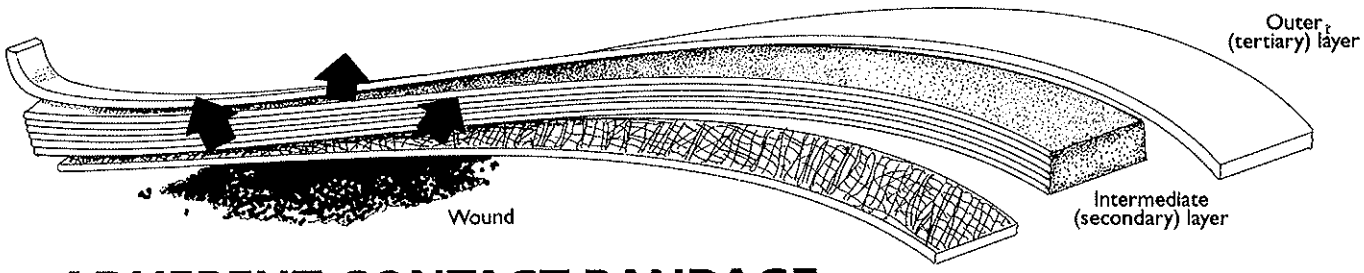
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Summer 1992 Vol. 15, No. 2

WILDLIFE JOURNAL

Journal of the International Wildlife Rehabilitation Council



ADHERENT CONTACT BANDAGE

Principle of dry-to-dry and wet-to-wet adherent contact bandages: Fluid absorbed into intermediate layer and evaporates (arrows). Necrotic tissue and debris adhere to gauze contact layer for removal with bandage change.

Soft Tissue Wound Management in Avian Patients. . . page 3

Guidelines for Authors for the *Wildlife Journal*

The *Wildlife Journal* is designed to provide useful information to wildlife rehabilitators and others involved in the care and treatment of native wild species with the purpose of returning them to the wild. All featured articles are subjected to a review process, and our staff and reviewers work with authors to produce the most accurate information possible in our ever-changing field.

The *Wildlife Journal* has various feature categories. We solicit submissions in the form of feature articles, rehabilitation notes, book reviews, news articles related to major events in the field, and selected case studies. Articles on veterinary medicine as it relates to wildlife rehabilitation are also welcome. We would like to expand the *Wildlife Journal* to include wildlife rehabilitation articles from countries outside the United States and welcome inquiries regarding such articles. We have two short features we use for basic information: "For The New Rehabber" and "Simple Things That Make a Difference." They are intended for basic information or new ideas that are easily demonstrated with a short text and photos. We pay authors a $25 honorarium for each article accepted for publication or provide a one year membership or renewal.

Submission Instructions

1. An original and two copies of the manuscript should be submitted to the Editor, IWRC, 4437 Central Place, Suite B-4, Suisun, California 94585, USA. The manuscript should include references, photo legends, and footnotes, and should be typewritten, double-spaced, if possible. The author's name, address, and phone number should be placed on at least the first page of the article so it can be readily identified and the author contacted.

2. The *Wildlife Journal* is prepared on a Macintosh personal computer with desktop publishing software. If papers are already on a personal computer disc, the submission cover letter should include that information, as well as what type of hardware and software systems were used. Obviously, being able to use the author's disc directly or translate by machine to Macintosh format prevents input errors and speeds up the process.

3. Manuscripts are received with the understanding that they have not been accepted for publication elsewhere. **It is the author's obligation to obtain permission or reprint rights if the submitted copy has been published elsewhere.** All accepted manuscripts are subject to editing. Unused manuscripts will be returned.

4. A separate page should be submitted with a short synopsis of information on the background of the author. Included should be the name, address, rehabilitation organization, and phone number of the author. Where appropriate, please list any academic degrees, special training, or experience that is relevant to the article (i.e., physical therapy—RPT, etc.)

5. Black and white photographs are preferred for use in the *Wildlife Journal*. When no other option is available, color slides and prints can be converted but this is costly and to be avoided when possible. Photo credits should be listed with the photographs.

6. Acknowledgments are limited to people who have contributed to the article in a major way.

7. References should be noted in the text with the last name of the author and the year published (i.e., Leighton, 1983) and listed at the end of the manuscript in alphabetical order in the following style:

LEIGHTON, FA; Peakall, DB; and Butler, RG. 1983. "Heinz-Body Hemolytic Anemia from the Ingestion of Crude Oil: A Primary Toxic Effect in Marine Birds." *Science* 20:871-873.

WILDLIFE JOURNAL

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Cover Drawing by Nancy Allen.

• The IWRC Journal is designed so you can use a 3-hole punch and store back issues in a binder for easy reference. The *Wildlife Journal* (ISSN: 0893-6560) is published quarterly by the International Wildlife Rehabilitation Council, 4437 Central Place, B-4, Suisun, CA 94585. © 1992 All Rights reserved. No part of the issue may be reproduced in any part without permission of the publisher.

Editorial . . .

Changes in the Wind

IWRC is on the move again! We are gearing up for next year and the new things we plan to do. You will notice that in this issue we are announcing a new column called *Members' Forum.* This will provide members with a place to come with their concerns and questions for help. Marge Gibson will coordinate the column and get answers for people needing help.

We are working on plans for a newsletter to assist in member networking, increase member interaction, and provide a new venue for information exchange. The newsletter, yet unnamed, will not be a citable publication, but will expand IWRC's ability to assist the membership. Currently we insert our annual report once a year in the *Wildlife Journal.* The newsletter will be inserted in this manner in the other three issues. The types of information to be included include: wildlife computer software updates, Regional or State Representative News, USFWS News/Bird banding information, Rehab talk: what's new, what works, and what doesn't! New products, literature reviews/member submitted poems, cartoons, art, and equipment exchanges. Look for the first edition in Vol. 16, No. 1 in 1993.

We are expanding our skills seminar program as well. In 1993, we will for the first time, offer specialized roundtable study groups in northern California. This pilot project will offer a variety of topics from grantwriting and computerized animal records to rehabilitation sessions on raptors, small mammals, and songbirds. Unlike the skills seminars that have lecture sessions and concurrent labs, these small groups (15 people) will review current methodology and meet as a discussion group.

Other plans in the works include the assembly of a review board to provide critical reviews of papers submitted for the annual conference proceedings. In the past, the IWRC board served in this fashion. Today, the field is growing and requires more expertise in any of a number of areas—not all of which are always represented on the board. Thus, we are in search of specialists to review papers. Any interested specialists out there?

Another idea brought up for discussion is the concept of issuing continuing education certificates for conferences and for home study through the *Wildlife Journal.* This would involve more labor on our part to set up questions from each feature article. Participants would be required to pay for the staff time to grade, record, and set up a storage and retrieval system for continuing education credits. It would, however, allow isolated rehabilitators to get credit without necessarily attending seminars or conferences away from home. Some states require continuing education hours already. If such a system were established, would more states follow? How do you feel about this? This involves much work and IWRC would like to hear from you about the feasibility of this idea. Drop us a note and sound off!

We have many ideas of ways to improve the field of wildlife rehabilitation. It all takes money and a supportive membership. We do amazingly well with a support base of only 1,500 members. To continue to do more, we need to have a larger support base. If you want to see IWRC continue to expand its services, urge your fellow wildlife rehabilitators to join! A gift membership is a great present for your veterinarian or a wildlife friend! At $30, this is one membership that is still a great value!

-Jan White-

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Soft Tissue Wound Management In Avian Patients

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Introduction

Wound healing is a complex interaction of a series of events in response to an injury, leading to regeneration of connective tissue, vascular supply and epithelium. The three basic phases of wound healing are inflammatory (exudative), collagen and maturation (Bojrab, 1981). It is important to understand the principles of wound healing in order to assess the wound and devise a treatment plan for optimal results.

Inflammatory Phase

Studies of the acute inflammatory response in birds have been done in chickens to gain a better understanding of the hemodynamic changes and cellular responses involved (Carlson, Allen, 1969; Jortner, Adams, 1971; Awadhiya, et al, 1980; Jain, et al, 1982). The inflammatory response during the first 12 hours is similar in both mammalian and chicken skin with immediate vasoconstriction to control hemorrhage, followed by vasodilation within 30 minutes (Jortner, Adams, 1971). Large numbers of heterophils and monocytes infiltrate the margins of the injured and necrotic tissue within the first two to six hours (Carlson, Allen, 1969; Jortner, Adams, 1971). Active phagocytosis of necrotic cellular debris and bacteria are observed during this period.

By 12 hours post-injury, the ratio of heterophils to mononuclear cells begins to shift toward a predominance of mononuclear cells, including lymphocytes, plasma cells, monocytes and macrophages (Jortner, Adams, 1971). During the next 36 hours, necrotic leukocytes that were active in phagocytosis accumulate at the periphery of the necrotic tissue and are in turn, phagocytized by macrophages and multi-nucleated giant cells. Fibroblasts appear in the wound during this period and continue to proliferate during the next few days, signaling the end of the first phase of the healing process.

Collagen Phase

There has been little work done in avian species to document the latter stages of wound healing, necessitating extrapolation from mammalian studies. The collagen phase begins on the third or fourth day in chickens (Carlson, Allen, 1969) and approximately the fifth day in mammals (Bojrab, 1981) and lasts approximately two weeks. During this phase, the fibroblasts synthesize collagen in the form of microfibrils, which aggregate into larger fibers over time. Capillaries develop from bud-like structures from nearby vessels and penetrate the wound. Wound contraction occurs and epithelial cells proliferate and migrate across the wound surface (Johnston, 1975; Johnston, 1977).

Maturation Phase

The final phase of wound healing is marked by remodeling of the collagen bed and a decrease in the number of fibroblasts (Johnston, 1977). The weak, poorly developed collagen is replaced by collagen fibers that are thicker and stronger. The fibers become more oriented relative to the normal tension on the wound margins. In mammals, this phase may take weeks to months.

Impediments To Wound Healing

There are many factors which can potentially impair or prevent normal wound healing (Bojrab, 1981). Severe protein deficiency and/or chronic anemia may have an adverse effect on wound healing. In many cases involving traumatic soft tissue wounds in wild birds, the hydration and nutritional status of the patient may be compromised. Many local factors may delay wound healing. The presence of necrotic tissue or blood clots may harbor bacteria and physically impede epithelial cell migration. Infection by pathogenic bacteria may significantly delay wound healing, depending upon the virulence of the bacteria, the status of the host's immune system and the nature of the wound. All foreign material, including dirt, debris, non-viable bone and other substances should be removed to prevent fistulous tracts from developing. Even suture material may cause a foreign body reaction, but the effect can be minimized by selection of appropriate absorbable and/or non-absorbable suture material.

Tissue destruction resulting from desiccation, severe trauma (e.g., crushing or projectile injuries) or poor surgical technique will delay healing. The location of the wound may also influence the rate of healing. Wounds of the distal extremities, especially the toes, tend to heal more slowly, possibly due to poorer vascular supply. Non-immobilized injuries over joint surfaces or those subjected to continual abrasion also tend to heal more slowly.

Wound Assessment

The condition of the patient and the wound should be assessed before deciding on the course of treatment of a soft tissue injury. Shocky, dehydrated, emaciated and/or anemic patients should be stabilized before the wounds are treated. In wild birds, stabilization is especially critical, since there is often a delay of many hours to days following injury before the bird is presented for treatment.

After patient stabilization, a number of factors should be assessed before determining the course of treatment, including the extent of damage that has occurred, the cause of the injury, the location of the injury, the condition of the vascular supply to the area and associated orthopedic or nerve damage, the age of the wound and the extent of contamination present.

The types of soft tissue injuries in birds include puncture wounds, lacerations, abrasions, thermal and chemical burns and frostbite. Pet bird puncture wounds generally occur secondary to cage wire, bite wounds, or toe nails. In wild birds, punctures may be caused by gunshot injuries, bite wounds, barbed wire, thorns, porcupine quills or branches. Shooting injuries may be very minor in cases involving a few scattered shotgun pellets, or quite severe, if extensive soft tissue and bone destruction occurs, such as with a close range shotgun blast or high-powered rifle.

Lacerations and abrasions may be caused by collisions with ceiling fans or other household objects with pet birds, and collision with vehicles, wire fences, branches, etc., with wild birds. The viability of the vascular supply around the injured area should be assessed, especially with lacerations involving distal extremities. Excitable birds may incur self-inflicted carpal, cere, corneal or keel abrasions from colliding with the caging materials. In this case, correction of the underlying problem or changing the cage design, location, size or adding padding is essential in the overall treatment regimen. Corneal abrasions may also be observed in birds that have collided with vehicles or windows. Fluorescein dye may be used to assess the extent of the corneal damage.

Thermal injuries in birds may result from electrocution, fires, contact with hot pans on the stove, or with birds caught in chimneys. The feathers provide some measure of insulation, however the extent of the trauma depends upon the cause and the duration of exposure. Damage may range from singed feathers, ocular irritation or mild erythema of the feet or other exposed skin, to severe destruction of the toes or feet, melted beaks and/or death.

Chemical burns secondary to contact with caustic solutions, acids or other irritants may be seen occasionally in birds. The affected areas should be thoroughly washed and the compound neutralized by either sodium bicarbonate solution for acidic compounds, or dilute vinegar for alkaline compounds (Perry, 1987).

Frostbite of the distal extremities may be seen in tropical or subtropical birds exposed to inclement weather. In northern climates, even birds that are normally acclimated to cold weather may suffer frostbite problems when the ambient temperature and wind chill combine to drop the temperature below freezing. These problems are most common in birds that are weak and debilitated, or when nutrition and shelter are inadequate. Frostbite of the toes or feet is commonly associated with raptors caught in leg-hold traps during the winter months in northern states. The prognosis is very poor for saving a toe or foot that has been frozen solid, but is usually favorable for superficial frostbite injuries. In these cases, the devitalized

epithelium sloughs in five to seven days after being replaced by new epithelium.

Wound Treatment

A treatment regimen should be selected once the patient has been stabilized and the extent of the wound assessed. Ideally, fresh, uncomplicated wounds should be sutured (Bojrab, 1981). However, unless the wound is surgically created or is a simple, clean laceration presented within eight hours of injury, this is often impossible. In avian practices dealing with traumatized wild birds, most soft tissue healing is by granulation because the majority of wounds are too old or contaminated to use primary closure. In some instances, once a healthy granulation bed is established and the infection is under control, the wound may be sutured.

The three basic considerations of wound management are cleansing, closing and covering (Bojrab, 1981). If the wound is extensive and the bird is stable and can tolerate anesthesia, it is recommended that these procedures be done under isoflurane (AErrane™).

Wound Preparation

The feathers surrounding the wound should be carefully plucked, or trimmed if the skin is very friable. Ideally, there should be a feather-free zone of two to four cm of healthy skin around the wound. The wound is then irrigated under a gentle stream of warm water or with an irrigation syringe and warm saline to remove gross contaminants, debris and blood clots. A 0.05% chlorhexidine diacetate solution (Nolvasan™) or 0.5-1.0% povidone-iodine solution (Betadine™) should be used to lavage the wound and provide antibacterial activity (Swaim, Lee, 1987). Hydrogen peroxide has been shown to be ineffective for bacterial infections, but may be effective as a sporicide in cases of suspected clostridial infections or initial cleansing of dirty wounds (Baldry, 1983).

In cases of suspected bacterial infections, cultures should be taken after surface contaminants have been removed, and appropriate antibiotic therapy started. Non-viable and necrotic tissue should be surgically debrided and hemostasis achieved. In complicated or older wounds, the debridement process may have to be repeated over a period of days.

Treatment options of soft tissue wounds following this stage involve choices for topical medications, dressings and bandaging materials. The treatment regimen may be dependent upon the type of wound, anatomical location, species and age of the bird, available materials and preferences of the clinician. The purpose of the following section is to outline the various choices and indications for each.

Topical Medications

The use of topical antibiotics can be controversial, however judicious use in certain avian wounds may be beneficial. When using non-water soluble medications or ointments, one must cover the wound with dressing and bandaging material to prevent soiling the feathers, with the resultant loss of insulation. Bacitracin, neomycin and polymyxin are three antibiotics that may be used in combination topically against a wide spectrum of pathogenic bacteria (Swaim, Lee, 1987). One percent silver sulfadiazine (Silvadene™) in a water-soluble cream is also effective against most bacteria, and is indicated for topical treatment of thermal burns and other wounds (Perry, 1987). Nitrofurazone products have been shown to slow epithelialization in mammals (Eaglstein, Mertz, 1981) and are probably not indicated for use in birds. Gentamicin sulfate cream used in canine wounds has been shown to impair wound contraction (Lee, 1984) so likewise, should be avoided in birds, except when used as an ophthalmic preparation for corneal abrasions.

Topical use of live yeast-cell derivative (Preparation H™) (LYCD) or skin respiratory factor has been shown to stimulate epithelialization and collagen synthesis in human (Kaplan, 1984) and canine (Swaim, Lee, 1987) wounds. LYCD has been successfully used in raptors for granulating wounds over carpal joints and for granulating pododermatitis (bumblefoot) lesions (Degernes, et al, 1990). Empirical observations are that wounds treated with LYCD epithelialize faster than do similar wounds not treated with LYCD.

Other topical medications used for the treatment of bumblefoot include camphor spirits and tincture of benzoin, and dimethyl sulfoxide (DMSO) in combination with dexamethasone and an antibiotic (Degernes, et al, 1990; Redig, 1987).

Bandaging

Properly applied bandages will serve to provide an optimal environment for rapid epithelialization and wound contraction with the fewest complications. The functions of bandaging material are (Swaim, Wilhalf, 1985):

1) to apply pressure in order to reduce dead space, swelling, edema and hemorrhage

Acknowledgements

I gratefully acknowledge 3M Animal Care Products for their generous donation of Tegaderm™ dressings and Vetrap™ bandages for use at North Carolina State University College of Veterinary Medicine.

PRODUCTS MENTIONED IN TEXT

AErrane™, Anaquest, Madison, WI USA
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Kling™, Johnson & Johnson, New Brunswick, NJ USA
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INTERNATIONAL WILDLIFE REHABILITATION COUNCIL

Wildlife Care Catalog
Fall 1992

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Session X - How to Develop and Organize a Wildlife Rehabilitation Program by Sally Lewis This packet is designed to accompany the actual seminar. The information is for everyone who wants to start a wildlife rehabilitation program as well as for those who want to see their existing wildlife group get better organized. Topics include; starting up, finding an effective board of directors, managing a volunteer program, qualities in a good leader and in a good worker, fund-raising, public relations, working with difficult people, conflict resolution, preventing burnout, and more. **Price $7.50**		
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"Handle With Care" 1991 From the 1991 conference in Vancouver, BC, Canada. Papers include: How to Make Your Wildlife Education Programs More Effective by Marge Gibson; Home Care and Wildlife Rehabilitation by Marnie Allbritten; Squirrel Rehabilitation Project by Carol McIntyre; Handling and Restraint of Wildlife Species by Florina Tseng, DVM; Seal Pup Rehabilitation Program by Laurence Braun, DVM; Rehabilitation of Orphaned Sea Otter Pups by Julie Hymer; Rehabilitation of the Beaver and Muskrat by Cheryl Millham; Rehabilitation of the Coyote (*Canis latrans*) by Jeanne Wasserman; Study of 129 Coracoidal Traumas, Successes Without Intervention by Kit Chubb; Radial and/or Ulnar Fractures: In Support of No Support by Kit Chubb; Current Protocol for the Rehabilitation of Oil Affected Waterbirds by Jan White, DVM; Care of Coots, Rails, Plovers, and Sandpipers by Meryl Faulkner; Aspergillosis in a Rufous Hummingbird Colony by Chris Harvey-Clark, DVM; Avian Hematology: An Overview of Specimen Processing, Sample Evaluation, and Interpretation by Victoria Joseph, DVM; Basic Public Speaking for the Rehabber by Alyssa A. Ottomeier; Raising More money in Hard Times by Bill Marshall; Hand-Rearing Techniques for Raptors by Claire H. Hager and Walter C. Crawford, Jr.; Rehabilitation of Orphaned Raptors: The Fostering Alternative by Brian Woodbridge; An Investigation Into the Health Status of Bald Eagles of British Columbia by Ken Langelier, DVM. **Price $20.00**		

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October 14-17, 1993

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Each year at our annual conference IWRC invites wildlife rehabilitators and professionals working in associated fields to make presentations which will assist those working in our field. We encourage papers that describe new and current methods in wildlife rehabilitation, natural history, management of medical problems (e.g., trauma, pesticides, frostbite, parasite control, nutrition-related disorders), diseases that occur in wildlife, health and safety issues including zoonotic diseases, post-release studies, and papers discussing current organizational methods (administration, fundraising, volunteer/employee management, computerized records managment, etc.). Papers on raptorial species are of special interest at this conference.

Proposals may be for paper presentations, workshops, round table discussion sessions, or poster sessions. Proposal applications include your agreement to provide a complete manuscript by the deadline.

Proposals for the 1993 Conference ***must*** *reach the IWRC office postmarked no later than February 22, 1993.*

Policies and Procedures for Presenters

Speakers' Compensation

Upon acceptance of the proposal, the paper, workshop and roundtable presenters are entitled to receive full non-transferable complimentary registration for the Main Conference Program. (Skills seminars, field trips, banquets, etc. are *not* part of the Main Conference Program.)

Poster presenters not otherwise scheduled on the program are entitled to 50% discount off the Main Conference registration fee.

Individual key note speakers may be granted travel expenses and/or hotel lodging depending on their location in relation to the conference.

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Manuscripts are submitted for publication in the copyrighted IWRC Conference Proceedings. When previously published and/or copyrighted material is submitted, it must be **clearly stated**. The ***author is responsible*** for securing permission to publish in the proceedings and documentation should be submitted with the manuscript.

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Lead roundtable or lead workshop speakers are expected to submit short summary papers (1-5 pages) that discuss their topics. Because registrants sign-up for workshops in advance, workshops are *not cancelled once the brochure is mailed.* Workshop leaders are responsible to find a replacement if they choose to cancel after registration has begun.

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Wednesday-Thursday October 13-14, 1993	Skills Seminars
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Deadlines

January 22, 1993—Proposal Applications due in the IWRC office.
February 28, 1993—Telephone notification to applicants of acceptance.
May 1993—Written confirmation of papers selected to presenters with Proceedings and Poster guidelines.
September 1, 1993—Presenter information and AV requests due.
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Information:

Questions regarding presentations should be directed to Mary Reynolds at the IWRC office. The office can be reached between 9 a.m. and 4 p.m. weekdays at (707) 864-1761.

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Please review the introduction and presenters "Policies and Procedures" before completing this proposal application.

All proposals must be submitted on this form, preferably typewritten. Only one proposal per form is acceptable. Applicants are encouraged to duplicate the form to submit multiple topics. No supplemental materials need come with the proposal.

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Above is my presentation proposal for the 1993 IWRC Annual Conference. I hereby acknowledge and agree to IWRC policies, procedures, and deadlines for presentations.

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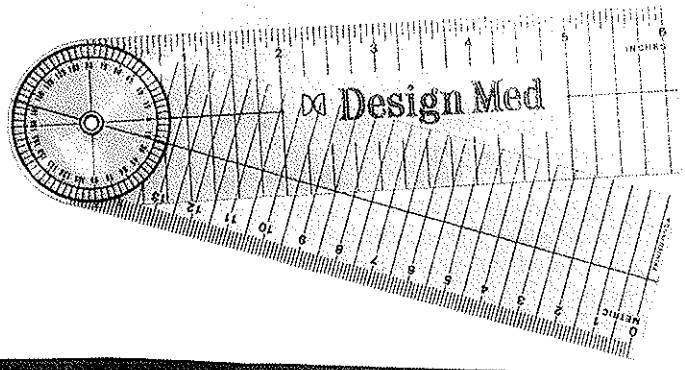
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Cottontail Feeding Problems: PART I: *"How To Bribe A Bunny"*

Emmy Reese
8806 Four Seasons Ct.
Alexandria, VA 22309
Wildlife Rescue League of No. Virginia

Introduction

Those who rehabilitate Cottontails can expect to run into a variety of feeding problems which range from a refusal to nurse to a reluctance to wean, with a susceptibility to diarrhea at all stages in the middle. Some problems are inherent and some are created in the rehabilitation process. Most are solvable or avoidable and it often comes down to who can be more patient and stubborn, you or the rabbit!

Unless Eastern Cottontails are over 90 g., or self-feeding and producing steady weight gains, they will need supplementary formula feeding. KMR/Multi-Milk™ and Esbilac/Multi-Milk™ are the formulas now most widely used. (Marcum, 1992.) Bactrim™, if used as a diarrhea *preventative* on intake for 5 to 7 days B.I.D, duplicates the milk-induced antimicrobial condition found in suckling rabbits (Brooks, 1986). Its use permits a rapid, but gradual, break-in from a hydrating solution to full strength formula within 24 hours (Hiss, 1990). Probiotic ™ (Pet-Ag's Bene-bact™ for mammals, or Probios™ oral gel for Ruminants) is used when the Bactrim™ has been discontinued or when solids are being introduced and until release to establish and maintain a beneficial gut flora.

There are several swallowing behaviors used to ingest the formula, including an infrequent, very rapid, "nursing reflex" which may or may not occur. Most typically they appear to chew the nipple, swallowing the formula as it is squeezed out. The important thing to remember is that *you are doing it right if it is swallowed!*

You Know There Is A Feeding Problem When:

1.They appear very unresponsive, only swallowing occasionally.
2. They respond only by repeatedly rejecting the (inserted) nipple.
3. Though appearing to feed they let most of it run out of their mouths until there is as much formula *on* the bunny as in it. Remember, it always takes *patience*! But it should *not* take two hours and half a box of tissues to feed a litter of 4 or waiting until a newborn falls asleep and begins to nurse as it dreams.

Feeding Equipment:

Both the small sized Catac™ nipple and the larger pointed version of the Pet nurser nipple have been successfully used. Both nipples are used on feeding syringes. The slit in the Catac™ or the hole in the nurser must be fairly large and gener-



ous. If you hold a Cottontail's pet nurser nipple up to the light you should be able to see daylight through the other end! When John or Jane Q Public tries unsuccessfully to feed them and tells you they doubt they got more than a drop or two, it is usually because they made the hole with a sewing needle. Fortunately aspiration resulting in pneumonia is not a problem in this species. If aspiration occurs or the milk wicks up the groove in the upper lip to the nose, blot dry with an absorbent tissue. Do not expect bunnies to reach out and latch on to the nipple the way little squirrels do; it will always need to be inserted. Gently hook the pet nurser under the side of the top lip and then move it forward. The Catac™ is easier to slide in except for an occasional first feeding of a new bunny with its teeth clamped shut. (Pinch the nipple above the tip and hook it in.)

Make sure *the formula is warm and freshly stirred* just before loading the syringe. They respond positively to warm formula and lose interest as it cools. A good arrangement is to keep the formula for the feeding in a 1/2 cup Rubbermaid™ container in a wide mouth (10 oz narrow neck food jar) thermos of hot tap water. Place the lid on top to minimize heat loss and evaporation. Have a mug of hot tap water on an electric mug warmer nearby. Remove the lid, stir the formula with a mini whisk (to put the fat particles back into suspension), load the syringe, (replace the lid), put the nipple on, then put it in the mug. Repeat this procedure just before picking up each bunny to weigh, stimulate, medicate and feed it. If a feeding is going slowly the syringe can be instantly rewarmed by putting it back in the mug for a few seconds, and a positive response usually follows. Placing the formula container in the mug results in overheating, but the temperature of the formula in the syringe will be just right.

If very young (eyes-closed) infants find full strength KMR™/Multi-Milk™ formula too thick to swallow, they may seem passive and unresponsive. Their formula will need to be *slightly* diluted by adding a few more drops of fluid to the formula *after* it has been warmed. When the unmistakable "nursing reflex" response is triggered it feels like a rapid fire suction pump. Otherwise you should feel newborns swallowing the formula, even if it's only a drop at a time. An older (eyes-opened), "wilder" bunny may vigorously reject the nipple until it tastes what it likes. Depending on these or other circumstances there can be good reason for you to be concerned that they are not getting enough.

Rabbits are well known for having taste preferences which play an active role in what Cottontails are willing to be fed. If they like it, they swallow it. If they don't, they won't! Being aware of this can help the rehabilitator take appropriate steps to overcome any normal resistance. There can be variations in "palatability" in the manufacturing of the milk replacers used.* Other refusals are due to the age or condition of the bunny. Tube feeding has its own problems, and not everyone is equipped to do it, so adjusting the flavor or consistency of the formula is worth trying first! Since rabbits are known to have both a "sweet tooth" and a "salt tooth," there are several options available.

1. Add a little mashed banana (minus seeds and fibers) to the formula for flavor. Once feeding is well established and weight gains are good, decrease and withdraw the banana. (Approximately 1/4 to 1/2 tsp banana per 7 tsp of formula.)

2. Use a hydrating solution to mix the formula. My experience has been that young rabbits always nurse well during the early rehydration period when milk replacers are gradually being added to the hydration solution. They may stop liking it when the solution has been totally made with water if a particular batch of milk replacer is not to their liking. They will readily accept a formula made with 1/2 Entrolyte™ (Beecham Laboratories, Bristol, TN), 1/2 tap water. When beginning to wean replace the hydrating solution with water. (Entrolyte can be frozen in small amounts and should be discarded 24 hours after thawing.)

3. Milk replacers + hydrating solution + banana = "BANANA MILK SHAKE!" This is used when there are one or more suspected other problems (e.g., cat caught, refusal to eat), and it is vital that feeding no longer be delayed. Once good weight gains are established you can begin decreasing the banana and gradually replace the hydrating solution with tap water.

4. Pediatric Stat™ will stimulate a feeding response when all else fails for the injured or ill bunny. This is a "highly concentrated nutrient containing electrolytes - maximal nutrient value in minimal liquid volume" (PRN Pharmaceutical, Inc. Pensacola, Fl 32504, obtainable through veterinarians). It is extremely rich and should be used with caution. For newborns, begin with 1/2 drop T.I.D. for one to one and a half days. For older eyes-closed babies begin with 1 drop at each feeding, for one to one and a half days. Increase the dosage up to 5 drops for large weaned juveniles. Discontinue as soon as normal feeding is established.

5. Hydration fluid and "Rice Milk" should be used to replace milk based formulas if diarrhea (that is visible on the rabbit)** is severe. To make "Rice Milk": Boil a handful of rice for an hour or

more in enough water to keep it soupy, adding more if the water gets low; puree with a little rice to thicken if you need it sooner. The congealing liquid left is "Rice milk." Use one part hydration fluid to one part "Rice Milk." If your bunny isn't willing to be fed as much as you think it needs of the hydration solution/Rice Milk , add one drop of Pediatric Stat™, or a little mashed banana, to the total amount mixed. *However, it is essential to not over feed!* (Overfeeding causes diarrhea!) Cut back a full cubic centimeter (cc) on the amount of regular formula fed before the diarrhea appeared, *checking the abdomen for fullness as you feed.*

Remove all other foods from the cage, but leave rice mashed with banana in a shallow jar lid for self feeders. (Add a little hydration solution if it goes untouched).Wait one full day and/or until normal droppings appear and then begin gradually incorporating the milk replacers back into the formula. (Use hydration solution in place of tap water during the transition back to full strength formula.) The advantage of using Rice Milk, or rice and banana, instead of hydration solution alone is that all nutrition has not been totally withdrawn for two or more days, and there will be droppings produced by which to gauge its progress.

It is normal for bunnies whose eyes are opening to start eating solids slowly in very small amounts. In five days or by the end of that week their appetites pick up. Eyes-opened bunnies, who are old enough to be eating and *need* solids but are totally refusing to touch them to for more than two days, should be checked for injuries or abnormalities. They may have a broken jaw, obstruction or wound and should be seen by a veterinarian. Bunnies that are thin and drool may have malocclusion.

Just remember "if they really like it , they will swallow it in a reasonable amount of time, with a minimal clean up! If they don't, they won't!" By the time you get the difficult ones feeding well, they refuse to wean. It's all part of being a Cottontail!

*Such variations can sometimes be extreme enough to constitute an abrupt change of diet. When nearing the end of one container it is a good safeguard to gradually mix in some from the next newly opened one, especially if the batch number and pull dates differ.

**Not to be confused with the 2 or 3 dark "bird droppings" found on the flooring that are typical at the beginning of stress induced enteritis at weaning and pre-release. (See Part II in Vol. 15, No. 4.)

*** *** ***

The author uses Entrolyte™ for oral rehydration on intake, and a formula of: 1 part powdered KMR™/ 1.5 parts Multi-Milk™/ 2 parts water. Pediatric Bactrim™ (Hiss, 1990) is given the first 5 to 7 days in suckling young to prevent diarrhea and permit a rapid break-in period when milk replacers are increased by 1/4 or 1/3 to full strength in 24 hours. Probios Oral Gel™ for Ruminants, is given S.I.D. at the introduction of solids, and as needed or until release. When eyes begin to open grass, clover, dandelions, plantains, alfalfa, and water are provided. Apple, rolled (Quaker™) oats, commercial rabbit pellets, and a salt lick are introduced soon after. Fresh wild greens are gathered every 2 or 3 days along weedy, unsprayed wild roadsides and compose the bulk of the diet provided. Custom designed, low, draped, cages are kept in a room used only for Cottontail rehabilitation. Release weights average 150 grams, but developmental readiness (e.g., digging out, defending territory) is the determining factor.

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Acknowledgments: Thanks to Debbie Koth, Dottie Frentzel.

Continued from Page 8 Wound Management

GLOSSARY

***aseptically**—pertaining to using procedures to prevent contamination*
***carpal**—pertaining to the carpus, or wrist*
***cere**—the firm fleshly tissue overlaying the upper beak*
***clostridial**—pertaining to a genus of bacteria of family Bacillaceae, common in soil and the intestinal tract of man and animals; frequently found in wound infections*
***collagen**—a fibrous insoluble protein found in connective tissue (skin, bone, ligaments, cartilage)*
***corneal**—pertaining to the cornea: the clear, transparent anterior portion of the fibrous coat of the eye*
***dead space**—the space remain in tissues as a result of failure of proper closure of surgical or other wounds permitting the accumulation of blood or serum.*
***debride**—to remove foreign material and/or dead tissue from a wound*
***desiccation**—the process of drying up*
***distal**— areas away from the center or trunk of the body*
***edema**—local or generalized condition in which body tissues contain an excessive amount of tissue fluid*
***epithelium**—the layer of cells forming the skin*
***erythema**—a spot showing diffused redness on the skin*
***exudate**—accumulation of fluid in a cavity, or matter that penetrates through vessel walls into adjoining tissue, or the production of pus or serum*
***fibroblast**—cell or corpuscle from which connective tissue is developed*

Continued on page 12

Simple Things That Make A Difference:

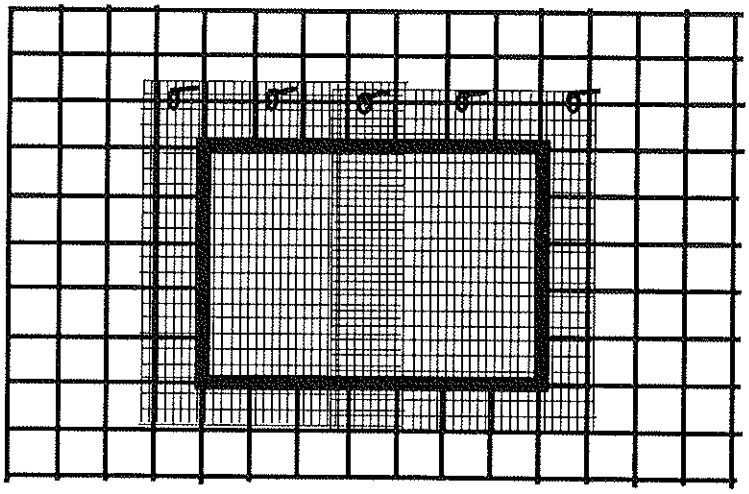
Screen Doors for Wild Bird Caging

Donna Burt
Stanislaus Wildlife Care Center
P.O. Box 1202
Modesto, CA 95353

One of the biggest time wasters in a wildlife rehabilitation center, and a source of stress for wildlife in care, is chasing an escaped finch all over the building with a net. The majority of escapes can be prevented by putting a screen door on wire cages.

Using twist ties or plastic cable ties, two overlapping sheets of plastic window screening can be hung inside the door of wire cages. When the door is opened the birds perceive the opening as a solid wall and do not try to escape. The screen is flexible and the center overlap gives complete access to the cage for feeding or cleaning.

Overlapping window screening blocking cage door.



Continued from page 11

fistulous tracts—*pertaining to abnormal tubelike passages from a normal cavity or tube to a free surface or to another cavity*
fluorescein dye—*red dye used chiefly for diagnostic purposes and for detecting foreign bodies in or lesions of the cornea of the eye; made from fluorescein sodium*
friable—*easily broken or pulverized*
granulation—*fleshy projections formed on the surface of a gaping wound;with new capillaries, supported by cells that will later become fibrous scar tissue; bring a rich blood supply to the healing surface*
hemodynamics—*study of the forces involved in circulating blood through the body*
hemorrhage—*abnormal discharge of blood*
hemostasis—*arrest of bleeding or of circulation*
heterophil—*an antibody reacting with other than the specific antigen*
hydrocolloid—*a mixture holding particles in suspension, in which the liquid is water*
hydrophilic—*pertaining to being attracted to water*
keel—*the vertical directed surface of the bird's sternum*
keratinization—*the process of forming keratin, tough protein substance in hair, nails, & horny tissue*
leukocytes—*white blood cells*
lymphocytes--*white blood cells without cytoplasmic granules; lymph cells, important in making antibodies*
maceration—*process of softening a solid by steeping in a fluid*
macrophages—*cells having the ability to ingest and digest bacteria and particulate substances and to store colloidal substances*
microfibrils—*very small fibers, often a component of a cell or of a fiber*
monocytes—*large mononuclear (having one nucleus) white blood cells, having more protoplasm than lymphocytes*
mononuclear cells—*cells having one nucleus*
multinucleated giant cells—*large cells with several nuclei, found in red marrow and spleen, also in healing tissues and around foreign bodies*
necrotic—*related to death of a portion of tissue*
occlusive dressing—*dressing that seals a wound completely to prevent infection from without & to prevent moisture from within from escaping*
phagocytosis—*ingestion and digestion of bacteria and particles by phagocytes*
plantar surface—*sole of the foot*
plasma cells—*the fluid portion of the blood in which corpuscles are suspended*
pododermatitis—*inflammation of the skin of the foot*
vasoconstriction—*constriction or narrowing of the caliber of blood vessels*
vasodilation—*increase in the caliber of blood vessels*
virulence—*the potential of a microorganism to cause disease*

Wire Cage Draining Tray for Avian Housing

Donna Burt
Stanislaus Wildlife Care Center
P.O. Box 1202
Modesto, CA 95353

Introduction

To prevent the transmission of internal parasites and other diseases, it is important to separate birds from their feces. In our busy shelter during the spring this is next to impossible. Changing papers at each feeding for every cage would require more volunteers than we have. At times it would require so many people working that there wouldn't be room for them to work. Using cages with wire bottoms supported above newspaper works until a bird decides to flap its wings and sends all that feather dust and dried feces floating around the room. By supporting wire bottom cages above draining trays, the work load is reduced and dried feces and feather dust are eliminated.

The Draining Tray

Draining trays are simply slanted trays with a drain in the far back corner. The wire bottom cages are supported on Duplos™ to keep their bottoms about two inches above the tray surface. After each feeding a kitchen sprayer is used to spray the wire bottom of the cage, change the water in the water dish and rinse down the tray. Because the tray is usually damp, feather dust stays put until it is washed down the drain. The bird room is much less dusty and volunteers have less problem with dust allergies. Fecal matter is also washed off the wires, out of the water dish and down the drain, thus separating the birds from their feces.

The birds do tend to get misted occasionally but the more often they get a bit wet the more waterproof they become. Any diet that spills on the birds can be washed off. We use a squirt bottle filled with water and just aim it at the food on the bird. They don't like being squirted but when the diet is fresh it rinses off without getting the feathers dirty or the bird wet.

The food is usually presented in hanging feeders. This makes it harder for the birds to defecate in their food and keeps it from being squirted when the cage is sprayed. Water is put in flat bowls on the bottom of the cage where they can be rinsed with each feeding.

Plastic sheets are hung between the cages with clothes pins to separate birds and help prevent the spread of some contagious diseases which are through spread with direct contact. This stops the birds from having any direct contact with their neighbors even though cages are packed into the trays. The dividing sheets can be sprayed along with the back of the draining tray as needed to remove spattered food.

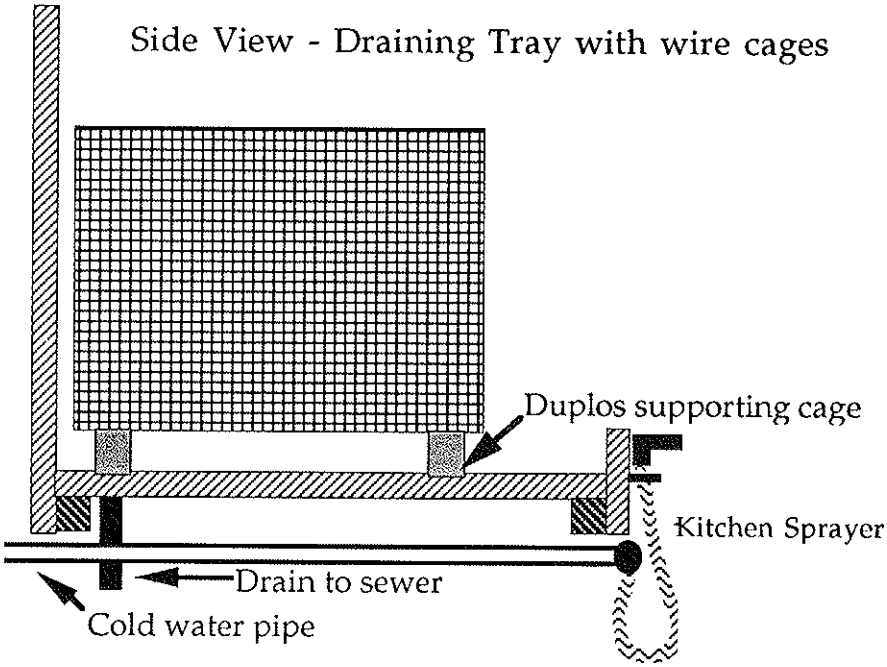
If left uncleaned for about two weeks the trays will develop a yellow, sour smelling, slimy coating that is probably bacterial growth. To prevent this, the cages are lifted off the trays and the trays washed with soap every five days. * Following the washing the trays are rinsed with disinfectant. The disinfectant should be left on for at least 10 minutes to give it time to work, then rinsed well and sun dried if possible.

The cages should be supported about 2 inches above the trays to separate the birds from their droppings and to provide good drainage. Duplos™ seem to work best. They are made of hard plastic so fecal material washes off easily. They can be disinfected with any cold disinfectant solution and then can be snapped together to make different sized supports.

When arranging the cages it is important to leave enough space to reach the drain because feathers, millet stems and meal worms tend to collect there and stop the tray from draining. Wet kibbles are also very effective at clogging the drains, so to alleviate that problem, we grind the dog food in a blender and feed it as a dry meal. The

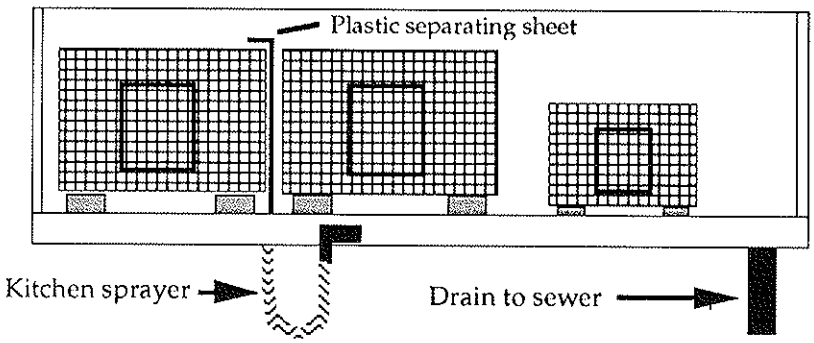
** Editors Note: The author is living in a desert. Those using this set-up in a humid climate may need to increase ventilation to decrease the amount of moisture in the environment which may facilitate the growth of bacteria and fungus.*

Side View - Draining Tray with wire cages



Change cage water and spray tray after each feeding.

Front view - Draining Tray with wire cages



birds eat it and it does not sour in warm weather.

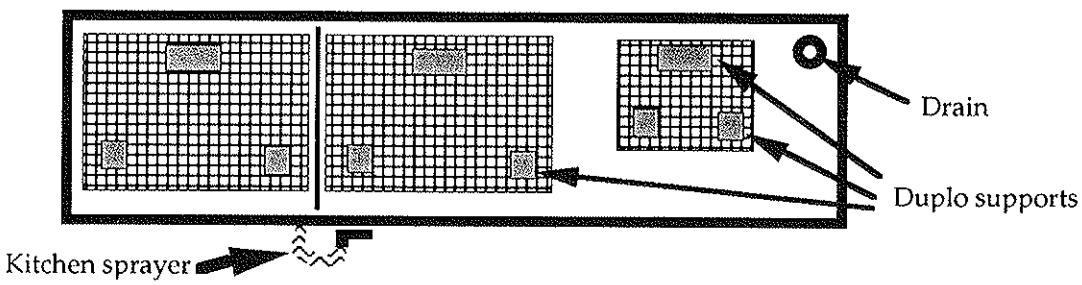
The trays are made of 1/2" exterior glue plywood and 1" x 1" Douglas fir strips. They are fastened with a 30 year gluing caulk and 3d nails. They are painted with two or three coats of heavy duty exterior enamel. The drains are standard 2" tub drains. The plywood was chiseled out to let the drain sit flush with the plywood. The standard rubber gasket was not used because that would require the removal of too much plywood, instead the drain was installed with silicone sealer to prevent leakage.

A feature that we plan to add next year is the installation of aluminum U channel over the front edge of the tray. The wood tends to get abused when heavy cages are lifted in and out of the trays.

The author does not believe that it is necessary or desirable to fiberglass these trays. Instead an annual or biannual sanding and painting during the off season will keep them working for years. If they are fiberglassed the scratches which will develop with usage will make them harder and harder to clean making it necessary to sand and paint them anyway.

Editors Note: Duplos™ supports are large Lego toy blocks made by Lego Sysems, Inc. 555 P.O. Box 1600, Enfield, CT 06083-1600.

Top view - Showing Placement of Supports and Cages



Announcements

Information Needed for Normals Database

The Wildlife Clinic of Tufts University School of Veterinary Medicine is compiling a database on the health parameters of native wildlife species. We currently have partial information on over 175 species, but need your help. Although natural history information is readily available, we are have having difficulty in finding information in the scientific literature on the hematology and clinical chemistry of many native mammals, birds and reptiles.

If you have such data in your files, would you consider sharing it with the broader wildlife community? Even if you only have laboratory values for one individual of one species, this constitutes valuable information. We are also interested in finding out about any literature on the subject with which you might be familiar. We will compile all available information and make it widely available. For their participation, anyone contributing data will receive full attribution and a copy of the database.

Once our database is a bit more complete, we will make it available to veterinarians, wildlife rehabilitators and wildlife biologists by posting it on electronic networks such as Econet, and making available both hard copy and diskette versions at our cost.

Data can be contributed as hard copy, or on 3 1/2 inch diskettes in any standard work processing format or as ASCII files. Please send data to:

Mark Pokras, DVM
Tufts Wildlife Clinic
200 Westboro Rd.
N. Grafton, MA 01536-1895
Telephone: (508) 839-7918
Fax: (508) 839-7930

Editors Note: Mark, you will like the next issue of the Wildlife Journal. We are publishing several review articles that will feature current normal hematology and clinical pathology for seabirds and raptors!

Used Rat Cages For Sale

The bottoms are 13 1/2" x 11 1/2" x 7" made of opaque plastic with a mesh net top. The top fits tightly and dips to hold food. A glass water jar comes with each cage. Price $6.00 plus postage and handling. For information call Jim Fitzpatrick at Carpenter Nature Center (612) 437-4359 (CST).

Members' Forum

Starting with our next issue of the *Wildlife Journal*, we will include a question and answer column. This column will be an opportunity to learn what is on your mind and present some direct answers to issues that are of most concern to you. We encourage all members to submit questions on animal care, ethics or whatever pertains to wildlife rehabilitation.

While all signed letters will be answered, only a limited number will fit our column space. All letters must be signed and include a self-addressed, stamped envelope for response.

Letters will be published anonymously if requested. If you need a quick reply, please include your phone number and we will call you collect. Letters are to be sent to the IWRC office c/o Members' Forum Editor, 4437 Central Place, Suite B-4, Suisun, CA 94585. We are all excited about the addition of our new column. Let's hear from you!

Members' Forum Editor
Marge Gibson

Jobline Information

We keep on file current job announcements. If you have a job or are looking for one, don't forget to call us at IWRC (707) 864-1761 from 9 am to 4 pm (PST). When we have enough jobs at one time, we do put out a job line. We will list internships as well.

Membership Directory is Completed

Thanks to the efforts of Rose Green, we have completed the typesetting of the 1992-1993 membership directory. We are getting cost estimates and will send it off to be printed as soon as our cash flow allows. We are also printing more than four *Wildlife Journals* per year and must pay for everything in sequence. We hope to get them out to you between this journal and the next one! Thanks Rose, for all your hard work!

Book Review

Financial Management In Nonprofit Organizations, Second Edition

Richard F. Wacht,
Georgia State University Business Press
College of Business Administration
Atlanta, Georgia 30303-3093
Price $45.00, 545 pages, 1991

Financial Management in Nonprofit Organizations by Richard F. Wacht is a comprehensive guide to each aspect of the treasurer's or chief financial officer's duties. An executive director of a small, nonprofit wildlife rehabilitation organization may be pleased at the prospect of discovering a comprehensive financial guide, however, not necessarily this book.

This is a textbook written for use in college level or the continuing education classroom or as a research source, and definitely not for self-study by the non-financially initiated. The premise for this work is that while there are a great many textbooks on the general subject of organizational financial management, there are relatively few that deal specifically with nonprofit organizations and their individual needs, and this, the author tells us, is the first such work. The second edition was published in response to readers' opinions that it would be more useful for the text to focus on smaller organizations, those with annual budgets of around ten to one hundred thousand dollars. The book contains practical applications of each subject, "computer assists," end-of-chapter questions, problems, where applicable, and bibliographies. A study guide is also available.

This is a truly comprehensive guide. It covers not only every aspect of financial management but addresses the different phases of an organization's existence: the start-up period, ongoing operations and the management of an organization in the throes of distress. The author is **emphatic** about the need for a text directed to nonprofits because of the divergent goals of for-profits and nonprofits. The goal of the nonprofit, he tells us, is to avoid insolvency or illiquidity and not to maximize owner's wealth, since there are no owners.

Since the book is all-encompassing, it is better suited to a **non**-financially experienced manager or as a reference source for the technically proficient financial officer. Individual textbooks exist which would cover any one chapter's subject for those who need such detail. On the other hand, the wildlife rehabilitator who wishes to gain the minimum knowledge to manage the finances of their operation would be overwhelmed by the sophistication of the terminology and concepts used. Introductory accounting is usually a two-semester course but in this book, it is primarily covered in one chapter.

The bulk of the information contained in the book is covered in any of the hundreds of other financial management texts that do not specifically deal with nonprofits. The author's premise that for-profits and nonprofits have incongruent goals is weak. In essence the goal of the financial manager is to most efficiently utilize the funds (or volunteered resources) provided, whether by owners or donors. A student without an introductory course in finance would be lost using this text. A student with such background (and who hasn't sold the textbook), wouldn't get enough marginal benefit to justify the cost. Just who the targeted purchaser is isn't clear. The same book that finds it necessary to define "accounts receivable" in its glossary gives sophisticated mathematical models for cash balance management.

If you decided you needed one book to which to refer for matters concerning the financial management of your nonprofit organization and you did not already have a textbook on financial management, we would recommend this book as the one. But, we would warn you that much of the book would be either unfathomable to those without a financial background, or too duplicative for those with such a background. Furthermore, despite the perceived need for this second edition, the book often deals with subjects unnecessarily complicated for the typical wildlife rehabilitation organization, guessing that the typical one is too small, for example, to have to worry about managing debt capital or investing in commercial paper.

Review submitted by:

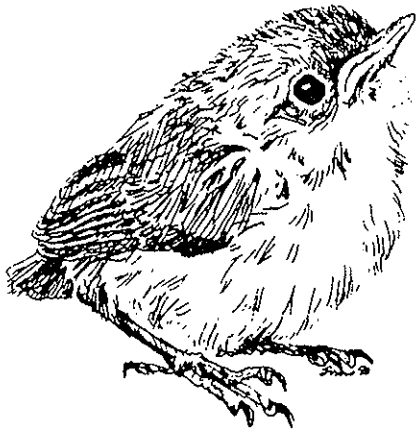
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