

Pet Farm, Inc. and Last Chance Farm, Miami FL

PSITTACINE PEDIATRICS

Susan L. Clubb, DVM and Kevin J. Clubb, Aviculturist

SUMMARY

Psittacine pediatrics requires the practice of good husbandry, an understanding of neonatal development, and a knowledge of what problems can occur with chicks both in the nest and the nursery. Fostering, incubation and handfeeding are used to increase production in captive collections. Altricial chicks need environmental temperature control as well as handfeeding for 6 to 16 weeks. Cleanliness, proper diet and handling techniques are vital to success. The most common infectious problems are bacterial and fungal infections. Viral diseases are uncommon but papovavirus infection can be a problem in handfeeding nurseries. Many developmental problems can be corrected easily if detected early.

With advances in the art and science of aviculture, an increased emphasis is being placed upon the proper care of neonates and an understanding of the disorders which are often encountered both in the nest and in the handfeeding nursery. As in any area of aviculture, the field of pediatrics is plagued by the inaccuracies of folklore. Husbandry techniques for nestling psittacines are advancing and becoming more practical and less of a burden to the human foster parent.

In this paper we will outline one method which has been used successfully for handraising thousands of psittacine chicks, a large percentage from hatching. This method was developed in Southern Florida, in the United States, and therefore the emphasis is placed on outdoors breeding. Problems peculiar to indoor breeding facilities will not be covered and some problems encountered in an outdoor breeding facility will not be pertinent to European indoor breeding facilities.

While this method is successful, it is not the only way and is not magical. Every aviculturist must develop techniques which fit his/her schedule, facilities, species and resources. Problems found in parent raised nestlings will also be addressed.

PROBLEMS ENCOUNTERED IN PARENT RAISED NESTLINGS

Psittacine parents, like any animal, are variable in their ability to successfully raise young, especially when inexperienced. Chicks or eggs may be abandoned or damaged by the adults necessitating artificial incubation and/or handfeeding.

Abandonment or abuse may occur if the hen lays another clutch of eggs before fledging of the chicks. This problem is most common in prolific, domesticated species such as cockatiels and lovebirds. Chicks may be plucked or pecked in an attempt to encourage them to leave the nest.

Disturbance by visitors, wild animals, or other birds (if colony breeding) may result in abandonment or abuse. This is especially true when dealing with inexperienced or nervous parents. Visitors should be limited during breeding season. Nest boxes should be checked on a regular basis to acustom birds to human activity around the nest. Addition of shavings, or cleaning the nest box during nesting can result in abandonment. Boxes should be cleaned prior to nesting. Pulling (removing from the nest for handrearing) part of a clutch may result in abandonment of the remaining chicks or eggs.

Some parents habitually break eggs, kill chicks at hatching, or mutilate chicks by plucking and biting toes. If pairs are repeatedly abusive the chicks must be fostered or handreared.

A nest box that is too hot, cold, wet, or dirty may result in abandonment. The presence of pests such as snakes, rats, mice or ants may also drive parents away from nestlings.

Asynchronous hatching and the resultant age disparity in siblings may necessitate pulling nestlings or eggs. Most psittacines lay one egg every two days. Many birds start incubation with the first or second egg. Some species, especially macaws, may lay the last egg several days later. After hatching of the first chick or chicks, younger eggs may not be well incubated or may be contaminated with fecal matter by older chicks. Younger birds may not be able to compete for parents attention and not be fed enough. Older chicks may trample hatchlings.

Missing eggs and/or chicks may be attributable to poor parenting or pests. Egg eating by parents may reflect dietary deficiency of calcium or protein, or bad habits. If egg shells are too thin parents may eat or discard broken eggs. Eggs and/or chicks may be eaten by snakes or rodents.

Fostering

Fostering is a practical alternative to handraising, especially by the inexperienced aviculturist. Fostering under a different species is practical and can be quite useful with reliable small species (conures, budgies) being used to foster larger species for the first few days or weeks.

For best results eggs, rather than hatchlings, should be placed in the nest. Acceptance is better and the chance of spreading disease is reduced. Fostering of eggs or babies should be timed to coincide with the hatching time of foster parent's eggs. Fostering of chicks,

especially of different species, or chicks which are too large, can result in abandonment. Some exceptional parents may accept chicks at any age or of any species. Eggs should not be added to a nest in excess of a normal clutch size.

Inexperienced or habitually bad parents may not provide adequate food for chicks, especially hatchlings. Chicks may be supplemented in the nest if parents don't feed adequately. If parents habitually underfeed, the chicks must be pulled.

Overfeeding is rarely a problem. Parents fill up the crop more than the handfeeder and may keep the crop full at all times. Feeding foreign material rarely occurs if adequate supplies of soft foods are available to feed chicks. Chicks in the nest seem to be able to tolerate more solid food at a younger age than handled chicks.

Injuries in the nest

Nestlings may be injured if frightened parents jump into the nest. Broken legs, lacerations or other injuries may occur. Proper nest box design and limiting visitors will reduce this problem.

Spraddle legs may occur if nest material is not deep enough and chicks must sit on a hard floor, or if parents sit too tight. Deviations from the hip or stifle are difficult, if not impossible, to repair after calcification of bones occurs. If the deviation is discovered prior to calcification of the bones, the chick may be propped up in deep litter or the legs may be taped together for support. This procedure is also successful in chicks with hatching abnormalities, but for best results, corrections should be made in the first one to two weeks of life. Such a chick must be pulled and handled.

Metabolic bone disease may result in fractures, spinal deformities or spraddle leg. This may be due to calcium deficiency, calcium/phosphorus imbalance or vitamin D3 deficiency. This is most common in African grey parrots. Supplements of oral or parenteral calcium and vitamin D3 at the first signs of fracture or deformity as well as providing support may avert serious deformation.

Bite wounds may be inflicted by siblings in feeding frenzies. These occur most commonly on the beak and the perilingual tissues. Perilingual injuries are prone to infection especially by *Candida*. Bite wounds on the crop may result in fistula formation which may require surgical correction. Bite wounds on the beak may result in scarring, delamination or wrinkling of the beak surface. These injuries are more common in handled chicks.

Injuries at fledging may occur in birds making their first attempts at flight. Injuries occur more often in flights than in breeding cages. Concussions are common when birds fly into walls or wire. They may be found on the floor dazed or exhibiting neurological signs (especially cockatiels). These birds should be placed in a cool environment to hasten vasoconstriction. Corticosteroids may be helpful. Fledglings, especially cockatiels, have hooks on the end of the claws which may catch on wire resulting in leg injuries. These hooks should be clipped prior to fledging. Chicks which are unable to get back into the box may get wet, chilled or be abandoned. Skin over the keel bone may be injured due to crashing to the floor.

Nest materials may also present a hazard to the nestling. Nest material may be eaten resulting in impaction or slow gut transit time. This is uncommon in parent raised babies. Fibers in nest material may entwine digits and result in swelling and eventual sloughing of the digit if not discovered in time for removal of the fiber. Fibers should be carefully teased out with a small hook and scissors. Bandaging with dimethylsulfoxide (DMSO) and nitrofurazone ointment will speed recovery of damaged digits. Constriction of the digits resembling fiber constriction, has been reported in *Electus* parrots and Macaws especially those raised in dry areas in California. The etiology of this disorder is unknown but may be related to low environmental humidity. If detected early this situation can be relieved by making a longitudinal, full skin thickness incision, through the constriction on the lateral and medial sides of affected toes. In advanced cases amputation of the toe at the point of constriction is indicated.

Death in the nest

Environmental hazards may result in death of nestlings. If the nest is too hot the nestlings may be abandoned or die of heat prostration. Fans or sprinklers and the provision of shade, may help to bring down the environmental temperatures. Cold is also a hazard especially for birds which lay early in the season, during a warm spell followed by cold weather. Insulation of nest boxes or the use of heat lamps may help increase box temperatures. Birds should be discouraged from breeding in very cold weather as egg binding is also more common in cold weather. Nest boxes must be constructed so that they will not flood or leak in heavy rains.

Bacterial infections in parents, especially pharyngeal and crop infections, may be transmitted to young. Diagnosis of problems in the young will allow treatment of parents prior to the next breeding. Candidiasis is a very common problem in chicks which may often be traced to the parents or the soft foods.

Viral infections are uncommon if new additions to the flock are quarantined. The exception to this is papovavirus infections in which the asymptomatic adult bird passes the virus to the nestling resulting in an acute fatal illness. Pacheco's parrot disease or psittacine herpes virus may also be shed when carrier birds begin nesting.

Chlamydia is frequently found in psittacine breeding collections especially in cockatiels. Any investigation of nestling mortality should include screening for Chlamydia. Giardiasis can result in heavy mortality in nestling cockatiels and budgerigars.

Pest and parasite control

Mites and roaches can usually be controlled by the addition of 5% carbamate dust to the nest material with no harm to the chicks or adults. Ants are more difficult to control but may respond to 10% carbamate dust.

Rodents frequently inhabit bird breeding areas due to the easy access to feeds. Elimination of nesting places and trapping will help limit the populations. Poisons must be used carefully to prevent accidental exposure of birds to poisons. Suspended cages limit rodent access.

Parasites are more common in birds housed in flights than in suspended cages, especially flights with dirt floors. Most internal parasites are more common in southern climates. Birds should be dewormed prior to each breeding season and perhaps more often if a problem warrants.

Ascariids are very common in cockatiels, Australian parakeets, and conures. Capillaria is a common problem in macaws and is very difficult to control if birds are kept in flights. Giardiasis is an important problem in cockatiel and budgerigar aviaries. Intestinal coccidia are uncommon in captive psittacines.

HANDFEEDING AND THE PSITTACINE NURSERY

The aviculturist must decide when it is appropriate to pull chicks for handfeeding and may have many reasons to do so. Many eggs are artificially incubated and the young must be handled or fostered. Some pairs fail to properly incubate eggs and their eggs must be incubated. When environmental temperatures are too high or low, hatchability may be improved by artificial incubation. Nestlings may be pulled which would otherwise die in the nest, to reduce the burden on a sick parent, or to reduce clutch size. A quick return to egg laying, double or triple clutching, may be hastened by pulling chicks or eggs. Birds are handled to produce a tamer pet birds or a calmer bird for future breeding. Some people feel that handled birds make poor parents and wild caught birds are more successful.

Hatchling psittacines are altricial and as such cannot regulate their body temperature. Hatchlings should be kept in a brooder at 32.2 - 34.4 C (90-94 F). Weak hatchlings may initially be kept at slightly higher temperatures. Chicks with early pin feathers should be in a brooder or room kept at 30.0 - 32.2 C (86 - 90 F). Humidity should be 50%.

Several specially designed brooders are available in the United States. Table # 1 These brooders are manufactured to be easily cleaned and maintain a stable environmental temperature for small chicks. Homemade brooders are also effective and much less expensive, although they are usually more difficult to clean. The simplest brooder consists of a box or aquarium containing a heating pad.

If environmental temperatures are too high the chick may exhibit panting, unrest, hyperactivity or poor growth rate. The birds skin may appear reddened and dry. Temperatures over 37.8 C (100 F) may be fatal. Cold environmental temperatures may result in death, poor gut motility, crop stasis or other digestive disorders, failure to feed or beg, inactivity or shivering. Low temperatures may also increase the incidence of respiratory disease.

Handfeeding formulas and utensils

Aviculturists have developed a myriad of handfeeding formulas over the years, some excellent and some disastrous. Several products are now available commercially. Table #2 The lack of personal experience with these products precludes comment as to their effectiveness.

For many years we have used a formula based on a commercial monkey food. Table #3. This formula was designed to be palatable, balanced, and simple to prepare. Simplicity is necessary as formula should be prepared fresh for each feeding in order to eliminate the chance for contamination. Vitamin and mineral supplementation is not necessary. The instructions for preparation of this formula are in Table #2. Long storage times or repeated reheating can lead to contamination. Improvement in early weight gains has been observed following the addition of an enzymatic food supplement. (Prozyme)

Formula should be about the consistency of thick soup. A more watery formula is recommended in the first few days. This may be practically achieved by feeding hatchlings the watery food on the top of the formula mixture or the first few meals may consist of watered oatmeal. It should be kept in mind that some individuals and some species may have different requirements.

Fasting for the first day after hatching is not required for normal yolk absorption. Weak or sick chicks however may absorb yolk more slowly than normal chicks. In most chicks the yolk is completely absorbed within 3 to 4 days after hatching.

Feeding with food in the crop should be avoided whenever possible. If food remains in the crop for several feedings or large amounts are in the crop when it would usually be empty, the cause of the disorder should be investigated. In some cases the birds are being overfed and the volume per feeding should be reduced, especially if the birds are fully feathered and near weaning. (Note: Some people feed very frequently and never allow the crop to empty and are successful.)

Birds are fed 4-5 times daily from hatching until the eyes are open, then fed 3 times daily until weaning. In order to maximize growth while cutting the number of daily feedings the crop is well filled. For example amazon, macaw and cockatoos chicks should be able to eat 7 mls of formula per feeding, by 7 days of age. Chicks which are fed more frequently in the first few days may grow faster, however the final weaned weight seems to be unaffected.

Sick birds should be kept separate and always fed last with utensils stored separately.

Most chicks should be pulled from the nest before three weeks of age. Older chicks may not adapt well to the nursery environment and may resist handfeeding. These chicks should be fasted for 12 to 24 hours to hasten acceptance of handfeeding. For best results chicks should be pulled prior to or at the time of emergence of pin feathers on the wings.

Handfeeding can be accomplished using a variety of utensils the most common being syringes, tubes or spoons. All have advantages and disadvantages.

The use of syringes for handfeeding is fast, sanitary and a known volume of food can be administered. Syringe size can be increased as birds grow. Catheter tip syringes (35, 60 or 140 cc capacity) are useful for feeding large chicks. Syringes are easily disinfected and should be soaked in a disinfectant solution between each use. A quaternary ammonium product containing a detergent (Roccal D) is ideal as it does not dry out the rubber syringe plunger, is easily rinsed from syringes and is apparently not toxic. Ideally a separate syringe is used for each bird. A syringe should NEVER be refilled after feeding a bird until it is cleaned, this is a common way to transmit disease by contamination of the formula.

The feeding response is initiated by gently touching the commissures of the beak while holding the head. When the bird starts a bobbing action, the glottis closes. The food can be pushed rapidly into the crop at this time without fear of getting food into the trachea.

Attachment of a rigid or flexible tube to a syringe enables rapid feeding of a known volume directly into the crop. This is an especially desirable technique for birds nearing weaning which resist head restraint required for handfeeding. Most birds can be trained to swallow the tube voluntarily. Tubes take more time to disinfect and may be difficult to adequately clean. Crop rupture is a hazard especially with a rigid tube. A large soft rubber tube is preferred as it is very difficult to introduce into the trachea. Care should be taken not to place the tube into the proventriculus as it is very easy to rupture.

Spoon feeding may result in a tamer bird but has few other advantages. It is time consuming and messy. Food which dribbles down the neck becomes dried, is a source of contamination, and feathers must often be plucked in order to clean the bird. Disinfection is simple but contamination of the food by repeatedly dipping the spoon into the food is a common problem. Spoon feeding is facilitated by bending the sides of the spoon up.

Housing and Bedding

Cleanliness is especially important with hatchlings as their immune system is immature and they are not able to withstand some of the common bacteria which adults birds are resistant to. Cleanliness to the point of sterility is not necessary. Ideally hands should be washed between feeding each bird or clutch, but this is not practical when feeding large numbers of birds.

Hatchlings can be conveniently housed in plastic freezer containers and larger birds kept in dish pans. These containers are easy to move and clean. Bowls with rounded bottoms should be avoided as leg deformities may result when birds lean on the sides.

Hatchlings are kept on paper towels with a new layer added at each feeding. The initial bedding should be crumpled or several layers thick forming a nest like concavity for the chick. This keeps the chick from rolling around or falling over on its back.

Bedding for older chicks can be a problem. Chicks kept on solid bedding material (paper towels, diapers, towels, etc.) tend to become covered with fecal material even if bedding is changed with each feeding. Nails may become caught in towels if they have a long pile. Clipping the tips of the claws may help prevent this. A double layer of toweling may be needed to reduce bunching or slippage of the towel from under the bird. Very smooth or tightly woven towels may not provide adequate traction and predispose to spraddle leg deformities. Towels are easily disinfected by washing in bleach.

Birds stay cleaner when they are kept on corn cob bedding, shredded paper or shavings but they may ingest the bedding. In large chicks ingested corn cob bedding passes through the gut, but in small chicks it may be retained in the crop or proventriculus. Brands of corn cob which are ground to a small size are less likely to cause impactions. Shredded paper may become wrapped around the legs of nestlings so they must be checked at each feeding. Shredded newsprint may discolor feathers. Shredded paper over corn cob reduces both the problem of entanglement and impaction, however it also is not ideal. Older chicks may also be kept in

a basket or cage with a welded wire floor as soon as they are old enough so their hocks won't become trapped in the wire.

A unique bedding material developed for use in poultry hatcheries can be utilized for psittacines. It has a surface much like Astro turf but the binding is perforated allowing liquids to pass through. It is easily cleaned and disinfected and slipping of the legs leading to spraddle leg is minimized.

Measures should be taken to control insects, especially roaches, which may spread disease from bird to bird. Dust from corn cob bedding can be minimized by the use of fans and air filters. Dirty pans are an ideal site for fungal growth and should be emptied and disinfected often.

Recognizing the normal neonate

The health and nutrition of the hen at the time of laying can influence the health of the newly hatched chick. Inbreeding may produce lethal or life threatening mutations. Incubation problems can cause small weak chicks which fail to thrive even under ideal conditions. All these factors should be considered when investigating neonatal disorders. Chicks incubated at low temperatures may fail to retract the yolk sac, fail to absorb albumin leaving a sticky chick or have bent necks. High incubation temperatures speed development and accelerate hatching leaving a chick with scruffy down and neurological problems. Skeletal abnormalities may result if the humidity is too low and membranes dry out, resulting in decreased mobilization of calcium from the shell. If the humidity is too high the chick will have an edematous appearance and may not retract the yolk properly. Many of these problems may also be seen in chicks which are incubated by the parents. Daily or frequent weighing of chicks is useful for monitoring growth and early recognition of illness, but is very labor intensive. Flammer compiled and listed normal weight gain of several psittacine species. (2) Judgement of condition however cannot be based solely of weight. Chicks are individuals and as such weight varies. An understanding of the normal physical appearance of a chick is vital to clinical assessment and early recognition of disease.

Normal skin should be pink with a yellowish tint. Yellow coloration is more prominent in some species. The skin should be opaque, soft, smooth and pliable. Dry, reddish, or wrinkled skin may indicate overheating or dehydration. Dehydrated birds will often have prominent skin vessels. White skin and very pale extremities indicate a bird which is cold, shocky, anemic or very ill. Birds which have inadequate fat reserves or are stunted have very thin transparent skin.

The pectoral muscles of the neonate are typically thin and poorly developed, and usually inadequate for intramuscular injection. The abdomen is prominent with a protuberant gizzard. Young birds tend to rest on their hocks and abdomen. The crop is very distensible holding approximately twice as much volume on a weight proportional basis as an adult bird.

The normal intestinal flora of psittacines reportedly consists primarily of gram positive bacteria including *Lactobacillus*, *Staphylococcus epidermidis*, *Streptococcus sp.*, *Corynebacterium sp.*, and *Bacillus sp.*

Gram negative bacteria such as *Escherichia coli*, *Klebsiella sp.*, and *Pseudomonas sp.*,

are commonly considered pathogens and are often associated with disease. Low to scant growths of *E. coli* in an asymptomatic bird may not warrant treatment.

Culture of the feces of new chicks as they are brought into the nursery, and appropriate therapy for pathogens, will often prevent illness and disease outbreak in the nursery. Gram negative bacterial infections, often with accompanying candidiasis, are the most common disorder of neonatal psittacines, but underlying viral, protozoal, Chlamydial or fungal diseases must not be discounted.

Crop washes and subsequent transfer of bacteria from the adult to the chick, are sometimes advocated as a means of providing normal flora to the new hatching. A potential for the spread of disease exists, and the beneficial effects have not been proven. Supplementation of *Lactobacillus* or similar products has been reported with mixed results. Commercial products do not provide the species specific flora which may be needed for gut colonization.

Vanderheyden reported that erythrocyte parameters (RBC, Hemoglobin, and MCHC) are typically, significantly lower in chicks less than four weeks old than in adult birds. Mean corpuscular volume is typically elevated in the neonate but packed cell volumes are similar to those of adult birds.

Weaning

Weaning is a very stressful time for a young bird and asymptomatic problems may surface. Weaning should not be attempted too early but conversely, extended periods of handfeeding are likewise detrimental.

The center of the back and area over the crop are typically the last to become fully feathered. When these areas are covered in pin feathers the bird is usually ready to start sampling solid foods. Young birds which are housed with older birds will usually self feed earlier as they will learn from the older birds.

The midday feedings should be eliminated first, then the morning and finally the evening feeding. A variety of soft foods should be offered at weaning time including: fresh corn on the cob, peanut butter and jelly sandwiches on whole wheat bread, apples, oranges, warm soaked monkey chow, peanuts and parrot pellets for large species. Small species will usually accept spray millet, peanut butter and jelly sandwiches, oranges, apples, parakeet mix, shelled sunflower and cooked sweet potatoes.

Weight loss of up to 10 % is considered normal. Weight loss of 15 to 20 % may be encountered and may be dangerous. Handfeeding should be resumed in these birds. Weaned birds which become ill may revert back to begging to be handled.

Stunting, poor growth rate or failure to thrive is common among hand fed birds. It is most common in the first 30 days of life. Most of these signs are corrected with time and adequate feeding and most birds will reach full adult size if stunting is reversed early enough.

The most common sign of stunting is inadequate growth rate. Birds should double hatching weight by 5 to 7 days of age. Daily weighing may be helpful but it should be kept in mind that stunted birds also gain weight daily, but in inadequate amounts. The trained eye is the best judge of condition.

Stunted birds appear thin and disproportionate with the head appearing too large for the body. Toes are a better indicator of adequate weight than breast muscle in very young birds. Toes, wings or backs should not be excessively thin. Eye opening may be delayed in a stunted or sick nestling. Eye slits may also appear to be above the pupillary opening or even above the globe. Eye infections may occur in these chicks. The normal age for eye opening varies greatly for different species. The skin on a stunted chick will appear thin and wrinkled without adequate amounts of subcutaneous fat.

Abnormal feathering patterns may be seen on the head and the emergence of body feathers may be delayed. As feathers emerge on the head they may form a point from the nares narrowing toward the back of the head, resembling a mohawk haircut. These feathers are often disordered rather than lying flat and uniformly pointing toward the back of the head. Feathers in other areas may emerge slowly and have stress marks, a demarkation crossing the feather perpendicular to the long shaft. These deformities in the feather usually consist of holes or absence of plumules and indicate a metabolic disturbance on the day the feather was being formed.

A globose head with an elongated slender beak is occasionally observed in a full sized stunted chick and is usually not corrected with time. This abnormality is suspected to be due to metabolic bone disease, or protein deficiency or excess at a young age. Beak deviations are also common in stunted birds.

Inadequate feeding is probably the most common cause of stunting. The fear of overfilling the crop often results in underfeeding and inadequate caloric intake. Food which is too watery may also result in inadequate caloric intake.

Enteric bacterial infections or candidiasis can result in, or be secondary to stunting. Any poor doing bird should be cultured for candida and gram negative bacterial infections.

Digestive Disturbances

Crop impaction or sour crop are terms commonly used to describe digestive disorders in psittacine chicks. Most diseases of young psittacines result in slowed gut transit time which is reflected by a crop that empties slowly. In the case of complete gut stasis the crop will fail to empty. Food which remains in the crop for an extended period of time will sour due to bacterial fermentation, resulting in sour crop. As the young bird becomes dehydrated, fluids will be pulled from the crop contents resulting in hardening of the crop contents or crop impaction. When this occurs, the bird must be treated as if it has a systemic disorder, not merely

a local problem in the crop.

Primary crop disorders include impaction, mycotic ingluvitis, crop atony or partial blockage by seeds, bedding material, fruit pulps or other foreign bodies. Foreign bodies should be palpated to determine size. If the particles are not very large or too numerous the bird may be able to pass them without detriment. Large foreign bodies, such as wood shavings, may be removed via the esophagus with forceps in large birds, or by ingluvotomy. A layer of paper toweling between small chicks and bedding may prevent ingestion.

Solid and liquid portions of some formulas may separate, and the water may be absorbed leaving doughy food in the crop. Water should be added and the food broken up by massage and it will usually be passed. If sour, the food should be removed by suctioning it out with a tube. Warm water is first flushed into the crop, then crop contents are broken up and aspirated. Milking the crop manually with the bird held upside down is a rapid way to empty the crop but may result in aspiration.

Mycotic ingluvitis or candidiasis often co-exists with intestinal candidiasis and can result in malabsorption.

Crop atony may result from over stretching of the crop. Some species are particularly susceptible (2-4 week old macaws, Queen of Bavaria conures, pinnons). These birds should be fed smaller volumes but as a result may mature more slowly. Providing physical support for the crop by using a sling for the crop (a crop bra) may help restore proper crop tone.

The crop may be burned by the administration of food which is too hot. A scab will appear on the skin covering the crop several days later and leakage can be expected in an additional 2 to 4 days. If the burns are mild they may heal without treatment or surgery. Fistulas may form with some burns requiring surgical repair. In very severe burns the crop will slough.

Crop ruptures are usually due to tubing accidents and can occur with flexible as well as rigid tubes. Macaws are especially susceptible to crop rupture. They bob their heads rapidly in a feeding frenzy and may bounce against the tube hard enough to rupture the crop. This can be avoided with a flexible tube, if care is taken not to hold the tube firmly near the birds mouth. Rupture of the mucosa of the pharynx may occur in birds which are being syringe fed. The prognosis is poor for any bird which has an esophageal, pharyngeal or crop rupture. Immediate surgery is indicated to remove subcutaneous food from tissues before the bird becomes toxic. Post surgical therapy should include flushing the wound, which may be left open, and the administration of systemic antibiotics and steroids.

Systemic problems may be reflected by slow crop emptying time. Gut stasis is a common finding in most infectious diseases in nestlings. Dehydration or low environmental temperature may also result in gut stasis. Failure to defecate, or passage of only urates, may be observed in a bird with gut stasis. Treatment with injectable antibiotics and fluids is indicated.

Dietary causes of slow crop emptying

Foods that are too cold may result in delayed crop emptying as well as foods which are

too thick, contain inadequate water, are too high in fat (too much peanut butter) or possible too high in protein.

Air gulping or swallowing air may occur with or without feeding. It appears to be habitual and is common in cockatiels but also occurs in very young birds of many species. Air gulping results in inadequate food intake as the crop fills with air and looks full. If transilluminated the air can easily be seen in the crop. Feeding at a steady, rapid rate, so the bird doesn't have time to fill the crop with air, will help minimize air gulping. Feeding small amounts and waiting for swallowing should be avoided. Feeding response must be initiated prior to feeding. Tube feeding may be required. Burping and adding more food to the crop may help get adequate amounts of food into the bird. Care must be taken when burping so as not to induce aspiration of food.

Regurgitation

Shrinkage of the crop at weaning is a natural process. As the bird matures regurgitation of small amounts of food immediately after feeding may occur signaling the need to reduce handfeeding volume and offer solid food. Foreign bodies in the crop, crop mycosis, or systemic or enteric infections may result in regurgitation.

Visceral gout usually results in vomiting prior to death. Gout can result from aminoglycoside therapy but is uncommon if drugs are used properly. Dietary imbalances such as excessive protein or Vitamin D3 may result in gout. Macaws are especially susceptible to hypervitaminosis D. Papovavirus infection in the chronic form can result in gout or cystic kidneys.

Developmental abnormalities

Most birds which are syringe fed are fed on the same side of the mouth at each feeding with no ill effects. A low percentage of birds, especially macaws, however develop lateral beak deviations, primarily of the beak tip. This may be due to the vigorous nature of the feeding frenzy in macaws which may result in damage to that side of the beak.

Some beak deviations, especially those that are deviated from the cere, may be associated with upper respiratory disease when the bird is very young. Beak deviations, both from the cere and the tip, are much more common in individuals which have been stunted or otherwise ill, than in robust birds, and are often accompanied by other developmental abnormalities such as globose heads and long narrow beaks.

Beak deviations may result in malocclusion which is unsightly and may require frequent beak trims, but is usually not harmful otherwise. Total correction after the beak is calcified is very difficult. It is important to recognize lateral deviations while the beak is still soft and pliable. Application of gentle digital pressure to the opposite side of the beak at each feeding can correct many cases of lateral deviation.

Cockatoos often develop a deviation of the upper beak into the lower. The mandible of a cockatoo chick is normally longer than the maxilla, which gains length later. Some birds also have excessive cornified beak at the tip of the maxilla which may cause it to turn in. This material can be trimmed with manicure clippers to a normal point taking care not to trim it too

short. The upper beak is then placed over the front of the mandible and held for a few seconds at each feeding. As in lateral deviations, this procedure is only effective if performed before the beak is fully calcified. Birds with beak deviations may benefit from calcium supplementation during the time that the beak is being manipulated.

Leg deformities may be associated with inadequate litter, or slippery surfaces as well as dietary imbalances. Birds should not be placed on a table where feet will slide apart. They should be placed on toweling or other non-slip surfaces. Very tightly woven toweling should not be used as it provides little traction. Keeping small birds in a bowl with rounded bottom may result in lateral deformity of the tarsometatarsus. Birds should be housed in containers with straight sides.

Joyner described small ear openings in handled macaw chicks. Skin folds may completely occlude the external ear canal especially in stunted chicks. In normal chicks a clear exudate may be seen inside the ear. Infection may occur and the ear canal fill with purulent exudate. This can usually be removed with gentle pressure and manipulation of the overlying skin to align the ear canal with the normal skin opening. The skin opening may be enlarged by stretching with mosquito forceps. Severe cases which are accompanied by infection may require surgical opening and topical antibiotic therapy.

Miscellaneous Conditions

Pasted vent may occur due to fecal accumulation or dirty bedding, especially if the bird is on toweling or diapers. Constipation is unusual and may be confused with gut stasis. Constipation may be relieved by feeding oatmeal with applesauce and bananas or by administration of mineral oil.

Aspiration of food results in sudden death if large portions of food are deposited into the lungs. If smaller volumes of food are aspirated, pneumonia develops over several days. Antibiotic therapy should be instituted but prognosis is always grave. Aspiration pneumonia rarely occurs if proper feeding techniques are used. Food can be delivered quickly after initiation of the feeding response as the glottis is closed. For quick feeding the chicks must be trained to accept the food when the syringe or a small amount to food is placed in the mouth. The feeding response may be accompanied by jumping and pumping in some species, however, some are passive and simply allow you to pour the food down the throat. Aspiration is more likely to occur if food is dribbled slowly into the mouth because the bird needs to clear it's mouth to breathe.

Coughing after feeding is common and related to the aspiration of minute amounts of food. This is usually associated with vocalization during feeding and rarely presents a problem.

Cornel scratches from nest mates, and foreign bodies under the lid are the most commonly observed eye problems in nestlings. Mycoplasmas are commonly implicated in conjunctivitis of cockatiel chicks but this has not been well documented.

Papovavirus (polyomavirus) is the most common viral disease encountered in the handfeeding nursery. Normal adult birds may shed the virus infecting their chicks. This disease is highly contagious and with an incubation period of approximately two weeks it can be widespread before it is detected. Pox is rare in domestically raised birds but a common

problem in some imported species.

Oral plaques in nestlings most often indicate oral candidiasis but may also be associated with hypovitaminosis A, bacterial pharyngitis, pox or accumulation of food.

Treatment

When signs of illness are first observed samples should be collected for bacteriology or other diagnostic tests prior to the initiation of therapy. To wait for the results of culture and sensitivity testing prior to treatment may be fatal. A large proportion of disorders of psittacine chicks may be husbandry problems complicated by bacterial and/or fungal infections. Antibiotic and antifungal therapy is usually indicated to prevent fatal infection until the precipitating factors, if any, are discovered and corrected.

Oral antibiotics are indicated in digestive disorders of suspected bacterial origin and are preferred as long as gut stasis is not evident. If gut stasis occurs, parenteral antibiotics must be used. Antifungal therapy should always accompany the use of antibiotics as fungal overgrowth, especially candidiasis, is common in chicks. Nystatin oral suspension is commonly used in neonates and is not harmful even in hatchlings. Nystatin should always be given after feeding as birds will often refuse food after tasting nystatin. A suspension prepared from Ketoconazole tablets is also very useful in treating chicks.

Oral rehydration therapy (ORT) should be initiated and may be used in conjunction with parenteral administration of fluids. Dilute cereal preparations can be used successfully for ORT. Gerber's oatmeal with applesauce and bananas (in the jar) diluted 50 % with water, works well as the only food for birds exhibiting gut stasis. This solution provides calories, potassium and other electrolytes present in the fruit juices and fluids which are readily absorbed by the chick. The juice of boiled rice is another natural form of ORT. A variety of solutions are available commercially for ORT. In addition fluids may be given intramuscularly, subcutaneously or intravenously.

In total gut stasis, or a very slow crop, the normal diet should be removed by tube to prevent souring. Turning the chick upside down and milking out crop contents is rapid and easy but may result in aspiration unless it is done very rapidly. Antibiotics and antifungals are added to the empty crop. The drugs are allowed to remain in the crop for a short period of time in order to have a local effect then ORT solutions are fed. If the solution is not passed within 6 to 8 hours, the crop must be emptied, fluids and antibiotics administered parenterally and the process repeated. The prognosis at this time is poor.

Proper diet and husbandry techniques are the basis for success in any handfeeding program and will limit the disease problems encountered by the aviculturist. In order to provide adequate treatment for immature birds the veterinarian must be aware of what a normal neonate should look like and how it should be cared for.

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TABLES

Table #1

SOME COMMERCIALY AVAILABLE HANDFEEDING DIETS FOR PSITTACINES (In the United States)

Roudybush's hand-feeding diet - Roudybush, P.O. Box 331, Davis, CA 95616
 Kellogg's Handfeeding Diet - Kellogg Inc., Milwaukee, Wisconsin
 Nutristart - Lalleber Co., RR2, Odell, IL 60460
 Topper Bird Ranch Diets - 20833 Roscoe Ave. Canoga Park, CA 91306

Table #2

HANDFEEDING FORMULA MADE WITH MONKEY CHOW

- A. 1 quart Purina High Protein Monkey Chow + 1 quart hot water - Allow to soak 30 minutes to soften the biscuits.
- B. Cook on stove top to a soft boil or microwave 8 minutes on high.
- C. Add 3 tablespoons of smooth peanut butter, 1/2-jar creamed corn (4 1/2 ounce jar), 1/2-jar oatmeal with applesauce and banana (4 1/2 ounce jar) (these items are variable)
- D. Add ice cubes as needed to cool (approx 5 large cubes).
- E. Smooth with a blender, hand mixer, or by hand. Add extra water if formula is to thick.
- F. Run a washed hand through the formula to check for hot spots.
- G. If time is short the monkey chow can be soaked in advance in the refrigerator for a few hours. Any remaining food should be discarded and NOT held for later feedings.

Table #3

SELECTED DRUG DOSAGES FOR HANDFED BIRDS

AMIKACIN - 15 mg/kg TID or 20 mg/kg BID
 CEFOTAXIME - 100 mg/kg IM BID
 CHLORAMPHENICOL - 75 mg/kg TID. Most often used in palmitate form for treatment of the individual bird (0.1 ml/ 30 gm TID). For flock treatment chloramphenicol powder (from capsules) may be added to prepared formula at the rate of 1500 to 2000 mg/gallon.
 CHLORHEXADINE - Can be added to formula at the rate of 5 cc/gallon of prepared formula. Used in flock treatment of mild candidiasis or when enteric viral infections are suspected.
 CHLOROTETRACYCLINE - For flock treatment of chlamydiosis add 2000 mg/gallon of prepared formula.
 DEXAMETHASONE - 5 mg/kg IM
 DOXYCYCLINE ORAL SUSPENSION - 50 mg/kg OID orally for Amazons 35 mg/kg OID for Macaws and Cockatoos
 GENTAMYCIN - 5 mg/kg BID
 GENTIAN VIOLET POWDER - For flock prophylaxis for candidiasis - 1/2 teaspoon per 5 gallons of formula. Can be used with chlorotetracycline or doxycycline.
 KETOCONAZOLE - 20 mg/kg BID orally - Tablets may be placed in suspension by grinding one tablet (200 mg) and mixing with 1 ml methylcellulose and 9 ml water. Refrigerate and discard unused portion after two weeks.
 LACTATED RINGERSSOLUTION - 1-3 ml/10 gm given subcutaneously, intramuscularly, or intravenously.
 NYSTATIN ORAL SUSPENSION - In very small birds give one or two drops following each feeding. In older birds give 1 cc/300 gm, once or twice daily or add 30 ml/gallon formula.
 PREDNISOLONE - 20-30 mg/kg IM
 TRIMETHOPRIM X SULPHA - .1 cc/30 gm TID in the very small bird or BID in older birds or added to the formula at the rate of 25 ml/gallon.

Correspondence Address:

Pet Farm Inc.
 5400 N.W. 84 Ave.
 Miami FL, 33166 USA