

Breeding Cockatoos and Macaws in Captivity

by Robert J. Berry

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Before I become directly involved in my topic, I would like to briefly comment on my introduction to the field of aviculture. My first birds were a pair of budgies which my mother quite innocently gave me for my fifth birthday. It wasn't too long after this event that I began to develop subtle signs of parrot fever. These symptoms, however, didn't reach their full manifestation until I was the ripe old age of seven - and this pair of birds raised five chicks!

Since that time, I have been a helpless victim of a rare and little known form of parrot fever for which there is apparently no known cure. The parrot fever I refer to, of course, is not psittacosis or ornithosis in its classical sense, but rather the type of parrot fever with which I'm sure many of you in this room are familiar; one which is characterized by a consuming interest in the members of the parrot family, accompanied by a strong compulsion to keep a number of these birds around you at all times. This need is never fully satisfied and the afflicted individual always suffers from a desire to have just one more. I am, in fact, addicted to parrots.

Today, I am going to direct my comments to two groups of parrots which hold my particular interest: the cockatoos and macaws. These remarks are based on my personal experience and

observations and are not intended to infer in any way that this is the only way it should be done. There are many ways to "skin a cat", and my objective is to help make the skinning process a little easier for some of you.

One basic premise which we should all consider in the aviculture of any species is that it is natural for well-cared-for, properly housed, healthy birds to attempt to breed providing all their behavioral needs are met. If they do not, in all probability, it is because we are doing something wrong.

A second premise is that while it is next to impossible to achieve breeding success with an incompatible or otherwise bad pair of birds, it is relatively easy to inadvertently stop a good pair of birds from breeding.

A third premise relates to Murphy's Law, which states that if something can go wrong, it will. From my experiences, I feel safe in saying that if you were not a pessimist when you started working with birds, you certainly will become one at some point during your avicultural career.

In general, I have found macaws far easier to breed in captivity than cockatoos, as they seem to have no critical requirements regarding aviary size, type of nesting structure, or specialized dietary needs. A review of the

literature quickly reveals that macaws have been bred successfully under every conceivable type of circumstance: in aviaries; at full liberty or as pinioned specimens; housed as pairs or in colonies' and even indoors in relatively small cages. The pair of hyacinths at the Houston Zoo raised their first clutch of two chicks to full independence while housed indoors in a temporary wire cage which measured six feet by six feet by eight feet tall with a wooden nest box attached from the outside at floor level.

The larger macaws in particular seem willing to accept practically any type of nest site so long as it is relatively dark and defensible. It seems to make little difference what the nest looks like, or where it is located, either elevated or on the ground. I have seen them nesting in barrels, garbage cans, wooden crates and even dog houses. A pair of pinioned military macaws owned by a friend and kept at liberty in her back yard, regularly nested in a dark corner of a store room under a table! and yes, they did rear their young!

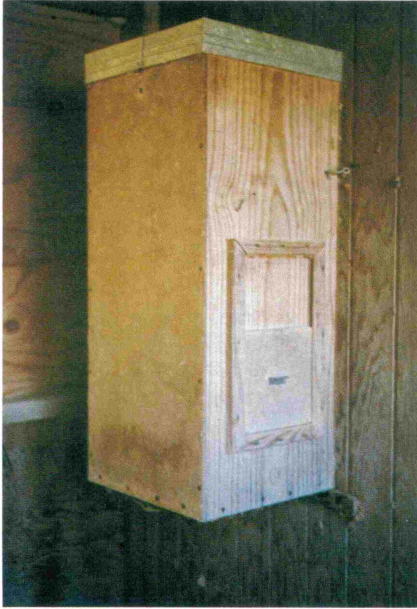
The urge to reproduce is so great in most macaws that hybridization readily occurs when a mate of the same species is not available. The primary prerequisite seems to be having a male and female housed together. Unfortunately, these birds are not dimorphic, which up to now has proven a major obstacle to

Cockatoo breeding aviaries measuring 16 ft. x 18 ft. x 7 ft. tall.



Photos by R. Michael Bowerman

Cockatoo nestbox — 12 inches x 12 inches x 30 inches.



Breeding pair of triton cockatoos, (Cacatua galerita triton).



Young triton (Cacatua galerita triton) in the 'porcupine' stage.



Breeding pair of rose breasted cockatoos, (Galah eolophus roseicapillus).

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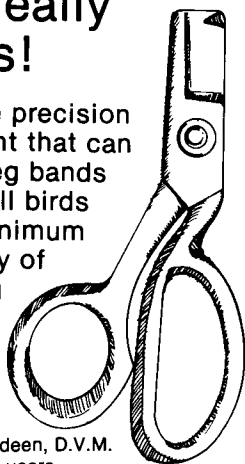
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breeding them in captivity. In the past, our efforts to determine their sexes have been little more than educated guesses. Checking the width of the pelvic bone on a macaw generally only tells you that the macaw *has* pelvic bones! Unless, of course, you happen to be checking a female about to start laying.

To further confound the problem, macaws are absolutely notorious for forming homosexual pairs. In fact, if you have two adults which attempt to copulate frequently and never produce eggs or consistently produce large clutches of infertile eggs, in all probability, you do not have a true pair. I would caution you that while the average clutch consists of only two or three eggs, some females may lay large clutches of five to seven eggs. Large clutches, therefore, do not necessarily mean you have two females. One of our female blue and golds never lays less than five eggs in a clutch. This presents a problem, since her egg-laying sequence is every third day. The oldest chick is two weeks old and quite large by the time the fifth egg is due to hatch, and in order to save the last chicks, it is necessary to pull them for hand-rearing. Otherwise, they would in all likelihood be mashed in the nest by their older and larger siblings. Also, rearing five chicks for ten to twelve weeks is a considerable strain on a pair of birds.

Now that modern techniques are available to help solve the dilemma of accurately sexing birds which are not dimorphic, and by this I mean laparoscopy, fecal steroid analysis, or chromosome techniques, not the needle and thread method, I predict a sharp increase in the number of macaws successfully bred each year.

Fortunately, sexing most cockatoos is not as great a problem as sexing macaws. Adult specimens in a number of species show distinct differences in eye color: dark brown or blackish in males and light brown to red in females. In some species, especially the various sub-species of *Cacatua galerita*, males are significantly larger than females. In addition to their larger size, many male cockatoos also have pelvic bones so close together as to seem almost fused. The black cockatoos, with the exception of the palms, are easily sexed as adults by the dimorphic coloration of their plumage. For species which lack any apparent dimorphism, such as the Moluccans, bare-eyes, and slender-bills, the use of modern sexing techniques is also quite useful.

In all cockatoo species, juveniles may prove difficult to sex. The transitional development of adult eye color in

females usually begins to occur during the first year and generally reaches its final stage of development in two to three-year-old specimens. Young female cockatoos kept on diets low in vitamin A and kept indoors without prolonged exposure to direct sunlight during this period of time often fail to develop the intensity of eye color characteristic of adult females (of their species). This may, in part, account for a number of the so-called brown-eyed females which are occasionally seen.

In their natural habitats, birds surely select mates and attempt to breed as soon as their physiology and environmental circumstances allow. There is a great deal of evidence that many of these birds reach sexual maturity sooner than has been previously believed. I feel the development of adult eye color in both macaws and cockatoos is indicative of sexual maturity. The lengthy maturation period of six years or more is certainly not valid for most species. I cite examples of a captive-reared pair of rose-breasted cockatoos rearing a chick when the adults were only eighteen months old. Several female Leadbeater cockatoos, reared in our collection, laid their first eggs during their third year. And, a male blue and gold macaw fertilized an eight year old female when he was between three and four years old.

Initial pair bonding apparently begins to occur at a very early age. Studies of clutches of three (one male, two female) Leadbeater cockatoos have produced some interesting data. Once independent, the three siblings were housed together compatibly until they were about eight months old. At this time, aggressive behavior developed in the group, making it necessary to remove the odd female. The remaining male and female continued to live together harmoniously. The following spring, this pair bond was intentionally disrupted, and each individual was isolated from sight contact with the other. After six months, the male was returned to the flight, and the odd female was introduced. The two specimens were tolerant of one another but showed few interactions or signs of pair formation. After a six month trial the second female was removed and the original hen reintroduced to the male.

Many non-breeding pairs of birds or specimens in our collections which exhibit aberrant breeding behavior may be the result of constraints we have placed upon them during critical periods of their juvenile development.

Contrary to popular belief, being tamed as pets and imprinted on humans, does

not always render a bird useless for reproduction. Male cockatoos are perhaps the most adversely affected. This may be due to the fact that cockatoos have a more elaborate courtship ritual than macaws. If tame specimens affiliate their courtship behavior with the presence of humans, they seldom if ever become effective breeders, even though properly paired. Pet macaws seem to suffer least from close human interaction once they have been weaned from their human associates and socialized with other specimens. It appears that the effects of isolation are the greatest obstacles to overcome, not imprint. One consideration in using pet birds for breeding purposes is the greater risk involved in working with them during the breeding cycle. Cockatoos do not become extremely aggressive when they are nesting, but even wild macaws will readily attack anyone or anything invading their territory. Tame specimens with absolutely no fear of humans cannot be trusted and are particularly treacherous at this time.

When selecting birds as potential breeders I feel it is best to attempt to acquire young, captive reared specimens for several reasons.

First, they are already adjusted to close confinement, and by and large, are less

stressed in a captive management.

Second, it is generally much easier to persuade young birds to accept a broader range of diet items, as their feeding habits are not yet firmly established.

Third, they are not as likely to have previously paired with another specimen, and, as a result, are far less likely to spurn their intended partner.

Fourth, and perhaps the most important consideration, is that they are already attuned to life in northern latitudes and do not have to adapt their physiological cycles to a change in hemisphere. In wild caught birds, this process may take a number of years, and may, in fact, be the chief reason so many people believed these birds took so long to reach sexual maturity.

The specimens which are least likely to breed for you are wild-caught adults which have matured and possibly already have bred in their natural habitat.

If captive-reared specimens are not available, birds removed from the wild as juveniles and allowed to mature in captivity are the next most likely candidates for successful breeders. In further support of obtaining captive-reared stock, data from many other avian species established in captivity have

shown a sharp increase in successful breeding from first and second generation captive-reared progeny.

Indications of pair formation are mutual preening, courtship feeding or display, copulation, roosting together, and exhibiting minimal amounts of aggression toward one another. Although frequent copulation is usually indicative of impending nesting, many well-mated pairs will occasionally copulate throughout the year.

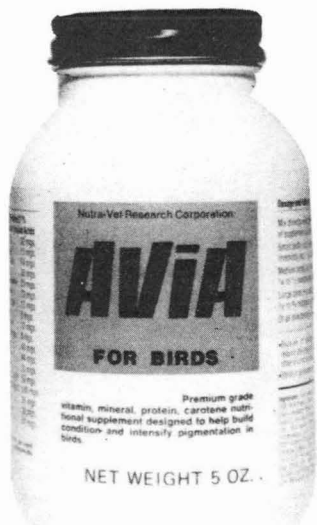
If a pair of adult birds shows all signs of compatibility but fails to reproduce, then consideration should be given to moving them to new quarters, reviewing their diets, and altering other environmental stimuli. If a pair is apparently incompatible, the only alternative is to acquire new mates for each of them.

In attempting to establish two new birds as a pair, it is generally best to house the individuals adjacent to one another until they begin to show signs of pair bonding. In some cases, pair bonding may occur almost immediately; in others, it may be necessary to wait until the specimens come into breeding condition before any significant interactions will be observed.

When pairing birds, the history of the

Analysis per 3.5 grams (approximately one teaspoon)

A	. . . . . 600 IU
Carotene	. . . . . 0.365 mg.
Canthaxanthin	. . . . . 1.8 mgs.
D ₃	. . . . . 60 IU
Arginine	. . . . . 32 mgs.
Histidine	. . . . . 13 mgs.
Isoleucine	. . . . . 24 mgs.
Leucine	. . . . . 33 mgs.
Phenylalanine	. . . . . 30 mgs.
Tyrosine	. . . . . 33 mgs.
Methionine	. . . . . 12 mgs.
Cystine	. . . . . 8 mgs.
Threonine	. . . . . 33 mgs.
Tryptophane	. . . . . 9 mgs.
Valine	. . . . . 40 mgs.
Lysine	. . . . . 44 mgs.
Alanine	. . . . . 30 mgs.
Aspartic Acid	. . . . . 50 mgs.
Glutamic Acid	. . . . . 140 mgs.
Glycine	. . . . . 36 mgs.



E	. . . . . 10 IU
K	. . . . . 0.001 mg.
C	. . . . . 6 mgs.
Bioflavonoid	
Complex	. . . . . 0.85 mg.
Hesperidine	
Complex	. . . . . 0.735 mg.
Rutin	. . . . . 0.365 mg.
B ₁	. . . . . 0.5 mgs.
B ₂	. . . . . 0.5 mgs.
B ₆	. . . . . 0.5 mgs.
B ₁₂	. . . . . 0.001 mg.
Choline	. . . . . 7.8 mgs.
Inositol	. . . . . 7.8 mgs.

Niacinamide	3.7 mgs.
P.A.B.A.	. . . . . 2 mgs.
Biotin	. . . . . 0.003 mg.
Calcium	. . . . . 170 mgs.
Phosphorus	. . . . . 170 mgs.
Magnesium	. . . . . 7.3 mgs.
Potassium	
Chloride	. . . . . 39 mgs.
Sodium	
Chloride	. . . . . 25 mgs.
Manganese	. . . . . 0.069 mg.
Cobalt Trace
Silicon Trace
Iron 0.7 mgs.
Copper 0.037 mg.
Iodine 0.008 mg.
Zinc 0.245 mg.
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Young Leadbeater cockatoos (*Cacatua leadbeateri*) reared at the Houston Zoo. This series of photos was taken after the reintroduction of the original hen to the male. See text on page 12.



Pair of greater sulfur crested cockatoos, (*Cacatua galerita galerita*).



individual specimens is an extremely important factor to consider. Are the birds young or adult? Were they wild caught or captive reared? Have they been kept as caged specimens or are they flight conditioned? Have they been previously paired with other birds? Etc.

Provided you have several specimens available, another method for successful pairing is to allow them to select their own mates in a group environment. This has proven time and again to be an extremely good way to establish compatible breeding pairs and is especially true when pairing juvenile birds. I might add, however, such colonies must be carefully observed for aggressive behavior and intervention taken immediately if necessary. This type of situation can easily result in death or badly injured specimens if not monitored closely. It is also extremely unwise to add a new specimen to a colony once the group has become established. Adding a new specimen may change the whole social hierarchy or pecking order and, in the process, much bickering and fighting may occur. Once it is evident that a pair is formed, they should be removed from the colony, as in all likelihood they will prove to be the dominant male and female and may inhibit or suppress pairing of other specimens in the group.

When large aviaries may greatly enhance the breeding potential for some types of birds, they are definitely not needed for either macaws or cockatoos. In reviewing numerous aviaries where successful breeding has repeatedly occurred, a size of six feet by twelve feet by seven feet appears to be totally adequate for all of the larger species. The so-called dwarf macaws and small cockatoos such as the Goffin's and red-vented can easily be accommodated in smaller flights measuring only three to four feet wide. Flights should not be cluttered with perches. Two larger diameter perches located at opposite ends of the enclosure are adequate. We do not use natural branches due to the frequency of replacement and have found two-by-fours and 3 to 5 inches diameter untreated fence post very satisfactory for the larger birds. There is also the added benefit that when roosting on these large perches during freezing weather, the breast feathers cover the toes, reducing possible frostbite.

Keeping breeding macaws and cockatoos in extremely large flights can only be justified from the standpoint of aesthetics. A point of diminishing returns is definitely reached where breeding aviaries are concerned, and

there is one distinct disadvantage to overly large or lengthy flights. When youngsters are newly fledged, they are not only clumsy, but are easily startled and have been known to build up sufficient flight speed in large facilities to break their necks or to cause other serious injuries when colliding with the aviary wire. I would hasten to add that while large flights do not seem to be the key to successful breeding, neither are cramped quarters. The disposition of a pair of birds should also be considered when deciding what size aviary is most suitable for them. Theoretically, calm, semi-tame birds are more likely to adapt to confinement in small aviaries and breed than are wild, nervous specimens.

Aviaries must, of course, be constructed of sturdy, chew-proof materials. And, it is always best to use a relatively heavy gauge wire, preferably galvanized after weaving, which has small enough wire spacing to preclude the entrance of sparrows and other pests. While chain link fabric is sturdy, it is not really suitable for outdoor flights due to the fact that even though it usually keeps cockatoos and macaws in, it keeps nothing smaller than a pigeon or a cat out!

If breeding aviaries consist of a series of consecutive flights, double-wiring should separate the units as a precaution against injuries from birds fighting through the wire. When pairs of birds are housed adjacent to one another, fighting can be a constant problem and definitely has an inhibiting effect on breeding success. Individual flights, where pairs are not directly associated with one another, are much more suitable for housing these birds. This type of accommodation seems to provide the inhabitants with a greater sense of security, which is a key factor in stimulating breeding behavior.

There are instances of macaws and cockatoos breeding in colonies, but in these cases, it is generally only the alpha or dominant pair which is successful.

Early this spring I received a call from a woman asking what she should do with a pair of macaws which has just laid a clutch of eggs. After asking her what they were nesting in and what they were being fed, I suggested that she leave them alone as much as possible. She then informed me that it was a hybrid pair consisting of a blue and gold and a scarlet, and asked me what she should do about the other two macaws in enclosure which measures about twelve by fifteen by ten feet tall! I suggested that if there were any signs of fighting, she should remove the extra birds for fear they

might disrupt the nesting pair, whereupon she asked, "What about the other birds in the enclosure"? When asked what other birds, her reply was, "Well, my husband and I don't really know anything about parrots, but think they are so beautiful that we have two blue and golds, two scarlets, a pair of umbrellas, a pair of sulfur crested and a pair of Moluccans in this large cage on the patio."

In my opening comments, I mentioned there is more than one way to skin a cat, and I would also like to add to that another cliché - ignorance is bliss. If I had tried to establish a group such as this, most would, by now, have missing toes, or perhaps feet, and a number would already be preserved as study skins!

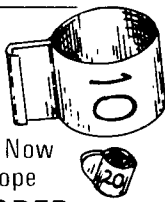
We have tried housing birds in colonies on several occasions and have had a great deal more trouble with cockatoos than macaws. I would never try to breed cockatoos in a colony due to their totally unpredictable fits of aggression. Coupled with the fact that once a bird is permanently maimed or killed, it can't be replaced for \$1.98.

Male cockatoos often show period of marked aggression toward their mates even in well-established breeding pairs. This is probably some normal aspect of their breeding behavior, perhaps courtship pursuit, but it does present a serious problem in a captive situation where it is a very common occurrence. If no controls are used, the ultimate result will usually be a dead or maimed female. I cannot emphasize this point too strongly to those of you maintaining cockatoos in your collections. We have had males of compatible breeding pairs which have reared young for ten to twelve years abruptly go into sham rage and kill their partners. I would quickly add that this type of deadly aggression is frequently reported from other breeders, so it is not just a fluke of behavior in our aviaries. In these situations, separation is, of course, an obvious solution, providing you are lucky enough to discover the problem in time to intervene. Another way of dealing with the problem is to cut the flight feathers on one wing of the male to enable the female to escape his wrath. I have not experienced any trouble with fertility employing this method, but have lost a couple of extremely valuable breeding hens when I failed to clip the males.

Another problem encountered with cockatoos is that male and female cockatoos alternate during the incubation cycle. Normally the male incubates most of the day. In captivity, however, these cycles often become confused, one

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partner trying to return to the nest immediately after it has fed and exercised. When this type of confusion in cycling occurs, fighting can also result, and the eggs may get broken or be improperly incubated. When this behavior develops in a pair, we usually remove the male and leave all of the incubation responsibilities to the female, who usually incubates satisfactorily, and even rears the young without the assistance of a partner.

A wide range of types of nesting facilities has been utilized by most species of both macaws and cockatoos. The only real prerequisite seems to be selecting a facility which suits the individual pair of birds. While some may seem willing to accept almost any kind of nest box, other may have critical requirements of depth and size or location to stimulate successful nesting.

Metal barrels and wooden nest boxes have been used with equal success. Natural logs are used by some aviculturists, but, in my opinion, are hardly worth the effort unless a pair of birds is totally uninterested in accepting an artificial nest site. We use both metal barrels and wooden boxes which are completely lined with wire and much prefer the latter. They are not only cooler, but also absorb moisture which may accumulate from the excrement of chicks. If placed directly inside the flight, wooden boxes are quickly destroyed and may not last through one breeding season. We, therefore, mount wire lined wooden nest boxes outside the enclosure with a communicating entrance through the aviary wall.

The floor of the nesting chamber should be covered with a coarse substrate to a depth of two to three inches. Wood chips have proven a satisfactory medium for this purpose. Whatever substitutes are used, one should bear in mind that birds are reluctant to walk on any surface into which their feet will sink, and that finely particled materials such as sawdust are dangerous since they may clog nostrils and throats of newly hatched chicks.

One design requirement for nest boxes which is frequently omitted is the provision of an inspection door to facilitate checking nesting progress. Many people fear that adults will desert the nest if undue disturbances such as inspections occur. This, of course, limits accumulating accurate data on incubation, nestling development, and discovery of problems which may develop in time to rectify them. By mounting the nest box outside the aviary, one eliminates the major objection to making inspections, since it is not necessary to wage war with the adults

to gain access to the box. Birds generally adapt quickly to routine activities, and if regular approaches are made to their nesting site, most pairs do not appear adversely affected by the intrusion. One should, however, always be prudent with regard to undue disturbances.

We regularly check our nests and feel it absolutely imperative to regularly monitor nestling development. We have never had adults abandon their young as a result, but have saved many chicks as a result of intervention before it was too late. When you wait to check the box after you notice a smell or don't hear the young being fed for several days, it's too late. In regularly checking nests, there is also the benefit of being able to remove infertile eggs at the earliest moment. This greatly increases the chance of a pair recycling. If a clutch of infertile eggs is removed immediately, most females will recycle within twenty-eight days. The longer they incubate or stay in the rearing cycle, the less likely they are to produce a replacement clutch. While most cockatoos only come into breeding condition in the late winter and spring months, macaws nest somewhat randomly and are not as closely aligned to seasonal breeding cycles. They will, however, normally begin breeding about the same time each year.

Both our macaws and cockatoos are allowed free access to their nest boxes year round, as we have found the birds do not always breed when we think it is the proper time, and if locked out of the boxes may drop eggs from the perch.

Within the limits of their specialized adaptation, parrots in the wild are free to select from a variety of food items. The captive specimen is, of course, limited to the foods provided by its keeper, a situation which is further restricted by whether the foods offered are actually accepted by the bird and eaten.

Nutritional needs may vary somewhat according to species and depend to a large extent on the age of a specimen, its reproductive status, and environment. The needs of the growing chick, for example, differ significantly from those of the adult; the breeding adult from the non-breeding adult; and the caged specimen housed indoors in a controlled environment with little opportunity for exercise from those of a specimen in an outdoor aviary subjected to dramatic climatic changes.

During the rearing cycle, many pair of birds will develop marked food preferences. These should be indulged, as failure to provide such items will frequently cause the adults to fail to feed or to abandon their young.

Diets are extremely important and poor nutrition is without a doubt a major cause of many of our breeding failures. Many aviculturists and pet owners tend to treat their macaws and cockatoos as pure vegetarians. This is a mistake, for, with the exception of a few specialized feeders, the majority of psittacines are best classified as omnivores, eating foods of both plant and animal origin. The fact that many parrots harbor endoparasites which require insects as intermediate hosts indicate most parrots eat some insects, and if you doubt a parrot eats meat, let a dead bird remain in a flight with other birds for a day and look at the condition of the carcass after its cage mates have selectively feasted!

The well-balanced parrot diet contains both plant and animal proteins, suitable amounts of carbohydrates for meeting energy needs, fats to aid in the absorption of other nutrients, and sufficient vitamins and minerals to support physiological processes.

The subject of psittacine nutrition is highly complex and time does not permit me to elaborate further. I would urge each of you to obtain a copy of the *Composition of Foods*, Agriculture Handbook #8 published by the USDA and available through the Government Printing Office. Carefully review the nutritional compositions of all foods being offered to your birds. Without this kind of information it is easy to provide foods which a parrot will eat, but which are nutritionally poor and detrimental to the long-term health of the specimen.

I would also recommend a good quality food supplement be regularly provided for your birds, either in the form of commercially prepared products specifically for birds, or perhaps dog, cat or monkey chows.

The palatability of dry preparations is improved for some species if they are softened in warm water prior to feeding. This will also result in better rates of consumption as parrots instinctively attempt to husk dry, brittle particles which results in a great amount of wastage and reduced psychological interest in these foods.

In conclusion, breeding cockatoos and macaws is in fact an extremely challenging task. The term "putting your birds to work" is in reality a misnomer, for in breeding birds, it is the aviculturist who is the worker. It is also the aviculturist who is the key factor in any successful breeding program. Those who are most successful have a form of non-verbal communication between themselves and their charges. If you "listen", the birds will tell you what they need! •

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