A PROGRAMME FOR BREEDING GOSHAWKS (*Accipiter gentilis gentilis*) IN CAPTIVITY WITH REFERENCE TO THEIR BREEDING HABITS IN THE WILD STATE

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In an attempt to induce such a highly strung genus of raptors as *Accipiter* to reproduce in captivity, I feel that more must be taken into consideration than in the cases of species from the genus *Falco*. A great attempt must be made to re-create, or compensate for natural circumstances before any extent of success can be anticipated. The degree of difficulty to induce the different species to breed will vary according to several factors. The great difference in size which occurs between, for example, Goshawks (*A. gentilis gentilis*) and Sparrow-hawks (*A. nisus nisus*), will grossly influence the minimum dimensions of suitable aviaries. Also, according to the size of the species, there will be a vast difference in the types of quarries upon which they feed in the wild state. Consequently, smaller species which prey chiefly upon small birds will be more trouble to maintain than larger species which feed on larger quarries and which to some degree would thrive on coarser foods.

Of the European, diurnal Raptors, the Goshawk is the species in which the breeding impulse awakens earliest in the year. It usually happens sometime in January, however, sometimes not until early February. The initiative to breed is taken by the female, which having located the nesting site of the previous season, sits by the nest and proceeds to scream in order to attract a mate.

An aviary designed to accommodate a pair of Goshawks which is programmed for breeding would have to be furnished and ready to receive the first hawk by the end of the year. I hesitate to commit myself into quoting overall dimensions; however, a description of what I consider to be the necessary furnishings will perhaps help to establish the approximate surface area. It should be rectangular in shape, possibly with rounded ends to prevent the female from cornering the male; it should contain, either by being built around, or by being planted with a tree at one end. The tree ought to have a crotch or a fork about 8 ft. above ground level. This will accommodate the nest, which if available, could consist of an abandoned Buzzards nest. A suitable type of tree would be an old apple or a pear. A second tree which offers a perch overlooking the nest, or some form of alternative perch should be placed at the other end of the aviary. A fir of some sort would be the most suitable. In the wild state, nesting Goshawks usually roost in a fir and sometimes fly quite a distance from the nest in order to find one. The male hawk does most of the nest building while the female perches close

by in a neighbouring tree.

Copulation seldom takes place on the nest itself. It usually happens on the perch on which the female idles the day away. The initiative is taken by the male which incites the female with a call, repeated twice or three times. This is answered by the female as he glides from his perch. From a shallow stoop he throws up on to her back and copulation takes place. Pairing takes place on awakening and is repeated several times throughout the course of the morning. Nest building is often interrupted for pairing.

Where old nests are re-occupied, the structures are restored with a layer of fresh twigs. Sprays of Spruce or Scots Pine, or live, green twigs in deciduous forests decorate the upperpart of the nest and green twigs line the bowl. The female usually assists with the lining of the bowl, in fact she adds twigs even after the male completely ceases working on the nest. This lining of the nest may be repeated until well into the period of growth of the offspring.

A plentiful supply of twigs and evergreen foliage should be available to the pair in the aviary so that they may restore the structure of the provided nest, if this is occupied.

Some form of "break" to prevent hawks newly introduced to the aviary from damaging themselves by flying against the wire-mesh walls would best be arranged. Foliage of Spruce, Yew, or similar species of conifer could be woven into the mesh of areas of the sides. A whole end could be screened off by such a method and used to conceal any filming or observation. The corners, if the ends are not rounded, should be planted with shrubs and crossed with branches at higher levels.

When kept in an aviary, Goshawks, especially freshly caught birds, will fly up against the roof. The usual result is a hawk with a bald head, if not a badly damaged one. A wire mesh roof is essential, but unless shielded may cause a highly strung bird to suffer bad head grazes. A ceiling of string net fastened at a height of 6" to 9" below the actual roof would prevent any contact with the wire. For various reasons a single roof of string-mesh would not be suitable. It would not, for example, support snow very efficiently. Snow would adhere to such a roof for a greater length of time. Debris in the form of fallen leaves, twigs and small branches would entangle and be a great trouble to remove.

Goshawks become sexually mature after the first moult and breed for the first time the following Spring. From the choice between the wild caught adult and the juvenile taken from the nest and moulted out in captivity, the latter bird is the more suitable. Due to its having been in captivity since leaving the nest, it will to some degree be more amenable to accepting the breeding quarters than would be the wild caught adult.

The female bird should be introduced to the aviary about late December at the latest. She should come into breeding condition

some time in January. This state will be indicated by her frequent screaming. At this stage the male can be introduced. It might be wise to first parade the male before her on the fist in order to ascertain her response to him as being satisfactory. If she is ready for him she ought to scream violently. Other display such as squatting on the perch will also indicate her readiness to accept the male. To introduce the male too soon could result in his death. I have the unfortunate experience of Goshawks kept together in aviaries killing each other and I would consequently hesitate ever to put two birds together again before the appropriate time. For the first time together they ought to be kept under close observation, especially the first time food is presented.

As soon as wild hawks have paired, the male alone hunts. All items of prey are brought to the nest deplumed and with the head consumed. Hunting is generally carried out about an hour or two after dawn. The male is incited into hunting by a call uttered by the female. Very often he is nest-building at the time; however, on being incited he abandons what he is doing and disappears into the forest for a period, usually of between 1½ and 2½ hours. If she feels hungry, the female will incite a second hunting excursion later in the afternoon.

The quarries taken by the male Goshawk during breeding probably differ somewhat from those taken outside the breeding season. All preys killed during the breeding season must be carried to the nest and consequently, need to be of a lesser size to those frequently recorded during the Autumn. Most items of prey are brought back to the nest deplumed to such an extent that they are beyond identification. Of those quarries that I have seen brought to the nest between the months of January and April, I have succeeded in identifying only a few. In three cases I could clearly define the blue, upper wing coverts of Jays (*Garrulus glandarius*); I suspected several other corpses that I saw delivered as belonging to Jays. Only once, to my surprise, did I see Red Squirrel (*Sciurus vulgaris*) brought. A Fieldfare (*Turdus torquatus*) and a Green Woodpecker (*Picus viridis*) were the only other identified species. From litter found beneath the nest I have identified feathers of Wood Pigeon (*Columba palumbus*), Magpie (*Pica pica*), Tawny Owl (*Strix aluco*), Hazel Hen (*Tetrastes bonasia*). The greater part of the litter consisted of miscellaneous thrush to pigeon sized bird feathers, most of which were difficult to identify. Also amongst litter I found the halsband of a Red Squirrel which had been marked locally during a study of the movement of this species of mammal. Birds clearly constituted the major part of the Goshawks diet during this period.

The birds in the aviary should be provided with a variety of food consisting of as much bird as possible. As much legitimate quarry as is available should be brought in by the gun and the trap. Moorhens, Coots, gulls, corvids, Starlings, Sparrows and Pigeons can legally be

taken. Rabbits, Squirrels, leverets, and small rodents too can be fed. In emergencies, Fox, beef or chicken heads will substitute. A sparrow-trap and a mist net, available from S. Young & Sons, Crewkerne, Somerset, Great Britain, left constantly set will ensure a steady supply of Sparrows and Starlings. Food should be available to the hawks *ad libitum*.

In Scandinavia, egg laying begins between the last quarter in March and the middle of April. Incubation commences after the laying of the first egg. The incubation period varies from between 41 and 43 days.

On the delivery of prey at the nesting site, the male reports his return by calling as he approaches. The female then leaves the nest to receive him and collect whatever he has brought. During the early days of incubation, the male broods the clutch while his mate feeds. However, as incubation progresses, it is with every increasing reluctance that the female is lured away from the nest to receive her food. He will attempt to lure her from the nest, but on failing deposits the prey some distance away. During a study of Goshawks in 1937, a Danish observer commenced to place plucked bodies of birds, heads removed, at the base of the nest tree, having established that the male of a pair had vanished, the female had incubated for 5 days uninterrupted without food. This female accepted the presentation of food as the bodies disappeared and she continued incubation without interruption. This assistance was provided for a period of ten days at the end of which, in some unknown way, she secured a fresh mate.

Through unforseen circumstances, it could happen that the presence of the male hawk in the aviary becomes undesirable. From the above account it would seem safe to consider removing him and to provide the female with plucked, decapitated birds. In fact after the first 18 days of incubation period, the period during which the male also takes part with brooding, the male in the aviary will no longer have any purpose to serve. Captivity may possibly influence the behaviour of the bird that is denied the freedom of natural circumstances such that it becomes desirable that it be removed. If copulation has been observed to have taken place and there comes about an abandoning of the clutch after incubation has commenced, or if incubation does not commence at all, the eggs should be tried in an incubators. Buzzards are known to become broody when kept in captivity and could probably be employed as prospective foster mothers for Goshawk eggs.

Some data are available concerning incubation temperatures of the Goshawk at the different stages of incubation, however, more data are required, especially concerning nest humidity and also nest behaviour. Artificial insemination has been contemplated and would be an ultimate solution if there was found to be a predominant reluctance to copulate.