not really in a starving condition—rather they are or have not eaten in a short time but seem hypoglycemic, sometimes even seizuring. The second category are animals that have not eaten in several days to one week depending on their size. They are 75–90% of their normal weight. They feel thin by virtue of their prominent keels or thin muscle mass along the lumbar back muscles. The third and most seriously affected group is comprised of animals that weigh 50–75% of normal for that species. These animals have few calories left to do the necessary functions of the brain and heart. Their heart muscles are weakened by thinning due to muscle wasting. They may and often do have other disease processes going on inside. These constitute a sizable number of animals especially birds that come into centers in the winter time. They are a real challenge to save.

The first category of animals are generally salvageable when not terribly complicated by other disease or trauma problems. The second category are much more difficult to save, but successes have been noted. The last category has been one source of frustration for wildlife care personnel with many more disappointments than successes. While not established regimen has been shown to be particularly effective, there are some basic principles that seem to be of value when working with these animals.

Current protocol, while not the same in all centers and veterinary hospitals, follows these principles: 1) The stress of handling must be weighed against the value of small amounts of food fed frequently to determine that frequency. 2) Food products requiring energy to break down *should not* be used on animals in categories 2 & 3 initially. This generally includes all regular foods and dog food mixes—they must all be broken down by the body and this process requires available calories which the animal may not have. 3) All animals should receive vitamin supplementation to aid them and promote appetite, especially the B vitamins. 4) Supportive care should include a heat source that will prevent the bird or mammals from using the last available calories to keep warm. These animals are not usually homeothermic. 5) Animals are hydrated first and given small amounts of simple molecular substances to provide energy second. Both processes may take several days to accomplish depending on the rehabilitator's ability to get fluids down and the animal's ability to keep them down.

Category I animals are generally treated as listed above and are usually able to go onto food within twenty-four hours. They are given fluids initially and those fluids should contain 5% dextrose (a simple sugar) and electrolytes. Simple sugars are easier to digest than are more complex sugars such as fructose, sucrose, etc. This may be increased to 20% orally without encountering problems. Seizuring animals need veterinary intervention—contact your veterinarian for specific treatment. Seizuring may be due to low blood glucose (hypoglycemia), low calcium (hypocalcemia), trauma, toxins, or other metabolic disorders. When the problem is related to lack of blood sugar, small amounts of glucose given orally may help.

Category II animals are started on fluids (5% dextrose) with *no* food offered. These animals may require electrolytes as well, so a Lactated or Acetated Ringers solution with 5% dextrose may be used orally. Acetated Ringers is processed and utilized by the body through the muscle instead of the liver with fewer steps and is appropriate for use in debilitated animals. Once hydrated, they can be given 10% dextrose orally. Since these animals are not going to be placed back onto solid food for varying amounts of time, nutrients other than sugars are added to their feedings. Aminoplex 34× concentrate has B vitamins and amino acids (the building blocks for proteins). In human medicine, a similar product which is

about 7× as concentrated is used. Doses are much higher than noted on the veterinary product when used for total supplementation of proteins so that no further tissues are broken down. To do this, the dose is 220 ml/Kg of body weight divided into various administrations.[4] This dose is high in volume and since it cannot be used as a sole source of nutrition, room must be left in tubing mixtures for calories to be added. This product has the caloric content of 5% dextrose so considerable calories must be added in order to meet the daily requirements of the animal.

Category II animals are gradually weaned back onto regular food over a period of three days to a week depending on the severity of the weight loss. The animal's weight must be checked regularly to monitor whether or not the loss is continuing, is arrested, or abated. It is a real test of judgement to determine successfully when these animals should be returned to regular food and in what fashion. If started too soon they will be unable to digest the food, sometimes resulting in sour crop or other gastric problems and further complications. The animal can be weaned from straight liquids to blended foods but should not go directly from one to the other. Rather the two should be mixed so that a gradual switch can occur. From there, the animal can be eased back onto real solid food.

Category III animals are to the point where they will often not return. At this point, the GI tract may be damaged due to the prolonged absence of food. Solid food at this point is a perverse form of euthanasia! The most important factors are fluids, heat, and dextrose. Even tube blended dog food will be too much for these animals to break down—do not use initially. Using the information provided, the amount of calories required by a given animal can be estimated and food/fluid formulations calculated that will hopefully provide the energy and nutrition necessary for recovery. The process of weaning onto tube mixes and then regular foods is similar to what was described for animals in Category II. Few of these animals make complete recoveries. It is important to keep specific case records so that a better survival rate can evolve from review and experience. When these animals do die, post mortems should be performed to help rule out other contributing factors.

LONG TERM STARVATION CONSIDERATIONS

1) The animals have few calories left to do the necessary functions of brain and heart.
2) Their heart muscles are weakened by thinning due to muscle wasting.
3) Other possible disease processes may be going on.
4) Transportation stress is important to consider.
5) Other environmental stress should be evaluated and minimized.

TREATMENT PROTOCOL

Treatment must be slow and individualized. Initial care begins with:

1) Fluids with 5% dextrose in small amounts. Simple sugars are important.
   Treat for shock.
   Length of time will depend on the condition of the animal & species.
2) Gradually when stable increase dextrose to 10%.
3) Over the next 1–1½ days up sugar to 20%. Then begin adding tube mixes in increasing amounts.
4) The animal can be switched to a high calorie force feeding liquid diet in 1–3 days depending on its condition.

RAPTORS: Begin adding bits of fowl leg. No roughage at this time. Gradually work back onto a regular diet.

SEEDEATERS: They can receive seed as a food earlier (within 8–48 hours). Do not allow them to gorge.

REFERENCES

1. STOLIKER, Harry. 1977. "Feeding Canines for Growth, Gestation & Lactation". Allentown: ALPO Center for Advanced Pet Study.
2. FOWLER, Murray E. 1978. *Zoo & Wild Animal Medicine*. Philadelphia: W. B. Saunders Co. p. 882.
3. FOWLER, Murray E. 1983. "Feeding and Nutrition of Animals in Rehabilitation Centers". Walnut Creek: Wildlife Rehabilitation Council. p. 5.
4. HASKINS, Steve. 1983. Personal Communication.

TABLE I

ANIMAL WEIGHT AND CALORIC REQUIREMENTS

	Wt. in grams	1500	1000	900	800	700	600	500	400	300	200	100	50
*	Basal	93	70	64.7	59.2	53.6	47.7	41.6	35.2	28.3	20.9	12.4	7.4
**	2X Basal	186	140	130	118	107	95.4	83	70	57	42	25	15
**	3X Basal	279	210	194	178	161	143	125	105	85	63	37	23
***	6X Basal	558	420	388	355	322	286	250	210	170	125	75	44

	Wt. in Kg.	2	4	6	8	10	12	14	15	20	30	35	40	50
*	Basal	118	198	268	332	393	451	506	533	662	897	1007	1117	1316
**	2X Basal	233	387	521	643	757	865	968	1018	1255	1687	1889	2083	2451
**	3X Basal	350	581	782	965	1135	1297	1452	1527	1883	2531	2834	3125	3677

* This is the energy produced by the animal to carry on basic body functions (i.e., circulation, respiration, digestion & thermoregulation) when the animal is in a thermal neutral state.

** This represents the energy required for activity, growth, lactation & work. Some stages of growth are in excess of 3×. Healthy birds are in this category.

*** Use when calculating energy requirements for sick or injured birds & mammals under 2 Kg.

TABLE II

Weights of Selected North American Birds

Species	Sex	Sample Size	Average Wt. (Grams)	Weight Range (Grams)
GREBES:				
Least:				
	M	(4)		101.8–136.6
	F	(4)		106.5–127.7
BOOBIES:				
Blue-Footed:	M	(2)		456.0–1358
	F	(2)		1641.0–1754
CORMORANTS:				
Double Crested	Both	?		1787.0–1929
Pelagic:				
	Both	?		1584.0–2490
GEESE:				
Black Brant:				
	M	(17)		1217.0–1669
	F	(14)		1188.0–1642
White-Fronted:	M	(57)	2848	
	F	(51)	2503	
Lesser Snow:				
	M	(534)	2743	
	F	(483)	2490	
Greater Snow:				
	M	(19)	3369	
	F	(12)	2771	
Ross':				
	M	(47)	1811	
	F	(32)	1612	
DUCKS:				
Mallard:				
	M	(1809)	1245	
	F	(1417)	1105	
Pintail:				
	M	(390)	1023	
	F	(166)	864	
Gadwall:				
	M	?		707.0–1132
	F	?		594.0–916
Wood duck:				
	M	(84)	679	
	F	(60)	670	
Redhead:				
	M	(70)		849.0–1358
	F	(26)		1075.0–1216
Canvasback:				
	M	(191)	1249	
	F	(54)	1154	
Greater Scaup:				
	M	?		549.0–1188
	F	?		594.0–1330
Lesser Scaup:				
	M	(177)	824	
	F	(44)	749	
Goldeneye:				
	M	(36)		707.0–1301
	F	(33)		622.0–1018
Bufflehead:				
	M	(17)		367.0–566
	F	(14)		226.0–594
Eider, Common:	M	(28)	2241	
	F	(32)	2010	
Eider, King:	M	(41)	1666	
	F	(140)	1562	
Oldsquaw:	M	(36)		905.0–1005
	F	(40)		747.0–824
Ruddy:	M	(13)	543	
	F	(8)	538	
MERGANSERS:				
Common:				
	M	(19)	1648	
	F	(30)	1236	
Red-Breasted:				
	M	?		1075.0–1245
	F	?		728.0–905
Hooded:				
	M	?		600.0–950
	F	?		450.0–675
KITES:				
White-tailed:				
	M	(2)		254.0–297
	F	(1)	304	
Mississippi:				
	M	(11)		212.0–268
	F	(5)		276.0–339
Everglade:				
	M	(4)		304.0–382
	F	(2)		382.0–410
ACCIPITERS:				
Coopers Hawk:	M	?	382	
	F	?	566	
Sharp-Shinned:				
	M	(899)	100	
	F	(1009)	170	
HARRIERS:				
Marsh Hawk:				
	M	(7)		360.0–389
	F	(21)		367.0–566
BUTEOS:				
Rough-Legged:				
	M	(5)	820	
	F	(7)	1075	
Red-Tailed:				
	M	?		1018.0–1132
	F	?	1584	
Swainsons:				
	M	(5)	905	
	F	(7)	1047	
Golden Eagle:				
	M	?		3622.0–4075
	F	?		4528.0–6339
Bald Eagle:				
	M	(7)		3622.0–4528
	F	(4)		4075.0–5886
OSPREY:				
Osprey:				
	M	(10)		1188.0–1598
	F	(14)		1245.0–1917
FALCONS:				
Peregrine:	M	?		571.0–714
(anatum)	F	?		849.0–1217
Merlin:				
	M	?		142.0–170
	F	?		198.0–254
GROUSES:				
Ruffed:	Both	?		340.0–666
Spruce:	Both	?		500.0–700
QUAIL:				
California:	Both	(652)	189	
Mountain:	Both	?	233	
PHEASANTS:				
Ring-Necked:				
	M	?	1225	
	F	?	953	
MARSH BIRDS:				
Great Egret:	Both	?		905.0–1132
Snowy:	Both	?	368	
Cattle:	Both	?	339	

**Note: Weights vary considerably depending on what part of the country the sample is taken from. Most of these are wild caught birds. Sample size should be noted when considering the data.

Weights of Selected North American Birds

Species	Sex	Sample Size	Average Wt. (Grams)	Weight Range (Grams)
Great Blue Heron:	Both	?		2264.0–3622
Green Heron:				
	M	(2)	174	
	F	(1)	181	
Black-Crowned Night Heron:				
	M	(3)	736	
	F	(2)	805	
American Bittern:	Both	?		509.0–905
Least Bittern:				
	Both	?		43.0–113
Sand Hill Crane:				
	Both	?		2581.0–6520
Virginia Rail:				
	Both	(7)		61.0–90
Sora:	Both	(7)		67.0–91
SHORE BIRDS:				
Am. Avocet:	Both	?	339	
Bl. Neck Stilt:				
	Both	?		410.0–452
PLOVERS:				
A. Golden:	Both	?		113.0–170
Bl. Bellied:	Both	?		170.0–297
Killdeer:	Both	(4)	88	85.0–92
SANDPIPERS:				
Long-billed Curlew:	Both	?		793.0–908
Willet:	Both	?		198.0–453
Stilt Sandpiper:				
	M	(24)		48.0–61
	F	(15)		52.0–68
Dunlin:	Both	(45)		47.0–72
Sanderling:	Both	(23)		42.0–90
Semipalmated:				
	Both	(102)		20.0–42
GULLS:				
Ring-billed:	Both	(4)	488	
Thayer's:				
	M	(4)		1033.0–1075
	F	(4)		814.0–977
TERNS:				
Common:	Both	(400)	121	
PIGEONS & DOVES:				
Band-Tailed:	Both	?		280.0–350
Mourning Dove:				
	M	(164)	130	
	F	(80)	125	
ROAD-RUNNERS:				
Roadrunner:	Both	(12)		269.0–274
OWLS:				
Screech.:				
	M	?		88.0–178
	F	?		92.0–220
Great-Horned:				
	Both	(10)	1034	905.0–1301
Long-Eared:				
	M	?	245	
	F	?	280	
Short-Eared:				
	M	?	315	
	F	?	380	
Barn Owl:				
	M	?	570	
	F	?		510.0–680
Snowy:				
	M	?	580	
	F	?	640	
Barred:				
	M	?	630	
	F	?	800	
Great Gray:				
	M	?	940	
	F	?	1300	
Burrowing:				
	M	?	160	
	F	?	150	
Boreal:				
	M	?	100	
	F	?	140	
Saw-Whet:	Both	(213)	91	
Whiskered:				
	M	?	85	
	F	?	92	
Flammulated:				
	M	?	54	
	F	?	57	
Pygmy:				
	M	?	62	
	F	?	73	
Ferruginous:				
	M	?	62	
	F	?	75	
GOATSUCKERS:				
Common Nighthawk:	Both	(7)		69.0–80
Pauraque:	Both	(3)		45.0–60
Whip-poor-will:				
	Both	(17)		46.0–69
SWIFTS:				
Black:	Both	?		43.0–47
Chimney:	Both	(1893)	22.8	16.0–35
Wh. Throated:	Both	?		26.0–36
HUMMING-BIRDS:				
Ruby Throated:				
	M	(32)		2.4–3.6
	F	(146)		2.8–4.5
Broad-Tailed:				
	M	?	3.2	
	F	?	3.6	
Calliope:				
	M	?	2.5	
	F	?	2.8	
Anna's:				
	M	?	4.3	
	F	?	4.1	
Black Chinned:				
	M	?	3.1	
	F	?	3.4	
Rufous:				
	M	?	3.2	
	F	?	3.4	
Allen's:				
	M	?	3.1	
	F	?	3.2	
Broad-Billed:				
	M	?	3.7	
	F	?	3.4	
KINGFISHERS:				
Belted:	Both	(14)		127.0–175
WOOD-PECKERS:				
Common Flicker:	Both	(13)	137.5	116.0–167
Yellow-Bellied Sapsucker:	Both	(7)		40.0–50
Downy:	Both	(101)		21.0–32

Weights of Selected North American Birds

Species	Sex	Sample Size	Average Wt. (Grams)	Weight Range (Grams)
FLYCATCHERS:				
Kingbird, E.	Both	(26)		34.5–53.5
Kingbird, W.		(1)	38	
Phobe, E.	Both	(9)		15.9–20.8
Pewee, E.	Both	(10)		11.4–15.4
SWALLOWS:				
Bank:	Both	(13)	16	
Barn:	Both	(7)		17.0–20
Cliff:	Both	(20)	21.5	15.0–25
JAYS:				
Blue:	Both	(144)		75.5–89.2
Scrub:	Both	(100)	80.2	
Stellers:		(2)	110	
MAGPIES:				
Black Billed:				
	M	(10)		169.0–200
	F	(18)		138.0–140
Yellow Billed:				
	M	(15)		162.0–188
	F	(18)		126.0–170
RAVENS & CROWS:				
Common Raven:				
	M	?	1381	
	F	?	1085	
Common Crow:				
	M	(30)		438.0–636
	F	(45)		417.0–608
CHICKADEES:				
Bl. Capped:	Both	(19)		9.2–11.8
TITMICE:				
Plain:	Both	?	13.7	
Tufted:	Both	(58)		20.3–25.3
NUTHATCHES:				
Red-Breasted:				
	Both	(312)		8.0–12.7
Brown:	Both	(21)	10.8	
CREEPERS:				
Brown:	Both	(177)		6.9–9.8
WRENS:				
House:	Both	(7)	11.0	9.9–13.3
Marsh, L-bill:				
	Both	(3)		9.2–15.0
Marsh, S-bill:				
	Both	(3)		8.1–8.2
MOCKING-BIRDS & THRASHERS:				
Mockingbird:				
	Both	(5)		45.0–60.9
Thrasher, Br.				
	Both	?	59.2	
THRUSHES, BLUEBIRDS:				
Robins:	Both	(49)		64.8–84.2
Hermit Thrush:				
	Both	(44)		23.8–35.3
Swainsons Th:				
	Both	(138)		22.9–37.3
Gr. Cheeked:				
	Both	(32)		23.9–35.3
BLUEBIRDS:				
Eastern:				
	M	(10)		27.6–31.6
	F	(10)		27.3–34.0
KINGLETS:				
Ruby-crowned:				
	Both	(69)		4.5–7.5
WAXWINGS:				
Cedar:	Both	(57)		22.9–37.2
SHRIKES:				
Loggerhead:				
	M	(24)		40.0–54.5
	F	(6)		40.0–47.4
Northern:	Both	(4)	67.5	57.5–75.0
VIREOS:				
Solitary:	Both	(17)		12.3–16.1
Philadelphia:	Both	(53)		8.9–15.2
WARBLERS:				
Blackpoll:	Both	(42)		11.0–15.5
Palm:	Both	(66)		7.9–13.4
Ovenbird:	Both	(61)		14.8–26.3
Yellowthroat:				
	Both	(348)		7.3–13.6
Y. Br. Chat:	Both	(26)	27.6	
Hooded:	Both	(46)	10.7	
Wilson's:	Both	(20)		6.1–8.3
BLACKBIRDS & ORIOLES:				
Meadowlark, W.	Both	(4)	101.5	84.8–111.8
Cowbird, Br. H.:	Both	(41)		34.3–53.9
Baltimore Or.:				
	Both	(235)		25.0–47.2
Brewers, BB.:	Both	(27)	57.7	44.5–72.9
R. Wing BB.:				
	M	(73)		62.0–65.0
	F	(28)		37.0–43.0
TANAGERS:				
Scarlet:	Both	(21)		21.5–42.5
Summer:	Both	(45)	31.0	
FRINGILLIDAE:				
Grosbeaks				
Bl. Headed:	Both	(4)	42.5	38.9–48
Blue:	Both	(21)	28.4	
Cardinal:	Both	(141)	43.7	34.6–53.2
Buntings,				
Indigo:	Both	(30)	15.0	12.2–19.3
Painted:	Both	(25)	14.7	13.0–17.2
Finches,				
House:	Both	(30)	19.3	17.3–23.7
Purple:				
	M	(72)		20.0–30.0
	F	(148)		20.0–31.0
Goldfinch, American:	Both	(6)		11.8–13.3
Towhee, Rufous-sided:				
	Both	(116)		33.0–45.8
Sparrows,				
Savannah:	Both	(16)		14.8–19.9
Chipping:	Both	(19)		10.3–19.7
Wh. Crowned:	Both	?		25.2–35.7
Wh. Throated:	Both	(341)		19.0–33.7
Fox:	Both	(16)		29.5–47.4
Lincoln:	Both	(13)		15.0–20.1
Song:	Both	(115)		16.4–24.4
Junco, Slate-Colored:				
	Both	(75)		15.0–20.4
Larkspurs, Chestnut-collared:	Both	?	20.0	

1. Bent, Arthur C. 1927. *Bent Life Histories.* New York: Dover Publications.
2. Terres, John K. 1980. *The Audubon Society Encyclopedia of North American Birds.* New York: Alfred A. Knopf, Inc.
3. White, Jan L. 1983. Case records of the Wildlife Rehabilitation Service. Fairfield: California.

What's Wrong with Bug Butter?

Guest Commentary by Murray E. Fowler, D.V.M., Chairman, Dept. of Medicine
School of Veterinary Medicine, Davis, California and the WRC Board of Directors.

INTRODUCTION

In the Summer 1982 issue of the *Wildlife Journal,* a diet called Bug Butter was presented in the column "Problem Solving with Carol Hamilton and Friends". The main components of the diet were strained baby food (muscle & organ meats such as liver, heart, chicken, or turkey) and vitamins. This diet has been widely used in the San Francisco Bay Area and has undergone at least three reformations. During the Fall 1982 WRC Quarterly meeting, the Board of Directors received some questions from Juanita Heineman of Peninsula Humane Society (San Mateo, California) regarding the diet. At that time, the matter was referred to the WRC Board Member and wildlife veterinarian, Sandra Emanuelson, who in looking over the constituents of the diet felt that it probably had an imbalanced Calcium-Phosphorous ratio; something that should be of great concern to anyone attempting to raise young animals.

A diet with a lack of calcium or too much phosphorous (an unbalanced ratio), or lack of vitamin D may result in metabolic bone disease also known as osteoporosis, osteomalacia, rickets, or nutritional secondary hyperparathyroidism. It is a disease characterized by a softening of the bones and is the result of dietary mismanagement. Once it has become advanced enought to debilitate an animal, it is very hard to impossible to reverse.

While the exact nutritional requirements of wild animals are unknown, some do come down with this disease when given diets that are unbalanced. An optimal ratio of calcium to phosphorous in the diet is felt to be between 1:1 and 2:1. With this in mind, the WRC Board of Directors referred a formal request for an opinion on this diet to Dr. Fowler for his review. The diet in the request submitted by Ms. Heineman for review was a revised version of the one appearing in the Summer 1982 *Wildlife Journal.* This one contained 200 more mealworms, 1 jar of baby egg yolks, and 1 or 2 tablespoons of Feline Science Diet.

DIETARY REVIEW

The beef liver, heart, chicken, and turkey are all essentially the same things. The analyses available to me indicate that these baby food plus the egg yolk and high protein baby cereal are all higher in phosphorous than calcium and have an absolute deficiency in both.

Human infants consuming these food items are still on milk and are getting their calcium in this manner. If I calculate correctly, the bulk of the diet is made up of 6 items of about equal weight:

Mealworms	100 gms.
Beef liver	98 gms.
Beef heart	98 gms.
Turkey	98 gms.
Egg yolk	98 gms.
Science diet	80 gms.

Mealworms may or may not have a proper Calcium/Phosphorous ratio. Four of the other components have an improper ratio. Only the Science diet is balanced for Ca/P.

Let me do a little calculation with you. I figured that there was about 600 gms of feed material in this formulae. Based on .9% calcium to be found in the science diet, that 600 gms. of food would contain 5.4 gms. of calcium (or 5,400 mg.) The supplement added in this particular Bug Butter was only 425 mg. (contained in 2½ teaspoons of vitamin). Granted, there is some calcium in the other food items, but not very much.

I have two main comments to make:

1. The formula is more complicated than needs to be as many of the components supply the same things.
2. It appears to me that there is an absolute deficiency of calcium and probably a poor Ca/P ratio.

WRC BOARD REVIEW

With the gracious assistance of Bill Stone, the curator of the Alexander Lindsay Jr. Museum, Walnut Creek, California, all of the components to Bug Butter were broken out to be examined. The diet was found to have a Calcium/Phosphorous ratio of 1:3 (as opposed to an optimal 2:1). The protein level was 23%. The energy provided was 1.6 Kcal/gram. To balance this diet takes a considerable amount of calcium but it can be done.

Several disadvantages were overlooked in the original journal article. This diet is complicated, the Calcium/Phosphorous ratio is imbalanced, and the energy provided per gram is low.

ENERGY REQUIREMENTS OF PASSERINES

How many Kcals are required by baby passerines to grow normally? Fowler estimates that the basal metabolic requirements for passerines can be calculated by multiplying $129.0 \times W^{.75}$ where W = the bird's weight in Kg. The answer will yield the Kcals required for the basic functions in a 24 hour period. Actual requirements for actively growing birds may be as much as 4 × the basal rate. The growth rate should be continuous with the bird attaining adult weight prior to the onset of major feather growth.

CURRENT TRENDS IN DIETS FOR SONGBIRDS

Currently, songbirds in the northern California area are being raised on simpler diets. One of the more popular is Science Feline or Canine diets moistened by water (with avian vitamins added). When the Canine Diet is used with Mockingbirds, Calcium Lactate is added at a rate of 75 mg/day/bird. Starlings fed the Canine diet are supplemented with a fat source such as Nutrical™ at

a rate of 1 cc/day. The Alexander Lindsay Jr. Museum, (Walnut Creek, Ca.) is using a combination baby bird diet that is modified for use in insectivorous birds and goldfinches. The Insectivore & Songbird Formula is a revised, balanced bug butter formulated by Juanita Heineman (PHS, San Mateo), Michelle Green and Joyce Long of Wildlife Rescue Inc., Palo Alto, CA.

SONGBIRD RECIPES & INSTRUCTIONS

- ALJM BABY BIRD DIET
  1 cup Purina Hi-Protein Dog Food
  4½ oz. of Gerber Banana Baby Food
  4½ oz. of Gerber Hi-Protein Cereal
  4½ oz. of Mockingbird Mix
  1 Teaspoon Superpreen Vitamins
  1 Hard-boiled egg (57 gms)
  1 cup water
  Directions: Soak Kibble. Blend egg, then add Kibble and other ingredients. Storage: Can be frozen in ice cube trays. Good in refrigerator 2 days.
- ALJM INSECTIVORE DIET
  1 cup Purina Hi-Protein Dog Food
  4½ oz. of Mockingbird Mix
  1 Teaspoon Superpreen Vitamins
  1 Hard-boiled egg (57 gms)
  1 cup water
- INSECTIVORE AND SONGBIRD DIET
  ½ cup Mealworms
  2 jars (3.5 oz.) Gerber's Strained Chicken
  1 jar (3.5 oz.) Gerber's Strained Beef
  1 jar (3.5) Gerber's Egg Yolks
  2½ Teas. Avia Vitamin & Mineral Supplement
  ½ Teas. Super Hygliceron B-Oil
  20 grains of Calcium Gluconate
  Directions: Place 2 jars of infant food in blender with mealworms, Avia, Hygliceron B Oil, & calcium tablets. Blend until smooth, add remaining ingredients and blend. If too thick, add ½ tablespoon of water at a time, blend.

Diet should be a smooth and creamy consistency like pudding or catsup. If too runny at time of feeding, add finely pulverized and sifted Science Diet or any other balanced dry food. Use ⅛ tsp. to every 30cc of bird diet. Dry food is very absorbent so use caution not to add to much dry food. Do not add any extra ingredients which may imbalance the nutritional balance of this diet.

- SCIENCE DIET PREPARATIONS
  Mixing Instructions: Make fresh daily and refrigerate when not in use. Add water until very moist. Let soak.

Science Diet	(Canine)	(Feline)	ALJM Baby Bird Diet
% Protein	26	32	12.7
Ca/P ratio	1.4:1	1.8:1	1.47:1
Kcal/gram	4.27	4.29	2.37

	ALJM Modified Insectivore Diet	Insectivore & Songbird Diet
% Protein	19.6	13.1
Ca/P ratio	1.52:1	1.6:1
Kcal/gram	3.38	1.4

EDITORS NOTE:

If you are interested in breaking down the diets your rehabilitation group is using and are unsure of the process, WRC has the complete packet prepared by Dr. Fowler for the Advanced Skills Seminars. It can be ordered for more information on wild animal nutrition and worksheets designed to break out the various components of a diet. See the ad on page 14 for information on how to order. We would like to encourage everyone to review carefully the foods they feed to growing and recuperating wildlife.

REFERENCES

1. FOWLER, Murray E. 1983. Feeding and Nutrition of Animals in Rehabilitation Centers". Walnut Creek: Wildlife Rehabilitation Council. p. 3–5.
2. FOWLER, Murray E. 1983. Personal & written communications.

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Tired?—Who's Tired?—Not Me!!

by Pat Quinn, Director,

George Whittell Wildlife Rescue Center, Monterey County SPCA, CA

I don't believe there are many people around who have not suffered at one time or another from "terminal burnout". A condition in which, for one reason or another, you burnout on the job and need to get away or just experience a change of pace. At a wildlife center you may not only suffer job burnout but emotional burnout as well and each of us reacts differently to it.

For example, we have the "Zombie Syndrome". This happens when one of our staff puts in a twenty-four hour day. You take one look at them and you realize that the lights are on, but nobody is home and that's usually what we do, try and send them home! Half the time though when I say "go home", I get a response like, "Oh, I'm fine. Besides, I still have a few things to do yet". To which I reply, "I'm still here, I'll get it done.". And I get back, "But it will only take a few minutes". Two hours later I'm feeling like "The Bicker Sisters", quarreling to see who is going to go home and take things easy for awhile. I suppose I should consider myself lucky, right? After all I could be arguing or begging, for someone to stay and get the work done. I do have responsible, dedicated, and sometimes "zombified" people working for me.

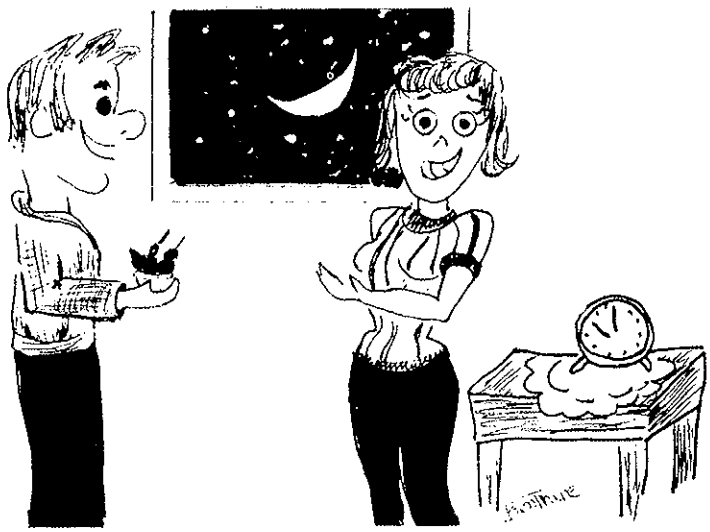
Another side of burnout is the "Stomach Revolution". This happens when you don't eat right, because you're worried about everything *else* eating right.

So the day arrives when you put a decent meal in your stomach and it reacts violently. As a matter of fact, you can actually hear your stomach asking the question, "What do you mean putting normal healthy food down here? I'm still having problems with that fast food hamburger you ate yesterday!" A few seconds later your stomach has put on a pair of boxing gloves and lets you have it. Out come the Rolaids as you rush madly to the next task trying frantically to forget you even had the "gall" to put something in that rebellious hollow cavern in the first place.

At the wildlife center it's either feast or famine (no pun intended). Most of the time we have animals poking out of every corner being treated for a varied assortment of injuries. Each one has a medical chart, a file card, usually a band number, always a cage number and anything else we can think of to make things complicated. Actually it's all a necessary evil to keep the animals and birds identified properly. Especially if you have twenty or thirty of the same species receiving treatment at any one time. Sometimes it's enough to make you want to pull your hair out; one strand at a time.

All of this pales by comparison when we start the "Silly Syndrome". This is the stage of exhaustion that arrives at the end of a long hard day. No matter what anyone says, serious or otherwise, it sounds funny. You giggle like a mad hatter until the tears flow like a fountain and then it goes from bad to worse with the use of atrocious puns. Sometimes they get so outrageous everyone ends up shaking their heads and begging you to stop. You go home feeling a little foolish, but better for getting it all out of your system.

Occasionally we'll ask ourselves why. Why persist in the type of work that is so demanding? But I know the answer. It's a fierce dedication to the preservation of a quality of life. It's a compelling force which drives you to try and save one more animal. To give the emergency first aid which will carry an animal through the first horrible night and then on its way to recovery. All of this so one can watch a golden eagle that may have spent eight weeks sitting solitary in a cage with a broken wing, soar over a rocky canyon. Or look into the eyes of a baby sea otter seeing the faith and trust it has given to you as you care for its needs. It's watching a baby hummingbird you've fed every fifteen minutes for several weeks take its maiden flight and hover over its first flower. It's all this and much, much more. It is a dedication to saving our wildlife for other generations to share and enjoy. Is it worth it you ask? Yeah . . . and necessary like breathing of those of us who work with this "dedicated madness". Deep in your soul you know as a certainty that you will persist until the last animal has received its medication and the last dish is put away for the evening. And usually, as you turn to go and your hand reaches out to flip off the lights you see someone walking up the hill carrying a box. You let out a big sigh and take your hand away from the light switch and reach for the first aid box instead . . . and wait for the next animal.



"They're kinda stuck together . . . maybe it was the honey . . . Should I have mixed it with something?"

Rehaber's Corner

The Rehaber's Corner is a place for sharing of ideas relating to wildlife care. Contributors are paid $5.00 for each idea accepted for publication. If you have an idea that you would like to share, write the Editor, WRC Wildlife Journal, P.O. Box 3007, Walnut Creek, Ca. 94598.

To keep tubeflex worms supplied with fresh water so they will live longer, put them in a nylon stocking and tie off to form a sack. Then insert them into the back of your toilet where fresh water will come and go each time it is flushed. No chemicals should be used in the storage area of the toilet. This will keep them live and fresh for days.

Mary B. Goodier
Sacramento Wildlife Care Assoc.
Sacramento, California

One way of harvesting soft worms for insect eating birds is to take a guinea pig wire cage (½″ × 1″) with tray and fill it with acorns. The worms come out of the acorns, fall into the tray below and are easily harvested daily by volunteers.

Bill Stone
Alexander Lindsay Jr. Museum
Walnut Creek, California

Birds suffering from temporary neurological damage often wreck their tail & wing feathers even when held in solid walled boxes. Upon recovery, they may have insufficient plumage to be released. By wrapping the problem wing(s), or tail in 2″ cling wrap, the problem can be alleviated until the bird is again able to stand and move in a more normal fashion. Birds should be placed in cardboard boxes with shavings, towels, or other acceptable bedding to keep droppings away from the body.

Karen McCarthy
Fort Ann, New York

To provide baby gallinaceous birds (i.e., quail, grouse, etc.) with a "Security Blanket", place a feather duster in their box, securing it so that it is about 1–2 inches above the ground. The babies think this is their "Mother", and will run in between the feathers to safety or to sleep.

Karen McCarthy
Fort Ann, New York

Squirrels and other small mammals sometimes will take milk too fast and choke. Additionally, they often are drinking small amounts of formula too hard to measure in the traditional pet nurser. This can be alleviated by using a 3 or 5 cc syringe (no needle) for feeding. The amount is then easy to measure and the flow controlled. (Editors note: a pet nurser nipple can be placed on a 3 cc syringe if necessary).

Fraya Katz
Volunteers for Distressed Wildlife
Albany, New York

Hummingbirds that fly into buildings and become trapped may not be able to find their way out, even when the windows or doors are opened. Hanging something bright red (i.e., flowers, scarf) near the exit may entice him out. In a recent experience, dimming the lights slightly caused the bird to come down and perch lower in the room, which was a help in ultimately getting the bird to exit out a window or door.

Pat Gonzales
Wildlife Rescue, Inc.
Palo Alto, California

Hummingbirds that are caught in fly paper can be safely cleaned with an eye solution "Tears Natural" by Alcon (P.R.) Inc. Humacao, P.R. 00661.

Dodi Franklin
San Jose, California.

WRC Skills Seminar Packets Available

The Wildlife Rehabilitation Council has developed a series of advanced skills seminars designed to further the training of wildlife center directors, team leaders, and supervisors. Due to the interest shown by rehabilitators both near and far, these packets are now available. The cost is $5.00 per packet and may be ordered from the WRC Literature Department.

Session I—Cleaning Oiled Birds, by Alice Berkner, International Bird Rescue and Research Center, Berkeley, California.
This packet contains the latest methods for the successful cleaning of oiled birds.

Session II—Restraint of Wild Animals, by Dave Jessup, DVM, William Clark, and Brian Hunter of the California Department of Fish and Game.
These materials cover basic consideration and responsibilities for restraint procedures, pharmacology, medical concerns, equipment, and safety considerations for all concerned.

Session III—Laboratory Procedures and Dianostics by Tami Biatek, AHT, Cottage Veterinary Hospital, Walnut Creek, California.
Procedures covered include the various aspects of hematology (i.e., collection in both avian and mammalian species), laboratory tests (BUN, PCV, TPP, WBC counts, differential, avian estimates, clot times, and preparation for lab work to be sent out), urology, parasitology (floatation, wet mount, direct smear) and special testing done for heart worm. Also included is basic information on bacteriology and culture and sensitivity testing.

Session IV—Physical Examination and Initial Care, by Sandra Emanuelson, DVM, (WRC Board Veterinarian) Cottage Veterinary Hospital, Walnut Creek, California and Jan White, Wildlife Rehabilitation Service Fairfield, California.
Topics covered include: intake procedures, initial exam, basic shock cycle and treatment, fluid therapy, emergency protocol, emaciation, and the protocol and treatment for selected poisons. Also covered are protocols specific to initial care of wild birds, mammals and reptiles.

Session V—Feeding and Nutrition of Animals in Rehabilitation Centers, by Murray E. Fowler, DVM, University of California, Davis.
Various aspects of feeding and nutrition in wildlife care are covered including: information on the requirements for energy, protein, Calcium/Phosphorus/Vitamin D, and hydration. Additionally, a section on thermoregulation, zoonoses, and metabolic bone disease have been included.

Session VI—Physical Therapy in Raptors, by Nancy Horowitz, RPT, Davis Raptor Center, Davis, California.
A registered physical therapist, Nancy Horowitz, brings to our field her knowledge of the principles, application, and cautions in the use of physical therapy on wild animals. Also included is the handout developed by the University of California, Davis, Raptor Center staff on the new method of harness flying for exercising and rehabilitation raptors.

Session VII—Basic Necropsy Procedures, by Pat Gullett, DVM, California Department of Fish and Game.
This packet provides rehabilitators with a procedure for both avian and mammal necropsy, complete with diagrams. Reptile drawings are included for reference along with a necropsy form for rehabilitators.

continued from page 4

ful deterrent. Note: Purina Kitten Chow and Zu/Preem already contain Vitamin K. For diets that do not contain this vitamin, K-Sol powder can be used.

- *Symptoms That May Indicate Constipation:* Anorexia, sluggishness, slow gait. Treatment: A small amount of mineral oil given orally or a sliver of glycerin suppository that is used for children. Try to determine why the animal is constipated and correct the situation. If the symptoms persist or worsen, consult a veterinarian.
- Isolate a debilitated animal since it can be severely mutilated and killed by cage mates.
- *Appetite Stimulant for a Debilitated, Anorexic Armadillo:* Nutri-Cal, Energel, or comparable product, dosed according to package directions.
- *Cracked, Torn, or Damaged Shell:* Can result in severe necrotizing infections, and should be treated immediately by a veterinarian who who should be informed of the following effective treatment. For adults—150,000 units benzathine penicillin G injected into the muscle mass of the hind leg, combined with debridement of wounds and daily application of a mixture of sulfonamides and urea in oil (Wampler, *Lab. An. Care,* 19(3): 392, 1969; p. 393 discusses anesthesia).
- *Tail Injuries:* Weekly application of an antibiotic cream or sulfa-urea-oil mixture pack; cover with adhesive tape.
- *Abrasions and Superficial Infections:* Consult a veterinarian regarding the use of an antiseptic astringent dressing which contains pyoktanin blue and phenol, applied daily or as needed, and use of a topical antibacterial powder such as Topazone (Storrs and Greer, *Lab. An. Sci.,* 23(6):823, 1973).
- *Concave Shell:* Generally indicates malnutrition and/or dehydration.
- References that can aid the veterinarian in treating this species are denoted by an asterisk under the reference section.

PRODUCT INFORMATION

Dynafos
International Mineral Company
Riverdale, Illinois

Energel
Animark, Inc.
Amityville, New York

Esbilac
Borden Pet/Vet Products
Elgin, Illinois

Furacin
Norwich-Eaton Pharmaceuticals
(Division of Morton-Norwich Products, Inc.)
Norwich, New York

Gerber High Protein Cereal; Gerber Rice Cereal
Gerber Products Company
Fremont, Michigan

Gevral
Lederle Laboratories (Division of American Cyanamid Company)
Pearl River, New York

K-Sol
Vet-a-Mix
Shenandoah, Iowa

Nutri-Cal
EVSCO Pharmaceutical Corporation
Buena, New Jersey

Paltone
Pitman-Moore, Inc.
Fort Washington, Pennsylvania

Purina Kitten Chow; Purina Cat Chow
Ralston Purina Company
St. Louis, Missouri

Pyoktanin blue and phenol (Pyoktanol)
Norden Laboratories
Lincoln, Nebraska

Topazone
Norwich-Eaton Pharmaceuticals
(Division of Morton-Norwich Products, Inc.)
Norwich, New York

Vipenta
Multivitamin Corporation
Riverdale, Illinois

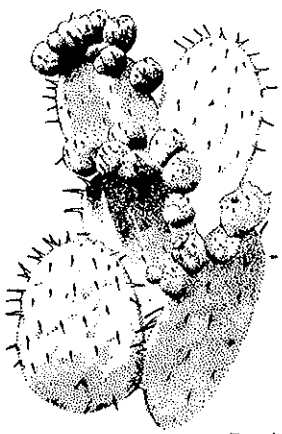
VPC
VPC Vitamin Products
Peoria, Illinois

Zu/Preem Feline; Science Diet Exotic Feline
Hill's Pet Products, Inc.
Topeka, Kansas

REFERENCES

1. *ANDERSON, J. M. and K. Benirscke. "The Armadillo, *Dasypus novemcinctus,* in Experimental Biology." *Lab An. Care,* 16(3):202–216, 1966.
2. BURT, WILLIAM H., and Richard P. Grossenheider. *A Field Guide to the Mammals.* Boston: Houghton Mifflin Company, 1976.
3. CAHALANE, VICTOR H. *Mammals of North America.* New York: The MacMillan Company, 1964.
4. DAVIS, WILLIAM B. *The Mammals of Texas.* Austin, Texas: Texas Parks and Wildlife Department, 1978.
5. FOWLER, MURRAY E. Personal communication, 1982.
6. _____. *Zoo and Wild Animal Medicine.* Philadelphia: W. B. Saunders Company, 1978.
7. HILL, E. RAYMOND, and Keith R. Kelson. *The Mammals of North America.* New York: The Ronald Press, 1959.
8. MARCUM, DEBBIE. "Hand-Rearing Non-Domestic Mammals." Unpublished paper, 1982.
9. MERITT, DENNIS A., JR. "Edentate Diets. I. Armadillos." *lab. An. Sci.,* 23(4):540–542, 1973.
10. "Mother's Milk is Nature's Most Perfect Food." Technical leaflet. Borden Pet/Vet Products, Elgin, Illinois.
11. PETERS, TERRY. *Armadillo.* Austin, Texas: The Stevenson Press, 1978.
12. STORRS, ELEANOR E. "The Astonishing Armadillo." *National Geographic,* 161(6):820–830, 1982.
13. _____. "The Nine-Banded Armadillo: A Model for Leprosy and Other Biomedical Research." *Internat'l. Jour. of Leprosy,* 39:703–714 1971.
14. _____. Personal communication, 1982.
15. _____, and W. E. Greer. "Maintenance and Husbandry of Armadillo Colonies." *Lab. An. Sci.,* 23(6):823–828, 1973.
16. TABER, F. WALLACE. "Contribution on the Life History and Ecology of the Nine-Banded Armadillo." *Jour. Mamm.,* 26(3):211–226, 1945.
17. *WAMPLER, STANLEY N. "Technical Notes. Husbandry and Health Problems of Armadillos, *Dasypus novemcinctus.*" *Lab. An. Care,* 19(3):391–393, 1969.

*Denotes reference that can aid the veterinarian.



Prickly Pear

WRC Fall Quarterly Meeting

The WRC Fall quarterly meeting will be held at Marin Wildlife Center in San Rafael, California on October 8, 1983. The guest speaker will be Annette Lomont, the Director of Development for the San Francisco Zoological Society, who will speak on "Fundraising for Wildlife Centers and Other Small Non–Profit Organizations."

The business meeting will begin at 10:00 a.m. with the general meeting following at noon. For directions call Marin Wildlife Center at (415) 454-6961. The address is 76 Albert Park Lane, San Rafael, CA.

Morbidity and Mortality Weekly Reports Now Available at Reduced Costs

The Morbidity & Mortality Weekly Report, published by the U.S. Public Health Service's Center for Disease Control, is now available at cost to all health care professionals. Previously free, the government found the costs too high and began implementing a $60.00 annual subscription fee. However, the Massachusetts Medical Society Publications, the publishers of *The England Journal of Medicine* will reprint and distribute this important weekly source of critical information at cost ($20.00 per year).

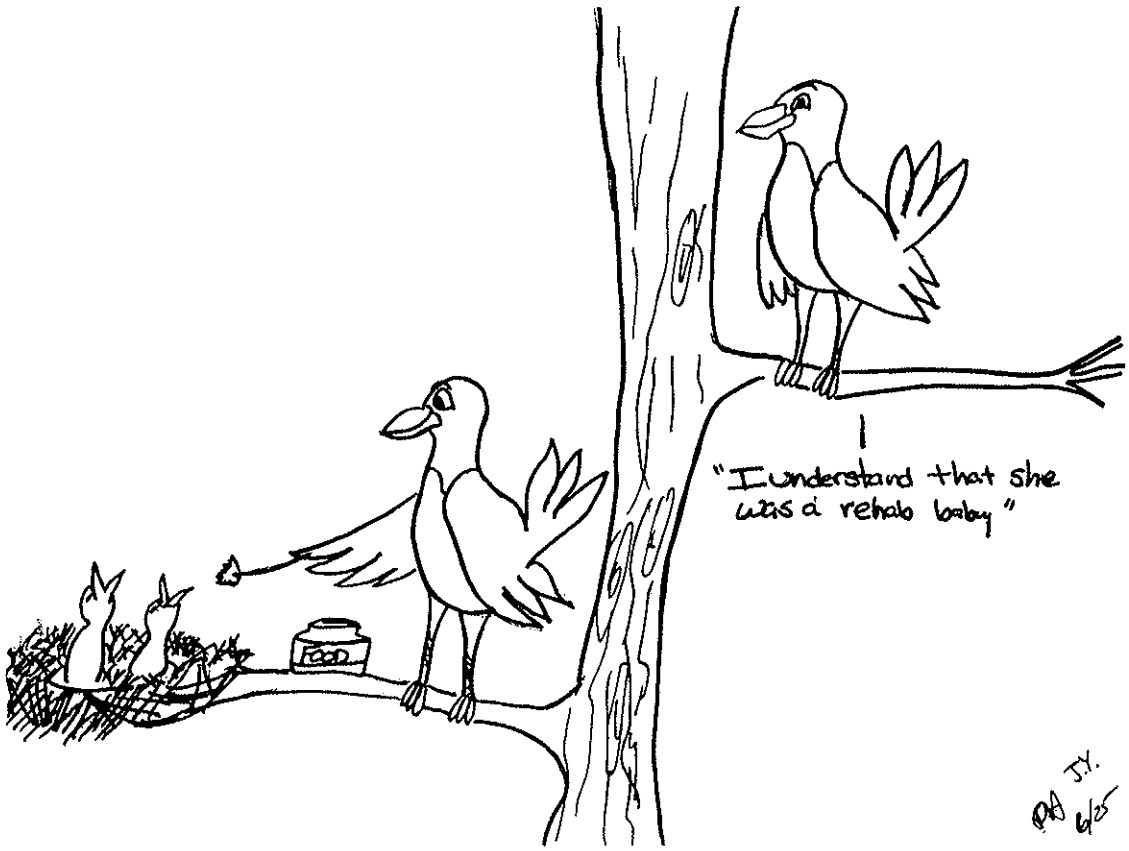
This weekly pamphlet contains vital information to rehabers on current trends in all the major zoonotic diseases (i.e., rabies, tularemia, leptospirosis, psittacosis, plague, & trichinosis). Other topics updated regularly include: human rabies vaccine developments, AIDS, venereal diseases, as well as many other health care problems that affect people in this country. To subscribe contact: MMS Publications, C.S.P.O. Box 9120, Waltham, Ma 02254 U.S.A.

No Visitors Allowed! Humane Methods of Keeping Wildlife Out of Gardens

The Evergreen Wildlife Conservation Society in Lake Zurich, Illinois has published a brochure that gives tips on how to discourage wildlife in your garden. It addresses such animals as the raccoon, deer, moles, squirrels, rabbits, and birds. The tips described in this pamphlet are humane ones and are also safe for the environment. Copies may be obtained by writing Evergreen Wildlife Conservation Society, Inc., 23946 Sunset Echo Lake, Lake Zurich, IL 60047 or by calling (312) 438-9333. Copies sell for 20¢ each.

Owl Eyes Needed

Research is being conducted on the physiological optics, comparative anatomy and diseases of the eyes of birds of prey. Well preserved specimens of eyes of owls are needed. Hopefully, they will allow us to correlate the variation we found in ability to focus near objects with morphological features of the eye. Eyes should be placed in 10% buffered formalin (which I would be happly to supply). Specimens should be sent to Christopher Murphy, Dept. of Anatomy, NYZ College of Veterinary Medicine, Cornell University, Ithaca, NY 14853, (607) 256-5454.



Current Literature

TUDOR, David C. "Mycotic Infection of Feathers as the Cause of Feather-pulling in Pigeons and Psittacine Birds" *Veterinary Medicine/Small Animal Clinician,* Volume 78, No. 2, Feb. 1983, pp 249–53.

GOLDSTON, Richard T.; Richard D. Wilkes; Irene Seybold, "Water, Electrolyte and Acid/Base Balance", *VM/SAC,* Vol. 78, No. 1, Jan. 83, pp 31–35.

SEYBOLD, Irene; Richard T. Goldston; Richard D. Wilkes, "Veterinary Clinical Parasitology", *VM/SAC,* Vol. 77, No. 11, Nov. 82, pp 1664–69.

ROWLEY, Jane; Basil Pshyk. "Use of a Fluoropolymer Plastic Intramedullary Pin to Repair a Fractured Humerus in a Hawk", *VM/SAC,* Vol. 77, No. 9, Sept. 82, pp 1395–6.

MURPHY, C. J.; T. J. Kern; K. McKeever; L. McKeever; D. MacCoy. "Ocular Lesions in Free-living Raptors", *Journal of the American Veterinary Medical Association,* Vol. 181, No. 11, Dec. 1, 1982, pp 1302–04.

MURPHY, C. J.; T. J. Kern; R. C. Riis. "Intraocular Trauma in a Red-tailed Hawk", *JAVMA,* Vol. 181, No. 11, Dec. 1, 1982, pp 1390–91.

FERNANDEZ-REPOLLET, Emma; Jane Rowley; Abraham Schwartz. "Renal Damage in Gentamycin Treated Lanner Falcons", *JAVMA,* Vol. 181, No. 11, Dec. 1, 1982, pp 1392–93.

LAWER, D. M.; J. Frink; F. J. Dein. "Rehabilitation of Ruddy Ducks Contaminated with Oil", *JAVMA,* Vol. 181, No. 11, Dec. 1, 1982, pp 1398–99.

MANN, Peter C.; Richard J. Montali; Mitchell Buss. "Mycobacterial Osteomyelitis in Captive Marsupials", *JAVMA,* Vol. 181, No. 11, Dec. 1, 1982, pp 1331–33.

HALEY, Patrick J.; Robert W. Norrdin. "Periarticular Xanthomatosis in an American Kestrel", *JAVMA,* Vol 181, No. 11, Dec. 1, 1982, pp 1394–96.

KOCAN, A.; A. E. Castro; B. Espe; R. T. Doyle; S. K. Olsen. "Inapparent Bluetongue in Free-ranging White-Tailed Deer", *JAVMA,* Vol. 181, No. 11, Dec. 1, 1982, pp 1415–16.

DIETERICH, Robert A.; Donald G. Ruther. "Rabies in Alaskan Reindeer", *JAVMA,* Vol. 181, No. 11, Dec. 1, 1982, pp 1417–18.

BROWN, Marilyn J.; Bruce Wojcik; Elizabeth C. Burgess; Gregory J. Smith. "Adverse Reactions to Sulfaquinoxaline in Coyote Pups", *JAVMA,* Vol. 181, No. 11, Dec. 1, 1982, pp 1419–20.

PANIGRAHY, B.; J. E. Grimes; S. E. Glass; S. A. Naqi; C. F. Hall. "Diseases of Pigeons and Doves in Texas: Clinical Findings and Recommendations for Control", *JAVMA,* Vol. 181, No. 4, Aug. 15, 1982, pp 384–86.

APPEL, Max J. G.; Colin R. Parrish. "Raccoons are not Susceptible to Canine Parvovirus", *JAVMA,* Vol. 181, No. 5, Sept. 1, 1982, pp 489–93.

GAUDRY, Daniel. "Rabies Vaccines: The Merieux Experience", *VM/SAC,* Vol. 78, No. 4, April 1983, pp 525–30.

ENGLUND, Jan. "A Comparison of Injuries to Leg-hold Trapped and Foot-Snared Red Foxes", *Journal of Wildlife Management,* Vol. 46, No. 4, Oct. 1982, pp 1113–17.

BURNHAM, William. "Artificial Incubation of Falcon Eggs", *JWM,* Vol. 47, No. 1, Jan. 1983, pp 158–168.

BLUS, Lawrence J. "First Records of Chlordane-related Mortality in Wild Birds", *JWM,* Vol 47, No. 1, Jan 1983, pp 196–98.

JACOBSEN, Nadine K. "Effects of Age & Behavior of Black-Tailed Deer on Dosages of Xylazine, *JWM,* Vol. 47, No. 1, Jan 1983, pp 252–255.

TEUBNER, Victoria A.; Gary W. Barrett. "Bioenergetics of Captive Raccoons", *JWM,* Vol. 47, No. 1, Jan. 1983, pp 272–4.

MENDENHALL, Vivian; Erwin E. Klaas; M. Anne R. McLane. "Breeding Success of Barn Owls (Tyto alba) Fed Low Levels of DDE and Dieldrin", *Archives of Environmental Contamination and Toxicology,* Vol. 12, No. 2, March 1983, pp 235–40.

OCEANUS, Vol. 26, No., 1, Spring 1983 issue devoted to Seabirds & Shorebirds includes the following articles plus others: Schneider, David. "The Food and Feeding of Migrant Shorebirds", pp 38–43. Buckley, P. A.; Francine G. Buckley. "Conservation of Colonial Waterbirds", pp 55–61.

POWELL, Constance B.; Roger A. Powell. "The Predator-Prey Concept in Elementary Education", *Wildlife Society Bulletin,* Vol. 10, No. 3, Fall 1982, pp 238–44.

GILBERT, F. Frederick. "Public Attitudes Toward Wildlife: A Pilot Study in Guelph, Ontario", *WSB,* Vol. 10, No. 3, Fall 1982, pp 245–53.

CRAVEN, Scott R. "Rehabilitation of Sick or Injured Canada Geese", *WSB,* Vol. 10, No. 3, Fall 1982, pp 277–80.

MACCRACKEN, James G. "Coyote Foods in a Southern California Suburb", *WSB,* Vol. 10, No. 3, Fall 1982, pp 280–81.

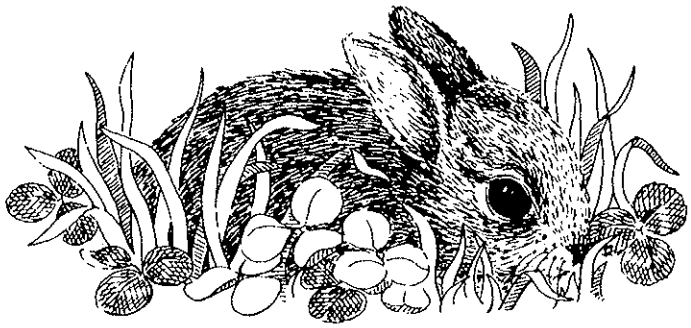
WRIGHT, Jerry M. "Ketamine Hydrochloride as a Chemical Restraint for Selected Small Mammals", *WSB,* Vol. 11, No. 1, Spring 1983, pp 76–79.

HEIN, Dale; Sarah F. Bates. "Criteria for Hiring Wildlife Employees", *WSB,* Vol. 11, No. 1, Spring 1983, pp 79–83.

KOCK, M. D. "Stabilization of a Tibiotarsal Fracture Using a Modified Kirschner Ehmer Apparatus in a Mollucan Cockatoo", *California Veterinarian,* September 1982, pp 11–13.



Informational Literature



A NEW METHOD FOR EXERCISING AND REHABILITATING RAPTORS, Terry Schulz, Julie Klingman, and Russell Tucker ($1.50)

This paper introduces a new method of exercising raptors with a minimum amount of human contact. This method is ideal for the rehab organization that does not have room for a large flight aviary. Complete instructions to build a fixed flight line and harness are included.

AVIAN DRUGS AND DOSAGES, Charles Galvin, DVM ($5.00)

A 32-page booklet that is an A to Z guide for drugs used on avian species. This booklet lists approximately 200 drugs that are used in birds and their recommended dosages.

IMMOBILIZATION OF SIMPLE AND COMPOUND FRACTURES IN SONGBIRDS AND RAPTORS Victoria Welsh ($2.50)

This booklet covers many aspects of dealing with fractures in birds. Areas covered include cleaning and disinfecting wound, fractures of specific bones and their treatment and post-treatment rehabilitation.

INITIAL CARE OF INJURED AND OILED WATER BIRDS, Kathy Hobson ($2.50)

Starting with the safety of your volunteers this paper goes on to cover such subjects as recording keeping, examination of the bird, treatment of sick or oiled birds, housing, salt water tolerance and much more. Recipes for the different groups of water birds are also included.

GOLD FINCHES, Carol Meaney ($2.00)

Goldfinches is a complete guide for raising young and caring for adult goldfinches. The paper starts with a natural history of the bird and goes into housing, diets, feeding techniques, behavior, special problems, release and more.

SWALLOWS, VARIOUS SPECIES, Carol Meaney ($2.50)

This paper follows the same format as "Goldfinches". Special housing needs, pesticides, and the special problems that can happen when caring for Swallows.

OPOSSUM REHABILITATION, Edited by Jan White ($2.50) SOLD OUT

This booklet covers all aspects of caring for opossums. Subjects covered are diet, zoonoses, raising infants, tube feeding, and much more.

RACCOON REHABILITATION, Edited by Jan White & Debbie Marcum ($3.50)

A 20 page booklet on the care, handling and release of raccoons. It includes details on infant and adult diet, medical problems, vaccinations, caging, growth charts to name a few.

IMMOBILIZATION OF SIMPLE AND COMPOUND FRACTURES IN MAMMALS Victoria Welsh ($2.50)

This booklet covers many areas of dealing with fractures in mammals. Rescue, transport, initial care, treatments for specific breaks, proper confinement, healing time and rehabilitation. This information is complimented by illustrations of splinting, and wrapping methods of fractures.

HAND-REARING NON-DOMESTIC MAMMALS, Debbie Marcum ($1.50)

An informative paper in six parts covering subjects such as initial care, medical problems and their treatment, feeding and nutrition, housing, behavior and release. This paper includes a medical and dietary products list and a biological data sheet.

RAPTOR CARE AND REHABILITATION, Gary Bogue and Dave Garcelon ($16.00)

A 140 page book on the complete care of raptors for rehabilitation. Sections include initial care, housing, medical problems, training and rehabilitation. Each section goes into great detail and addresses common and not so common problems that are encountered with these birds. Illustrations include perches, flying equipment, splints and wing and body wrap to name a few.

Send all orders to: WRC LITERATURE ORDER DEPT., P.O. Box 3007, Walnut Creek, CA. USA 94598. (Postal costs may be slightly higher outside the United States.