Chapter 1

Aviary design

At the outset, it can be very helpful to decide which species of pheasant will inhabit your new aviary. Blue peafowl are obviously much larger than Grey peacock-pheasants and the birds obviously require different sized aviaries and create very different demands on the aviary itself.

The cost of building an aviary is usually much more than the cost of the birds within it so the amount of funding available may also limit the size and shape of your aviary.

Who will design it? Someone with knowledge of the birds that are to inhabit it or an architect brought in with little or no practical experience. Some zoos face major problems with designers and architects who are highly competent at their job but have no experience of the needs of the birds. They need to be briefed thoroughly. In one well-known zoo, an architect placed all the pheasant pop holes into their night shelters high up so that the birds could fly in at night - of course, pheasants need pop holes at ground level.

Size

In the interests of the welfare of the birds within an aviary, obviously the larger the aviary the better it is likely to be for the occupants. Finance will usually play a major part in determining how large an aviary can be. It makes great sense to ensure that the pheasants within the aviary can act as naturally as possible and can run or fly away from potential dangers. All aviaries will impose some restrictions on birds and no man made structure will equal the bird's natural environment. However, pheasants usually adapt very well to life in captivity and, provided their environment is as stress-free as possible, they usually live much longer than they would in the wild. Many pheasants reach 20 years or so, and can have a full reproductive life for all of this time.

Where finance is limited, it is usually better to lessen the height of an aviary and spend more on providing a larger floor area. Pheasants spend the vast majority of their lives on the ground and do not get much benefit from an aviary which is more than 2 metres tall. Indeed, it only needs to be this height to allow the keeper to service the birds – most pheasants would be happy to have the majority of their aviary less than 1 m high.

As will be discussed later in this document, an irregular shaped aviary (where there are numerous nooks and crannies for females to hide when males become too aggressive) can be much better than a square or rectangular shape. The more hiding places there are for a hen, usually the safer she will feel and the better she will breed. If plenty of cover is provided, a 100 sq.ft (10 m^2) is recommended for a beginner as an absolute minimum for a small pair of birds, such as peacock-pheasants. Please only regard this as an absolute minimum and try to provide the biggest area possible. Larger species will need considerably

more space, particularly if they have a grass floor. 400 sq. ft (40 m^2) seems a practical minimum for a grassy area to be maintained, and even this will be decimated by eared pheasants and monals.

For conservation breeding where parent-rearing may be a key factor, larger aviaries allow sufficient space for hens to keep their chicks out of the way of males that can sometimes be aggressive. Indeed, a larger aviary can offer the facility of dividing it at times. Aviaries that need to cater for a whole family of overwintering pheasants will need to be very large if the natural environment within them is not to be decimated by the growing family during winter.

Materials and climate

Use should be made of experience that others have gained about which materials last best under the particular climatic conditions that prevail in the area where the aviaries are to be built. Provided that costs are not prohibitive, use the best materials you can afford and those that are most appropriate for the climate. Wooden frames in areas with wood-eating termites are obvious examples of money and effort that is likely to be wasted.

Aviary building materials

Firstly, it is important to say that you get what you pay for – good quality preparation and materials will last longer, and will also probably look better to you and to the public.

- **Foundations**

What goes into or on the ground before anything is constructed – a concrete base slab is a very effective anti-vermin and predator control, but is very expensive and still requires some form of cover, such as sand or soil to protect birds' feet.

If brick walls are to be used for shelters, or as low barriers between birds, these will affect costs and construction time, since they require firm foundations and more additional labour.

- **Framework**

Whether the framework is of wood or metal, both will need to be treated to preserve them. Wood should be tanalised and possibly also treated with a further preservative, such as bitumen. In a climate where rain is frequent, fungus can develop quickly on untreated wood, and can be an increasing problem as the wood ages.

It is also worthwhile considering what species might inhabit the aviary besides galliformes – a well-known zoo designed a very expensive aviary using metal framework, only to find that the parrots that later lived in it had major problems in very cold weather when their feet got stuck to the freezing metal.

As mentioned previously, wood boring insects, or birds such as parrots, will also make short work of timber framed aviaries. On the other hand, in the UK, timber-framed aviaries seem ideal for the environment and have lasted 15 years without any major problems.

- **Netting – wire (gauge) or string**

Netting is designed, not just to keep the birds in, but also to keep the public and predators out. An analysis of these is vital. Usually, in collections where the public have access, aviary wire is much thicker to keep the public out and

pheasants probably only need nylon string netting to keep them in. However, the public and predators can make short work of this. 19 gauge wire is the minimum thickness on the outside against predators – usually parrots are not kept with pheasants, but if the aviaries have different species in them from time to time, a parrot would soon bite its way out of 19 gauge mesh.

You can compromise with wire on the outside and nylon string netting on internal partitions. To keep sparrows and small birds out, you need 1″ (2.5 cm) square mesh, but small mice can still get into 1″ by ½″ (2.5 by 1.25 cm). Since pheasant aviaries need to be quite large, many pheasant keepers use nylon netting on the aviary roof, particularly since birds are less likely to injure their heads if they fly up in panic. It is also very much easier to put nylon netting in place on a roof than to struggle with heavy rolls of wire, particularly when the width of the rolls results in the need for joints to be made. However, in many areas, nylon netting has proved a false economy. Predators such as mink, weasels, stoats and foxes find it easy to enter through netting roofs, and are often helped when rats or squirrels start the hole-making process. Once inside, predators often go from aviary to aviary killing large numbers of birds, even though they only need one to eat.

Netting can be fixed to wooden framework using staples or clouts (wide headed, galvanised nails). Stringing wire or welding can be used on metal frames. A 25 m roll of 6 ft high 16 gauge wire can weigh nearly 100 kg. Lifting this up to fix on the roof of an aviary can be extremely difficult, particularly if only one person is available. A useful tip is to place a long, round pole through the centre of the wire roll and then to manoeuvre the ends of the pole onto the supporting roof beams. The wire can then be unrolled by rotating it around the centre pole.

Snow on small gauge wire or on string netting can settle on the roof and its weight can bring the roof down. In areas where heavy snowfall is experienced, additional roof supports will be needed. It is always advisable to dislodge snow and ice as soon as possible after it forms on the aviary roof. More is discussed on this later.

- **Roof – above netting**

It is advisable for any roofing sheets to be placed on top of the netting so that, if it gets damaged or blows away in a gale, then the birds are still protected and secure. It can be a false economy to use just roofing materials and not have netting underneath. Roosts that have their roof several inches below the netting can encourage the birds to roost on top of the roost, with their heads against the netting. This can allow easy access by predators at night, and is one of the major sources of death and injury to pheasants at night in the USA from owls.

If corrugated sheeting is used to provide shelter without wire netting underneath, this also provides easy entry for small predators and mice.

- **Shelters**

Birds will need shelter from strong sunlight and most pheasants dislike getting wet. A large percentage of pheasant species come from cold, mountainous areas, such as the Himalayas. They have evolved to survive much colder temperatures than are usually experienced in captive collections, but their natural environment seldom receives the cold rain that many European and North American countries experience in winter. Cold wet birds die so if your winter subjects birds to these conditions you will need to provide good cover. Tropical species will also need some form of heated roost in colder climates. Tropical pheasants are very prone to frostbitten toes, and the pain of such events usually kills the bird eventually as well.

When planning a shelter inside an aviary, it is probably best to build it the whole height of the aviary. Economising by building a shelter which does not reach the aviary roof can result in birds attempting to roost on the roof. In a zoo where this happened, predators killed a number of pheasants that were roosting in this way.

- **Bird Flu**

In recent years, lethal forms of Avian Influenza have spread throughout the world. Although avian flu in less virulent forms is always present in some wild birds, the transmission of H5N1 from birds to humans has caused a number of deaths. The major concern is that the current H5N1 strain will mix with human flu to mutate into a virus against which most people will have no immunity. Consequently, governments decree that any outbreak will usually be contained by culling all captive birds within the vicinity of the outbreak.

Since many pheasant species are threatened, provided that your birds are already registered with the Government (see page 5) then they may be afforded some protection provided they can be excluded from contact with wild birds or other domestic free ranging birds. If designing new aviaries, it is as well to consider how your birds might be retained under cover in the event of an outbreak, and to build these facilities into your aviaries.

Aviary height

- **Who is it for?**

Probably the needs of keepers will be highest as they have to be able to stand to work in the aviaries. However, if other species that need flying height are also to be housed in the aviary, then pheasants will also roost up high. Beware possible perches that would allow a pheasant to roost too near the roof of the aviary, particularly perches that are not underneath a shelter. Predators often kill or injure pheasants at night if they can catch them with their head against the roof wire.

- **What are the birds' needs?**

A high perch underneath the night shelter is the most necessary requirement for a pheasant. In the wild you only find them on the ground during the day, unless there is extreme danger.

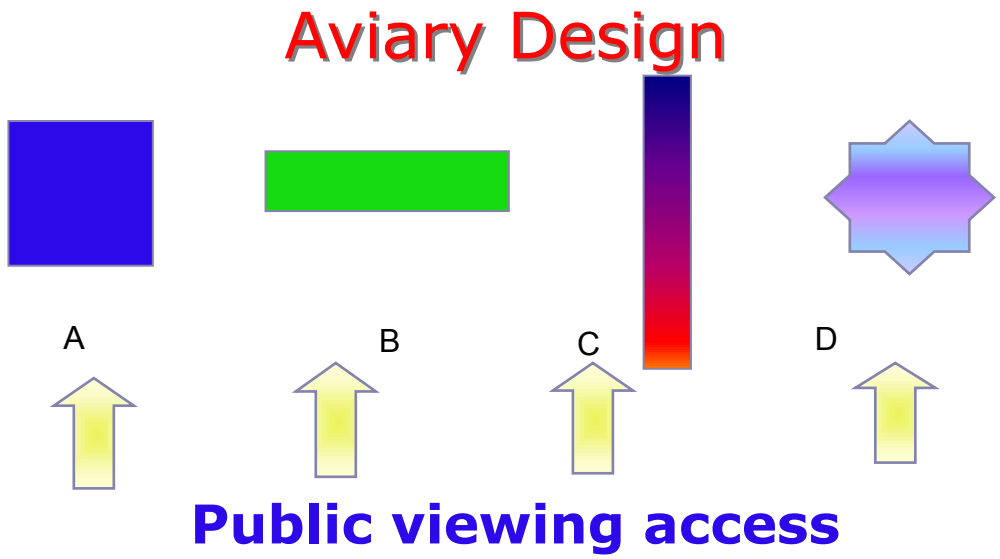
- **Aesthetic properties**

A well-planted, tall aviary looks much better and probably makes the pheasant feel more comfortable in its environment. Opportunities to get some shade, to peck at some foliage, to forage for insects, etc., will all provide an

environment that is more conducive to breeding. However, always look at the aviary from the bird's point of view and try to evaluate how they will see and use it.

- **Dangers to birds – supporting beams**

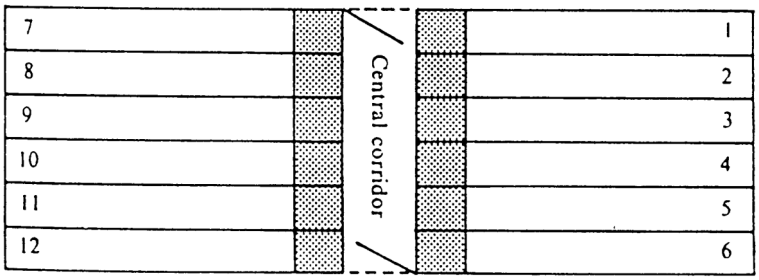
The roof of an aviary has to be supported, so cross beams are necessary for this purpose. However, remember that pheasants fly straight upwards in an explosive action if they panic and the speed of their upward flight can often result in serious head injury or even death. By far the best solution is to spend sufficient time with the pheasants so that they are comfortable with humans around them. They soon get to recognise feeding and cleaning routines and, if they aren't worried by these, they will not fly up when someone comes into the aviary. However, with birds that have not yet developed a trusting nature, look at the aviary roof for potential hazards. Maybe some judicious padding for a short while might save the life of a precious bird. One Dutch breeder hung a "curtain" of 2" (5 cm) wire netting suspended only from the roof to reduce the impact if a bird flies off its perch in a night panic.



Theoretical aviary designs

Imagine the different environment for pheasants in each of these aviary shapes. Consider the effect of the public. What security is there for the birds? What is there of interest for the birds? Are there secluded areas for hens to get away from the cock? If each of these aviaries had the same area, their perimeters might be quite different and the costs are therefore likely to vary as well.

From a pheasant's point of view, it would probably prefer the aviaries in order D, C, A, B. However, the costs are also likely to escalate considerably with some of the options.



In the diagram above there are two banks of straight aviaries divided by a central corridor, like at Sungkai in Malaysia as shown below. This is a very sensible design for use with the public, who have no access to the central area. The central corridor acts like a safety porch for the keepers, with no actual aviary entrances on the outside. There is easy access to aviaries for large items, such as wheelbarrows, etc. Always look at doorways: the fewer doorways there are, the less opportunities for mice and other vermin to find a way in.

Sungkai aviaries

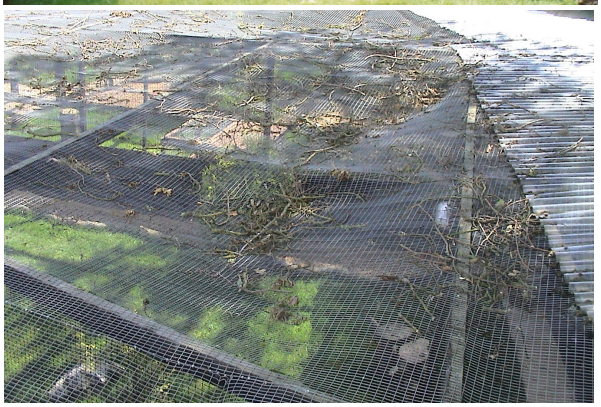
These very large aviaries belonging to the Wildlife Department in Malaysia have been designed to allow access for a small tractor to move large amounts of sand in and out of the aviaries. They are constructed in a clearing in the forest.

One major design fault was that the concrete base was not built very high and the metal framework was not fitted flush to the concrete base. As a consequence, they have had major problems with pythons eating their birds. Keepers always

catch the python afterwards since, once it has swallowed a bird, it is too fat to get back through the gap it came in through.

The Aviary Roof

Inevitably many aviaries will gather debris on the roof, particularly if they are located beneath trees, as can be seen here.



The weight of debris can accumulate to quite a considerable mass, particularly wet leaves in Autumn and Winter. A heavy gauge wire mesh will probably withstand quite a significant weight before it begins to sag, but it is very worthwhile planning before the aviary is built how you propose to clear the debris. If the roof timbers are of adequate strength (such as 4” x 2” joists - 10 by 5 cm) then it is possible to lay scaffold boards across the joists and then walk on these to gather the debris and clear it. Without planning for this eventuality, this problem is often encountered too late to be able to resolve it in a very satisfactory manner.

A strong roof has an added advantage. Should a gale bring down a large branch from the tree above, there is more likelihood that the roof will withstand the impact, or at least continue to retain the birds until such time as you can repair the damage.

Snow on the aviary roof

In areas of heavy snowfall, the roof needs to be sufficiently strong to withstand the weight of snow. In this aviary, at Kufri in the Indian Himalayas, more than 2 m of snow had fallen on the roof.

It is always a good idea to clear the roof of snow as quickly as possible. If the roof is well designed, it should be possible to place a scaffold board on top and then sweep the snow away. If this isn’t practical, another solution is to lay a rope across the roof and, with one person at each end, use it to drag the snow off the roof.

Another major disadvantage of allowing the snow to remain on the roof was experienced by the birds in this aviary. Outside it was very sunny and quite warm, but under the snow-covered roof, the birds were in the shade and were soaking wet from the constant dripping of the melting snow.

The weight of snow on the roof of this large aviary caused the upright posts to collapse inwards. The nylon mesh roof had no central posts or cross members to support the weight of snow on the nylon mesh roof.

In the event of an outbreak of avian influenza,

like polythene sheeting. Once this disease is present, it is likely that the increased security surveillance will need to be in place for up to six months. Polythene on an aviary roof will not allow any snow to fall through the mesh and heavy snowfalls can build rapidly, putting immense additional weight on the structure. It is advisable to plan for such eventualities! It can prove extremely helpful to have pre-prepared sections of nylon netting which will fit quickly onto hooks to retain birds within the covered areas of aviaries.

Aviaries on sloping ground

If the only available ground for a pheasant aviary is on a sloping site, it is still possible to provide an interesting environment for birds and visitors alike. By using a stone retaining wall and large wooden pilings, this aviary has been terraced to provide several large, flat areas.

Another approach might be to retain the slope and keep pheasant species in the aviary which tend to spend their lives on hillsides, such as crestless firebacks or Bulwer's pheasants (if they are available). However, sloping aviaries can be much more difficult to maintain for the keeper, particularly when trying to keep them clean or to mow grass.

Terraced aviaries can pose particular problems in heavy rain, when the rainwater runs off in streams, taking large amounts of soil or sand with it. Drainage channels can help with this.

Keeping the public out

Any aviary in a collection which is open to the public may need additional structures or be made stronger to keep visitors away from the birds. Note the safety barrier attached to the framework of this metal aviary at Sungkai in Malaysia. By being made of the same material as the aviary itself, and by being welded to the aviary framework, it gives the rail great strength and it looks good as well.

Doorways / pop-holes

How many doors are there – security?

The more doors that are created into an aviary, the more opportunities there are for birds to escape and for predators and the public to get in. Also, more locks may need to be bought. However, prior thought should be given to how birds might be moved from one aviary to an adjoining one without the need for the stress of catching and handling birds.

Which way do they open –for birds – for keepers?

If there is a safety porch, birds can be trained to jump back when you enter the aviary if the door can be opened outwards. If a bird seems to be making an escape attempt, the action of pushing the door closed, towards the bird, can act as a deterrent. Gate springs are extremely useful as they make the aviary doors close

automatically behind you. They also keep the door closed if a panicking bird flies against it.

Perhaps this may be one reason why some breeders prefer inward opening doors. Some people feel that a door opening inwards will make birds move back anyway. By far the best idea, is to create a safety porch, with the outer door opening outward and the inner door opening inward – then there is no chance of a bird escaping.

How wide and high are they?

Doorways have to allow keepers to get in and out of the aviary. If maintenance has to be carried out or you need to get large amounts of replacement sand into the aviary from time to time, then there needs to be a larger access for a wheelbarrow.

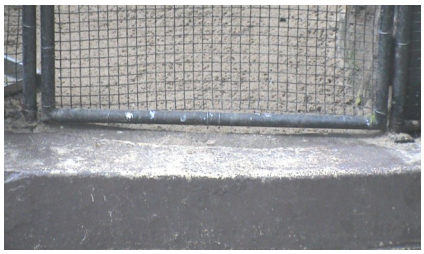
Height and placement of pop-holes for a roost or between aviaries

Birds that have to be handled become stressed. Therefore if pheasants need to be moved, it is much easier to persuade them through a pop-hole or doorway, than to catch them up. It is unusual but not unknown for birds to collapse and even die from the stress of catching.

Door security

By constructing a rebate around the door frame against which the door will fit tightly, access to mice is almost impossible.

This concrete doorway in a well-known zoo has become worn over years of use. It was interesting that this was the only aviary in the complex where mice were observed.



Doorway plank on an aviary entrance

Sometimes a plank of wood at the foot of the doorway will deter pheasants from walking out if the chance arises. However, design the aviary so that the plank can lift out of slots if you need to bring a barrow load of sand in.

Another example of making a doorway more secure

This doorway has a well-designed wooden base which can lift out to allow access for a wheelbarrow.

Safety porch

Accidental escapes by birds that panic when you enter their aviary are surprisingly common. A safety porch limits escape possibilities and also provides a confined area where it is easier to catch up a bird. This excellent example at the Tierpark in Berlin is extremely substantial, although it might prove difficult to enter with a wheelbarrow for maintenance.

This triangular shaped safety porch cleverly provides access to two different aviaries.

If the central corridor is fairly narrow, it can also be used to "walk" birds from one aviary to another without the need to stress them by catching them. This corridor has doors that are designed to open across the corridor and form a barrier, and the opposite doors can both be opened to form a crossover route from the aviaries on one side of the corridor to those on the other side.

Providing access between aviaries.

This shows the use of doorways opposite each other to allow easy transfer of birds from one side of aviary complex to the other without the need to catch up and stress the birds. These were used to allow a new pair of Palawan peacock-pheasants to become acquainted, and then gradually introduced to each other, whilst separating them at night.

Pop holes

Pop holes allow birds to gain access to a night shelter or another aviary. The standard position is low down and near a corner, since pheasants naturally walk around the perimeter.

Beware architectural follies – one architect for a well-known zoo had only seen parrot aviaries and designed the pop holes for pheasants high in their roosts.

By running a piece of string through screw eyes, the pop hole can be opened and closed without entering the aviary, without the need to approach the birds closely. In the right hand photos, the aviary designer has constructed a very efficient system of chains, wires and pulleys that allow pop holes to be opened very quickly without entering the aviary.

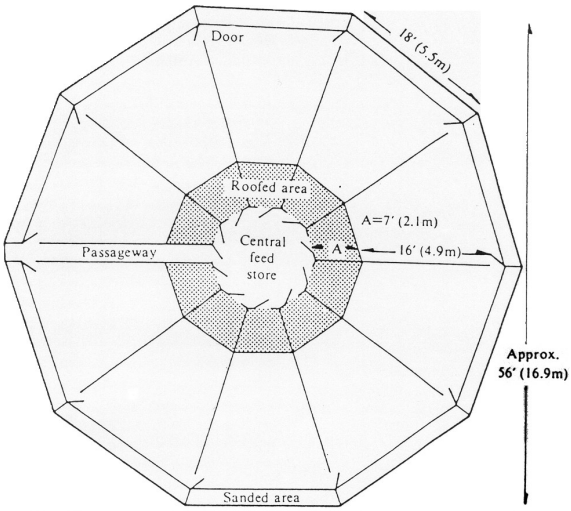
Pheasant chicks are unable to fly when they hatch, although some can manage some flight after three or four days. However, it is not uncommon to find a pop hole into the roost or shelter which is too high for a newly hatched chick to

manage. In very damp whether, this would mean the hen needing to care for her chicks in an unsheltered area and, under these conditions, chicks can easily get wet and then chill to death.

If there is a difference in ground levels between the main aviary and the shelter, a pile of sand can quickly be raked into position to provide a slope up which chicks can follow their mother into the dry. Alternatively, as in the photo here, you can have a ready-made ramp to put in place when the chicks are expected to hatch. Note, however, the dangers of this ramp where a chick might just get underneath and get lost. This Palawan hen has parent-reared for many years and, like all peacock-pheasants, keeps her chicks very close.

At Blossom aviaries in Himachal Pradesh, where there has been a pheasantry for rescued cheer pheasants for many years, the aviaries were built on the side of a steep hill. A series of terraces provided a number of flat areas within each aviary. Each terrace was about 18” (0.5 m) below the next. The night shelters were constructed at the highest point of each aviary. When the cheer pheasants began to rear their own young, each family was hatched on the highest terrace as the nesting sites were under the night shelters. Gradually, as the hens and chicks explored their large aviaries, they worked their way down the terraces, ending up at the lowest level. The “step” up to the higher terraces was too high for the chicks so they remained on the lowest terrace at the bottom of the aviary. Of course, although their hens tried to take the chicks up to the dry when it rained, the chicks were unable to manage the steps. In light rain, the hen could cover the chicks but, when the monsoon started within a couple of days, rain fell so heavily that it cascaded down the aviaries and formed a large pool at the bottom in which the chicks drowned. The aviaries were then modified to provide a slope in place of the terraces and no further chicks were lost.

Aviary design - circular



Circular aviary design. Note the single access gate and central store and feeding room.

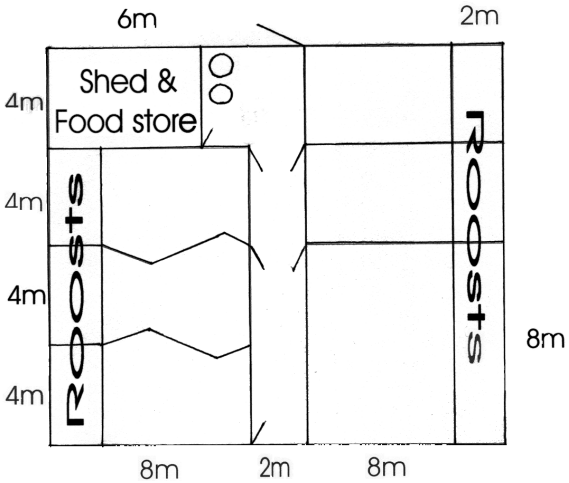
A cartwheel wheel-like design by Keith Howman. This design has one central corridor. It is good to keep food secure and dry and away from the public. It has a built in covered safety area for food bins, brooder boxes, etc. It is also easy for keepers to access aviaries without causing much disturbance to the birds. This design gives a good view of the birds for the public and a small shelter at the back for the birds, with a sand area under perches to make cleaning easier. However, if the birds wish to get away from the public, they have only a limited area to use.

Aviary design – Sarahan

Sarahan Pheasantry in North India – circular. This is where the first Western Tragopan was bred in 1993. Note it is an all metal construction because of termites and a variety of predators, including leopards!

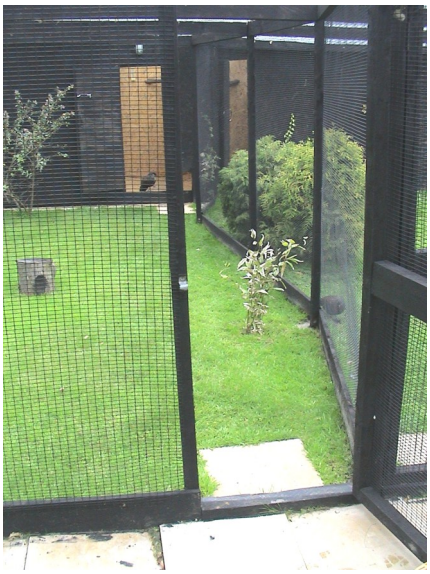
At a similar aviary in Sungkai, Malaysia, a Crested Fireback wild male walked out of forest into the access corridor seeking to mate with captive female.

Aviary design – some alternative plans



The night shelters are on the outside of this complex, as the birds are in need of shelter and privacy – i.e. breeding quarters where the public are excluded. It provides good protection from drafts since the backs of aviaries are solid and it also cuts down on heating bills with the roosts adjacent to each other.

The layout of the bank of aviaries on the left, where the internal partitions between the aviaries have been staggered, provides the same area of aviary, but give more variety for the birds and offers additional nest sites and security for hens.



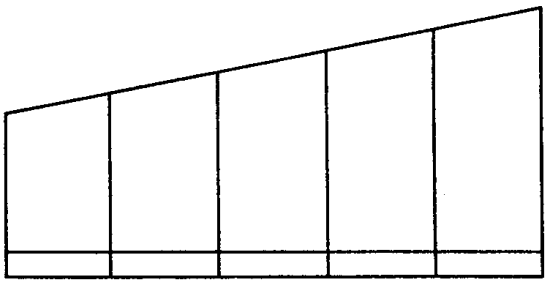
Dividing panels between aviaries

Angle the internal walls between the aviaries to provide variety for the observer and security and nesting sites for the hens. Also note the paving slab inside the door to avoid wear on the grass by the keeper.

Aviaries with irregular walls

These large aviaries at Sparsholt College near Winchester in the UK have been constructed with "zig-zag" walls which create many corners for hens to nest and hide. Once shrubs have grown in the corners, these are ideal pheasant aviaries.

Major Iain Grahame's design to accommodate different species in different sized aviaries in one aviary block.



Plan of aviary design with different sized aviaries, but standardized shelters at rear.

Boarding between aviaries

It is always best to ensure there is a visual barrier between each pheasant aviary. If this is not present, invariably there are problems between the birds, whether of the same or different species.

- **Problems with fighting between pens**

Cocks and hens from different pairs become very territorial and will fight through the wire if they can. The experience of finding a satyr tragopan cock killed through the wire by a peck to the head from a brown eared pheasant in an adjoining aviary taught the author a painful, but valuable lesson.

- **Distractions from breeding displays**

Even if they don't fight, males try to impress females in adjoining aviaries, often concentrating more on the neighbouring hen than on their own mate. This does not encourage good breeding.

- **Security of chicks**

Chicks can get through small mesh very easily, and they certainly don't see a pheasant in the next pen as a potential enemy. Even standing close to the wire can result in death or injury to a chick. It can be horrendous to see a Himalayan monal female catch a very young Temminck's tragopan chick and literally pull it through the small mesh between their aviaries. Of course, the chick did not survive. Therefore, a solid barrier can be a great protection for chicks.

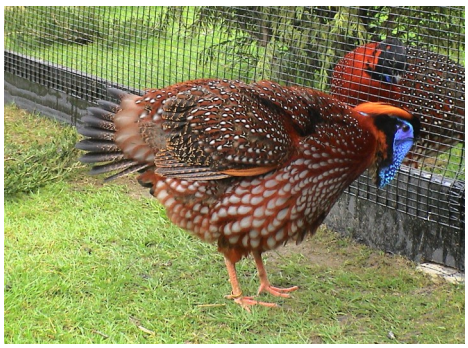
- **Public viewing better**

As can be seen from the next photo, open aviaries can look really good to members of the public, but they are not necessarily bird friendly.

Open aviary

There are no visual internal barriers between the birds – this looks very good and allows excellent views of the birds, but may result in distractions and fights.

Example of a satyr tragopan male displaying to a Temminck's hen in the adjacent aviary.



Temminck's tragopan male distracted from breeding by a satyr male next door.

One fairly inexpensive way of providing solid as well as visual barriers between aviaries is to use feather edge fencing board, as in these peacock-pheasant aviaries at Keith Howman's.

Rustic pole construction

The use of rustic poles can be used to create an aviary which is pleasing on the eye and is less intrusive than some materials. However, the poles are often not treated with preservative and therefore have a more limited life than wood that has been tanalised.

Brick fronted – Keith Howman's design

A more solid and permanent construction to divide aviaries. These need good foundations and are more expensive, but can be much more secure and should deter any mice or predators from transferring between aviaries. Care should be taken to ensure that birds cannot stand on the top of the wall between adjacent aviaries. Incorporating brick can make aviaries much more secure. However, there were aviaries in Zoo Negara in Malaysia which had stone walls. Unfortunately, the walls had sufficient gaps in the mortar for large numbers of rats to colonise the whole area.

Brick based with welded metal framework

This group of aviaries provides great security against any form of predators, but is expensive compared to other constructions unless you have building skills. Many parrot breeders construct such aviaries as their birds would destroy wooden framework. Fortunately, pheasants do not have such destructive tendencies.

Pens for quail, partridges and francolins

These species are not covered in this book, but excellent advice can be obtained from books on these species by Gary Robbins, obtainable from WPA or AB Incubators.

Aviary wire mesh

If you know that your aviaries will be constructed within a secure area where predators will have no access, then some form of string netting is undoubtedly the easiest and most economic material. Otherwise, you are likely to take the decision to use wire mesh to secure your aviaries.

Wire mesh comes in different thicknesses and the space between the wire can also vary considerably. The thickness of the wire is known in the UK as the **gauge**. Nineteen gauge is much lighter and thinner than 16 gauge, and therefore quite a bit cheaper. These two gauge sizes are adequate for pheasants, since they do not destroy wire with their beaks in the way that some parrot species can. Nineteen gauge will keep out small predators, like cats but not a determined fox or badger. Some zoos need even thicker gauge wire to keep members of the public out! Whatever mesh you decide to use, make sure it is **galvanised** which will make it last much longer.

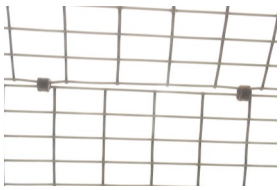
The cheapest and thinnest wire mesh is that used to construct chicken runs cheaply, so this is often known as **chicken mesh**. The spaces are usually hexagonal. If you have no likely predators, chicken mesh can be adequate, although its construction means that it can stretch out of shape very easily. However, most experienced aviary builders find that the cheaper chicken mesh is often a false economy as it breaks easily and certainly does not last more than a few years before deteriorating.

Mesh that has been welded into a square or rectangular shape is much more rigid and long lasting is usually known as **weldmesh** and even the thinnest 19 gauge will usually last 15 years or more. but 16 gauge is more likely to keep out predators. Although a little more expensive, 16 gauge weldmesh is more likely to keep predators out as well as the advantage of being able to support a much greater weight, especially on the roof, so heavy snow or occasional falling branches cause little damage. Of course, it also will last much longer and aviaries have been known to last 30 years..

Decide on the mesh spacing after assessing what you will need to keep out of your aviary. Experience has shown that one inch by half inch keeps out all but the smallest field mouse. If you wish to deter even these, you probably need half inch by half inch. Larger mesh sizes will allow other creatures in to the aviary and in these times when avian influenza threatens birds, and it is advised strongly that you try to keep out all wild birds that would love to feed on your pheasant food.

The traditional way to fix aviary wire to a wooden framework is by using staples – (galvanised U shaped nails). These can be difficult to hammer in unless you are fortunate to own an electronic stapler. Galvanised nails with wide heads (known as "clouts" in the UK) are much easier to manage and hammer in and do not pull out of the wood as easily as staples. They are also much cheaper. By using the wide head of the nail to cover a corner of the mesh, even large areas of netting can be affixed very quickly and easily. If you are attempting the task on your own, nails can be driven in halfway and the wire hung and adjusted until it is in the right position. Then the nails can be driven in fully, pinning the mesh to the framework. An example can be seen in Photo A.

A



B

C

D

Large aviaries are almost certain to need mesh to be joined. Special galvanised clips can be purchased and fitted using pliers. Overlapping the edges of the wire can provide much better security; wire joined as in Photo B is not nearly as strong as in Photo D. Another way to join two pieces of weldmesh can be seen on Photo C. Here a thick piece of wire has been tensioned between the two edges of mesh and a thin wire has then been interlaced to hold them all together. The tensioning wire certainly adds stability to the join. However, this will need regular inspection as the thin interlacing wire will not last as long as the mesh and, once a break occurs, the whole section can be undone very easily by a persistent intruder, such as a squirrel.

Every nail or staple dropped within an aviary during construction is a potential death sentence to any pheasant that will live there, particularly digging pheasants that seem able to swallow almost anything. If you are constructing your own aviary, you are likely to take the greatest care in finding dropped nails, but contractors are unlikely to show the same degree of care, so a very careful examination after construction could save a valuable pheasant's life later.

Bitumen on aviary wire

This photo shows even more clearly how wire netting can almost disappear from view if covered with bitumen paint.

Plastic coated wire netting

In this aviary in Austria, plastic coated wire netting has been used and it is very unobtrusive. The plastic coating probably also extends the life of the netting by a number of years, but this material has not been available for sufficient time to know the effects of prolonged sunlight on the plastic. It is more expensive than normal netting, but is easily put in place with galvanised nails.

Enclosing a large area

Long-lasting nylon netting can now be produced to cover large areas without the need for seams or joins. At this aviary complex in Germany, the owner has used large poles with metal dustbin lids fixed to the top of each pole to stop it breaking through the netting. Cables have been stretched between the poles to support the netting. The owner has joined the netting to the front of his aviaries.

In the UK, such a structure would require planning permission from local government. It is excellent for

waterfowl and birds, such as cranes and allows these birds to fly freely within a large area and avoids the need to trim wing feathers. However, most pheasant species would end up fighting if several of them were kept within such an area, which is why the owner of this complex keeps his pheasants in aviaries alongside of the large netted area. One pair of his pheasants are allowed out onto the grass at a time. Another major danger to pheasants within such a construction is the large pond. Pheasants cannot swim and often end up drowning when kept permanently within such an aviary. Even if adult birds survive, young pheasant chicks seem to show a remarkable ability to drown in even the smallest pond. If pheasants are held in such areas, the owner will need to evaluate carefully what other species are kept in the same space – the cranes here would certainly eat pheasant chicks.

In an area where heavy snowfall is expected, the weight of the snow will often cause the netting to rip through the poles, allowing birds to escape or causing them to be crushed by the falling roof. If rain falls during winter and this subsequently freezes, the build-up of ice on the netting can also have a similar effect.

Predators are much more difficult to keep out of such a construction; rats and squirrels find it relatively easy to gnaw through a corner to gain access to the bird food within. Many breeders use solid aviary complexes around the perimeter to deter predators and then net over the internal area.

At a time when diseases such as Avian Influenza pose great threats, this system has the advantage of keeping birds under quite natural conditions and limiting their contact with wild birds that might carry diseases. However, it does not stop the transmission of disease from wild birds passing overhead. During outbreaks of avian flu within Europe, veterinarians and government officials have decreed that birds in this sort of enclosure must be moved under cover where disease transmission from wild birds is impossible.

One great use for this type of construction is in release pens, and most game farms use temporary pens to acclimatise their birds before release. Similar temporary large pre-release pens can be easily constructed for pheasants that are being released in reintroduction programmes, and they have the advantage of being usable on many different occasions in a variety of locations.

Dividing walls

Here, an excellent dividing wall between two aviaries at a well-known zoo still has a flat surface on which the birds very obviously roost and spend a great deal of time. Additional wire has needed to be put in place to stop the birds worrying each other. If the wall had been given a steeply sloping surface, none of this would have been necessary.

Aviary floors

- **Wire mesh for security**

Wire mesh on the floor deters diggers such as monals, and adds security against predators – grass grows through without being killed off at the roots. However, it may be hard on birds' feet. One idea is to use temporary wire covering to re-seed heavily used areas, which is best done whilst the hen is sitting, as only the male bird will be using the aviary most of the time. At these times, a variety of grass which grows extremely quickly, such as "Canada Green" can prove very useful.

- **Grass**

Remember the effects of "diggers", such as cheer, monals and the eared pheasants. On the other hand, koklass need large areas of grass – about 400 sq. ft. (40 m^2) minimum - more when they have young. Re-seeding and protection of particular areas with mesh needs to be budgeted for.

- **Sand**

Sand is hygienic and easy to keep clean and to disinfect. – there is no need for grit in the diet for digestion or for egg laying. Sand also looks good when raked and it drains well, particularly if retained by boarding. In very wet areas, or those prone to minor flooding, raising the birds above the surrounding land area on sand can keep their feet dry and be much healthier. One well-known breeder has recently begun to keep his birds on a small rounded grit, known in the UK as horticultural gravel. He has found this has cut down dust levels inside the heated night quarters of his tropical pheasants, and the rounded grit doesn't harm the birds' feet.

- **Bark chippings**

Natural materials replicate areas such as forest floors, which are can provide a natural environment for many species. Bark chippings can be acquired easily from garden centres and other horticultural outlets and they offer the pheasants, particularly those that like to dig, the opportunity to keep very active, turning over the debris and seeking titbits of food. This material needs to be raked regularly so that mould does not develop and most keepers who use this material change it every six months or so. If large amounts of mould are allowed to develop, it can create a very unhealthy environment for the birds.

- **Dried leaves**

If you have access to large amounts of dried leaves, these will provide hours of interest for the birds as they rake through them seeking food. As with bark chippings, care should be taken to ensure mould does not develop.

- **Raised above ground level**

In many zoos, where expense is less of a problem, raising the internal level of an aviary by about 30 to 60 cm can counter drainage problems, particular in tropical regions with very heavy rainfall. Drainage pipes can be inserted into the substrate to clear water rapidly. The ends of these pipes must be covered in wire to deter rats and mice from climbing up them into the aviary.

- **Mud**

Mud is what you get if you don't provide anything else. It is unpleasant for the birds in areas where there is poor drainage, especially on clay soils. This problem is often very noticeable in small aviaries where birds soon reduce turf surface to mud.

Grassed aviary – mountain peacock-pheasants

The aviary must be sufficiently large to sustain use through all seasons of the year; some species inflict heavy damage on any grass – e.g. monals, eareds and cheer. Tragopans seem to need a minimum of about 500 sq. ft (50 m^2) of grass to live on, since they crop it consistently. In winter, when grass stops growing in many areas, unless there is sufficient, the birds just wear it out.

Roosts/shelters– unheated for hardy species

Here, these satyr tragopans receive shelter from the wind with solid wooden walls to their roost, and shelter from the rain provided by clear plastic corrugated sheeting. Nothing more is needed, since these Himalayan birds are totally hardy under UK conditions.

Roosts/shelters–heated for tropical species

These Malaysian peacock-pheasants have a fully insulated shelter, with double panelled wooden walls and 2 inch thick polystyrene sheeting between the wooden panels. Triple wall polycarbonate sheeting has been used on the roof. Other tropical species have their roosts attached so that heat generated in one shelter can help to keep the other roosts warm. Because the insulation is good, comparatively little heating is needed to keep the birds snug in the coldest of winters. Tropical species will require a minimum temperature of around 7 °C and should be shut in at night. Care needs to be taken to ensure that no mice can gain access to the insulation material, or they will nest there and live happily on the birds' food.

An additional advantage of a heated shelter is that it can act as a "**hospital" area** if a bird is unwell. The bird can be walked in without needing to be caught and adding to its stress levels.

A tubular oil-filled heater powered by electricity is very easy to install and will usually run happily for years without any problems. For greater economy, the heater can also be used with a thermostat.

Roosts / shelters – polycarbonate roof and lighting in aviary

An overlap on the polycarbonate roofing sheet keeps the entrance area to the shelter dry. It is useful to have some form of lighting both inside the roost and in the aviary. Should a tropical bird decide to roost outside on a cold, frosty night, it can easily be ushered back indoors with the lighting turned on. There is then no need to handle the bird and cause it to panic.

Roosts/shelters–internal lighting and power

Taking electricity to an aviary complex often requires running an armoured cable from one's house. Often, this is buried underground and then run to a separate fuse board. Always seek professional advice if you are not a professional electrician.

As well as having internal lighting, it is useful to have the occasional power socket within an aviary. Power tools can be plugged in easily if small repairs need to be effected. Peacock-pheasants do not crop the grass in their aviaries so, in large grassy aviaries, a small electric mower can be plugged in easily. If a bird is sick, access to a power point can provide a heat lamp quickly and effectively.