**FERTILITY 'WRITES'**

**Compiled by Betty Rea**

The saying 'Don't count your chickens before they're hatched' is worth heeding. There are so many things that need to happen before we have young birds ready to release into the flight. Firstly, we need compatible parents, fertilisation has to occur, eggs have to be laid and incubated and lastly chicks must hatch and be fed. All of this takes time and the breeder needs to be observant and patient.
Recently I have spoken to several members who have had unacceptably high ratios of clear eggs so I thought that it might be a good time to search my files for all of the material relating to fertility and reproduction. As it is not a simple topic I have divided it into sections - **Compatibility, Fertility, Incubation, Hatching and Feeding**.

**Compatibility**

Most of us have probably chosen what we thought was the ideal pair only to find that they just did not like each other, or worse that they were actively aggressive. I remember pairing a particular hen for the first time and giving her the mate I really wanted her to have in order to produce some Clearbody and Clearbody split chicks.
Within minutes she had the cock cowering on the floor of the cabinet. My second choice fared no better. Eventually I allowed her to have the mate of her choice, a cock that flew in from the adjacent flight and sat on the outside of the cage feeding her through the bars. In the following years she was compliant, accepting the cocks that I chose for her. She went on to produce some really nice chicks.
Some pairs accept each other almost instantly, some take a few days to become friendly, some will sit on opposite sides of the cage indefinitely and some will be aggressive. Its up to the individual breeder as to how they handle these situations. If you really want a pair to be together you might persist but from what I hear from other breeders most will give up after a few weeks and either try another pairing or return both birds to the flights. If I see aggressive behaviour I separate the pair immediately as I see no advantage in risking injury to any bird.
Apart from the factor of whether they actually 'like' each other it may be a matter of timing. If both birds are in peak breeding condition and 'ready to go' they are more likely to accept each other than if one or both is not in breeding condition. Deep colour of the male cere and an even light brown of the female’s cere together with bright eyes and high level of activity and interaction are signs that birds are in condition. Hens may be eating their perches and trying to jam themselves into the most unsuitable corners of the aviary that they can find. Cocks may be trying to mate anything that will sit still!
Budgerigars are very aware of colour and have definite colour preferences. Some research has shown that they choose mates of the colour that they first saw in the nest box and that fostered chicks chose the colours of their foster parents rather than the colour of their genetic parents when finding a mate. Dr. Harry Cooper suggests watching your birds to see the colours that they choose when selecting a mate for themselves. I have observed this myself and have found that some cocks always choose a hen of a particular colour.
Sometimes we can be lucky and the mates that our birds choose for themselves are what we would have chosen ourselves, or are at least a very good second best. Some of these choices end up being most productive and result in happy birds and happy breeders.

**Fertility**

Gerald Binks, in 'The Challenge' lists twenty factors that may contribute to infertile eggs.
1. Failure to mate.
2. Immature parents.
3. Unsuitable perches.
4. Overweight hens/tumours.
5. Male infertility.
6. Genetic factors.
7. Incorrect lighting/temperature.
8. Tired birds.
9. Birds out of condition.
10. Aviary too quiet.
11. Box bound hens.
12. Highly strung hens.
13 Disturbance - vermin- external lighting.
14. Infected eggs.
15. Buff feathering.
16. Drug effects.
17. Internal layers.
18. Pairing on the decline.
19. Old age and infections.
20. Condition not synchronised.

**Failure to Mate**
Some birds are keener than others, we need to breed with the birds from our stock that are bright, active and show the desire to mate. Shy retiring birds, that show no interest, usually fall to produce. Good nutrition is essential if birds are to succeed in the nest box.
**Immature Parents**
Some birds are very keen to breed when they are barely passed being chicks themselves but it is not fair to expect them to do so even if they are themselves big. Even if they are physically able to mate, lay eggs and incubate, the task of feeding and raising a nest of chicks is too much for very young birds. Producing and laying eggs at a very young age can also be detrimental to a hen. Birds of some of the rarer varieties take longer to mature than the more common varieties so it is worth taking this into account when pairing up.
**Perches**
Gerald Binks recommends square perches firmly fixed and made of hardwood. This is because round perches can become worn and polished making it hard for the hen to grip when the cock mounts her. This will be more of a problem for large hens than small ones. Wonky perches have often been blamed for failure to mate successfully but many breeders have found that, if they really want to, birds will find a way. Some birds with physical disabilities (missing leg, for example) will mate on the floor of the cabinet. I have cocks with missing legs that have had no problem mating in the usual way. They both lost a leg very early in life, have a healthy solid stump and show no sign of being aware of their disability. A cock that loses a leg later in life may however be unable to mount a hen and mate her.
**Overweight hens, or tumours**
Large hens are not necessarily overweight but the ones that are inactive and have put on excessive weight around the back part of their body may have difficulty breeding. it appears that excess weight in this region may restrict the oviducts preventing successful mating and also hamper egg laying. Tumours in this area have the same effect.
**Male infertility**
Assuming that a cock has matured normally he may be physically infertile or have weak sperm. On the other hand he may be physically fine but has not learned the technique of mating, especially if he is near the lower end of the pecking order in the aviary A bird that has been exhibited too frequently may be rendered infertile due to stress.
Dr. Baker states that very few cocks are in fact sterile but that there are times in their cycle when they do not produce sperm.
**Genetic factors**
Birds that have been closely bred over many generations in order to concentrate their good features may in some cases also concentrate genes for less desirable traits such as weak sperm. Dr. Harry Cooper points out that by inbreeding we can lose the "hybrid vigour" that is seen when birds from a wide gene pool interbreed. This means that we have to look at our in-breeding and line breeding practices to determine whether we have inadvertently bred infertility into our lines. The best bird in the show is not a great deal of use if it will not reproduce. The careful use of outcrosses is recommended when a lot of close pairings are made in order to perpetuate a specific variety, especially the rare varieties where the whole breeding programme may be based on a single bird.
**Incorrect light and temperature**
This is not as much a problem for us as it is in cooler countries where daylight hours can be very short and heating and lighting of breeding rooms is necessary. The birds need sufficient daylight when breeding to have time to feed their chicks sufficiently. In our climate the daylight hours are sufficient for the birds to do what needs to be done. Experiments have shown that the birds do not benefit from having lights left on for extra time as they are attuned to the daylight hours.
**Tired Birds**
Birds stressed by being left without food (even for a short time) or by being exhibited too much may be too tired to begin breeding. Similarly, birds affected by parasites may be restless at night and be too tired to be interested in breeding.
**Birds out of condition**
Cocks have a cycle that includes times that they are not producing any sperm. If the birds are not in breeding condition when paired up (and if they actually get together) infertile eggs will result. Out of condition hens may show no interest in the nest box at all. If the hen does not get to the point of passing copious droppings she is not in condition and should be returned to the flight.
**The Quiet Aviary**
Budgerigars are gregarious and in nature breed in the colony situation. The noise of other birds stimulates the process. This can be a problem for the beginner with only a few birds; a single pair of birds rarely breeds successfully. Some breeders have introduced wire cabinets, claiming that these promote breeding because they allow the birds to see each other. Other breeders feel that they have no advantage over wooden box type cabinets. It appears that the noise factor is of more importance than the visual factor.
**Box Bound Hens**
As the term, implies this condition occurs when the hen goes into the box and does not emerge to be fertilised. A hen that is simply overanxious to go in to breed may behave in this way when initially paired. On the other hand a hen may behave impeccably for the first round but refuse to come out of the box to be fertilised for a subsequent round. Having the first round chicks still in the cabinet can be one of the causes of this, as hens often dislike mating in a distracting situation. Another problem that can occur in this situation is that the hen may lay, but because the older chicks are coming in and out of the nest box, the eggs may be broken.
I have read that in the wild once the chicks are self-sufficient the pair will fly off to make a new nest elsewhere leaving the older chicks to complete the raising of the youngest. Recently I had a nest of seven chicks that fitted this category and I could see the parents mating fervently but most of the chicks were still running in and out of the nest box. As luck would have it, I had a spare breeding cabinet, so I moved the pair to that. It surprised me that Mum was very distracted and ran up and down the cabinet calling to the chicks. On the second day I removed her and put her back in with her brood wondering how she would behave and watching her carefully in case she attacked them. For a couple of days she just sat beside them, fed the occasional snack to them but they were basically independent.
Meanwhile Dad was in the cabinet by himself exploring the new nest box. When I put her back in with him she was quite happy to settle down and I saw them mating again. A day or two later she laid her first second round egg. This behaviour surprised me as I had been led to believe that a hen would be far more interested in getting on with a new round than with checking up on existing chicks. In fact I have had hens attack their youngest offspring - to the point of death - in order to be free to sit again.
There are several techniques for keeping a hen out of the box in order for her to mate - these basically involve the closing off of the box for a short time. The design of the cabinet determines how this will be done. Boxes that can be moved along so that the hole is closed off are ideal. Alternatively, stoppers can be made for the hole to the nest box, or the hole blocked off with crumpled paper. Some breeders remove the box entirely. Different breeders use differing techniques but all with the same purpose; the exclusion of the birds from the box for 24 hours or until they show signs of getting together. Closing the nest box off over night and then opening it again a couple of hours after dawn is another suggestion. This forces the pair to spend time together, and will hopefully lead to them mating.
The presence of the nest box is one of the factors that sets a pair into 'breeding mode'. One suggestion is to put a pair in a cabinet with a nest box to get them interested in breeding, then remove it for a few days so that they concentrate on each other, putting it back once they have been observed mating. Dr. Harry Cooper points out in one of his articles on this subject that, once a hen begins laying, there is a change in her hormone levels. The effect of this is that she loses the urge to mate and increases her desire to brood.
**Highly strung hens**
Such hens can be a disaster in the breeding situation as they are likely to re-act in panic when mated and upset the whole aviary. They can panic in the nest box and smash their eggs and if they ever do have babies (or fosters) they can pass on their anxiety to the offspring. Gerald Binks suggests sending them to the pet-shop!
Disturbance/Vermin
Wandering vermin are a health hazard but can also cause the birds to be restless and agitated. They are then tired during the day and do not do well breeding. Another disturbing factor can be flashing lights (from houses nearby or cars passing). Shutters to prevent this being a problem may be necessary.
**Infected eggs**
This is particularly a problem with second or third round eggs as they can become caked with droppings. Nest boxes need to be cleaned between rounds with new false bottoms put in place for the next round. Eggshell is porous and allows bacteria to pass into the egg - eggs thus affected may be addled. Eggs can be washed using clean warm water but this is a tricky process and eggs must be handled with great care - don't attempt to scrape off caked droppings! Handling of eggs by the breeder may also infect the eggs, so take care and always wash your hands if touching eggs. Dr. Baker's research showed that a high percentage of dead in shell resulted from staphylococcal infection, which is rarely found in droppings.
Humans however have a very high incidence of staphylococci on their skin, including their hands! He recommended not handling eggs. If they are removed from the nest for marking, make sure that they are returned exactly as they were as the hen turns them during the day and knows the sequence in which she has placed them in the nest.
**Buff feathering**
This is the term for the heavy coarse feathering that can make a bird look really large. Unfortunately, it can also make them much harder to breed because the heavy feathering around the vent can prevent successful mating and fertilisation. Buff to Buff matings are not encouraged for this reason. Trimming feathers away from the vent area is an option. This can be done to both hens and cocks and should improve the ratio of fertile eggs.
**Drug effects**
The use of drugs to treat or prevent certain illnesses can leave cocks temporarily infertile. Good husbandry would involve giving birds a period of good feeding and rehabilitation before pairing up after any illness. The breeder must take into consideration the type and duration of illness and whether it is wise to breed at all with a bird that has been affected.
**Internal layers**
This is a term used to describe a hen that goes through the process of preparing to lay - that is she will swell around the vent area and produce the large droppings typical of a brooding hen but no eggs will appear. This is due to a malfunction of the shell gland, so the egg is partially re-absorbed, and the rest passes out in the dropping. Feeding increased calcium does not usually have any effect but is worth a try. If the hen is a maiden hen she can be given another try the following year.
Dr. Harry Cooper points out that there can be several abnormalities in a hen that result in the ova not passing down the oviduct or not forming a normal egg. Sometimes a large cyst forms in the oviduct and blocks any sperm coming up and ova passing down. Hormone levels can also affect successful egg production. A hen may have a level of one hormone that allows her to mate but lack another that would lead her to produce eggs.
Hernias or pelvic abnormalities may also lead to eggs not being laid - an experienced breeder would detect external anomalies.
**Pairing on the decline**
Birds go through fitness cycles relating to the time of the moult. Unfortunately with erratic weather patterns this can be very hard to determine and birds may go into moult when we least expect it. They need to have come out of moult and be heading towards peak condition before pairing. Gerald Binks suggests that they be 3/4 towards their peak. The hen's cere is an indication of her condition and when she has a clear light brown cere she is ready to pair. By the time it has gone to a really dark brown she is on the decline. As Dr. Harry Cooper points out, an enormous amount of a bird's resources go into producing a new set of feathers, and a bird in this condition cannot be expected to breed successfully.
**Old age and infections**
When is a bird too old to breed? Breeders with many years of experience will tell you that they have bred with birds that we would now consider too old to breed. A cock is considered capable of breeding from 6 months of age to about four years with a hen considered to be at her best in her second and third years. Many of us have bred with six year old birds and are still having success with them - but this is becoming less common. Some birds at six years can and do produce; others are obviously 'past it'.
**Condition not synchronised**
This is a difficult one for the breeder who wants to pair a particular pair of birds. So often the birds we want to pair to achieve a certain result are just not ready at the same time. The breeder then has to make a choice.
Do we pair the perfect couple and end up with all, or mostly, clear eggs or do we compromise, take the second best mate for the bird - one that is in peak condition - and thus produce a full nest of chicks? The odds are that in a full nest there will be one or two better than average birds and at the same time the fertility of the line is being maintained.

**Incubation**

Some maiden hens simply do not know how to incubate their eggs. Dr. Harry Cooper suggests making the concave in the false bottom large and deep as this encourages the hen to sit correctly. If the concave is too small she may have difficulty keeping the eggs together and covering them. They may also roll around the nest box when she tries to turn them. An immature maiden hen may not have developed the desire to incubate and be inclined to play with, rather than sit on her eggs. This is a good reason not to attempt to breed with hens that are too young. Keep in mind that some varieties mature more quickly than others.
Some may mature early and do everything 'by the book' - like us, birds are all individuals. Cocks that enter the nest box may be a distraction - some hens allow the cock to sit with them and will share the eggs with him, while others resent him entering the box. Chicks from the previous round can be a distraction and prevent a hen from sitting - they are also a hazard as they can easily smash the eggs with their coming and going and result in them being soiled and spoiled. Noises and lights in the night, along with rodents and other pests may cause the incubating hen to come off her eggs allowing them to chill.
Progesterone is the hormone that kicks in when the hen is broody. It increases blood flow to the muscles around the abdomen, which, together with the loss of feathers in this area, increases the heat that can be transferred to the eggs. It is also the hormone necessary for the production of crop milk, so if it is lacking the hen may not incubate or feed effectively. Nestbox/breeding cabinet design can be a cause of eggs failing to hatch. If the birds have to enter and leave the nest box by going over the eggs damage can easily occur and the eggs can be disturbed. The hen turns them several times in the course of a day and if this sequence is disturbed eggs may not develop and hatch. A certain level of humidity is necessary but most hens will take care of this themselves by rolling on their green food to gain moisture or having a 'bathe' in their water dish. In extreme heat it may be necessary to use a mist spray in the breeding room regularly to keep up the humidity. If a chick dries out during the process of hatching it can become imprisoned in its shell and not have the strength to complete the hatching process.
Hens have different ideas about what they do and do not like in the design of nest boxes. Some like to sit on their eggs and look out to see what is going on outside. Some like to go to the far end right away from all disturbances. Some like to sit jammed up against the front door so that when you open it the eggs all fly out! It is necessary to use half doors or blocks for such bird so that eggs do not get lost.
If you have hens with such idiosyncrasies make a note of it so that next time they are put in to breed you don’t waste time trying to get them settled. In order to accommodate a hen that had cysts on her wings and could not fly I made a breeding cabinet with the nest box attached at the bottom so that the hen could literally walk into it. This has since proved popular with a number of pairs and the chicks love it as they can walk in and out, feeding on the cabinet floor with their parents and then run back inside when they feel like it. I have also made false bottoms with concaves at the front, the back and the centre in order to cater for the different desires of various hens.
Most breeders check their nests at least daily, some who have the time, check both in the morning and late afternoon. Unless there is a problem this should be sufficient. Do remember that no amount of looking and checking will make a clear egg fertile but it can make a fertile one addled! Also remember that strong vibrations or bumps can damage an egg, as the 'strings' (chalaza), that hold the yolk in place may break. This too causes addling.

**Hatching**

Prior to hatching it is often possible to hear the squeaking of a chick inside an egg. A strong call is a good sign. The chick may hatch over several hours but if the egg cracks and the chick does not manage to break free it may die. There can be several causes for this - the one we hear most about is lack of humidity (as previously mentioned). Sometimes though the chick is simply too weak to hatch, this may be genetic or it may have been infected in the egg. The eggshell may be extra thick or the membrane too strong for the chick to successfully break free. The chick needs to be in the right position inside the egg to be able to rotate itself fully as it breaks open the eggshell, if it is in an abnormal position it may be unable to free itself. This is when the breeder’s intervention may be warranted.
Lethal genes can also come into play at this point and affected chicks may die before, during or shortly after hatching. If a chick has been observed to be in the process of hatching for what the breeder deems to be an extraordinarily long time it may be worth intervening and very carefully removing enough of the shell to allow the chick to free itself and complete its hatching. Clean warm hands are an essential if you are considering this and the chick, together with the shell, should be replaced with the hen immediately. For the first week of its life a chick is totally dependent on its mother and siblings for body warmth. After that time, warmth is obtained through the metabolism of food.
Don’t be tempted to initiate hatching just because an egg has reached 18 days. Incubation may not have commenced immediately or eggs may have been cool for a time during incubation slowing down their progress. Healthy chicks will hatch in their own time and weak ones may not make the grade. It is usually best to allow nature to take its course.

**Feeding**

We have probably all experienced the maiden hen that cannot, or will not, feed her new chick. I have had a series of them recently. However by swapping chicks (about 5 days old) that will shout for their food for the newborns some of them have been saved. Once a young hen has learned to feed she will probably not have any difficulty with subsequent chicks.
Poorly fed chicks may need to be transferred to another nest. Their loose, dark coloured skin and poorly filled crops identify such chicks. If there are no alternative nests available it may be necessary for the breeder to give some supplementary feeding to such chicks. Make sure that feeding pairs have plenty of fresh foods as well as their seed mix. Seeding grasses, silver beet, carrot, endive are all suitable and some pairs also appreciate a piece of wholegrain bread moistened with milk. Uneaten soft foods need to be removed before they 'go off'.
Sometimes a new Mum does not produce the thick creamy crop milk necessary for the chick in the first eight days of life. If she is feeding whole grains the chick will not thrive and needs to be transferred to a nest where the hen is feeding correctly.

References:
Gerald Binks - 'The Challenge' Chapter 32, Infertility - the Greatest Hurdle
Dr. Harry Cooper - Budgerigar World - 4 articles 'Infertility in Budgerigars'
Dr. John Baker - Budgerigar World - 'Why Eggs Fail to Hatch'
Don Burke - Budgerigar World - 'Fertility and Vigour in Budgerigars'

Betty Rea is the Magazine Editor of The Rare Budgerigar Club of Western Australia Inc.