

## Health and Behavior Risks and Benefits Associated with Rearing Imprint Raptors

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*Abstract:* The hand rearing of young raptors as 'social imprints' has both behavioural and health advantages and disadvantages. The rationale for imprinting a young raptor is to either reduce the stress of training on a young parent reared bird (which will include a decreased need to reduce the bird's bodyweight and hence suppress the immune system) or to stimulate that imprinted bird to voluntarily donate semen or accept insemination (particularly valuable in the production of hybrid falcons, which are popular in the Middle East falcon market). As veterinary advisors we need to be aware of these risks and benefits and how to manage them.

*Key words:* raptor, imprint, hand-rear, metabolic bone disease, atherosclerosis, splay leg, aspergillosis, respiratory toxins.

*Introduction:* Raptors held in captivity in the UK are typically 'captive bred' (as birds may not be taken under license from the wild) and have traditionally been parent reared. Modern management of all species should be in line with the 'five freedoms' and should minimize any negative effects.

### Five Freedoms as stated by the Bramble Committee of 1965

**Freedom** from hunger, thirst by ready access to fresh water and a diet to maintain full health and vigour.'

**Freedom** from thermal and physical discomfort by providing appropriate environment including shelter and a comfortable resting area.'

**Freedom** from injury and disease and pain by prevention or rapid diagnosis and treatment'

**Freedom** to express most normal patterns of behaviour, space, facilities, occupation'

**Freedom** from fear and distress by ensuring conditions and treatment which avoid mental suffering'

Hand-reared raptors will almost inevitably become imprinted. Imprinting is a complex process. Young raptors intended for imprinting will typically be removed from the nest at 12-14 days, whilst full fledging does not occur until 30-45 days (species dependent). The creation of social imprints (reared with others of the same species, but in the company of humans) is almost universally beneficial, however the creation of full imprints, (one bird imprinted on one owner, in the absence of others of the same species), can result in adverse outcomes. In any event, the fact that raptors are being reared in a 'human environment' exposes them to risks by which they would not normally be challenged. These risks include potential disease issues, which will be addressed in this paper. The information shared in this presentation is derived from clinical raptor case presentations in a busy specialist avian service.

### Health Benefits

For parent reared birds, initial training for free flight as is required in display and falconry roles necessitates food restriction (to ensure the bird returns for food), weight loss, and enforced proximity to humans; all of which cause stress to the bird. Some raptor species are more prone to the effects of stress, e.g. accipiters and Gyrfalcons (*Falco rusticolus*) rendering them more prone to

aspergillosis. A socially imprinted bird is not stressed by proximity to humans, therefore there is a reduced need to lower body weight to encourage the bird to return to the handler, catabolism is avoided, and stress-induced immune suppression is reduced.

**Health Disadvantages** Hand-reared or imprinted birds are fed more often, typically eating more in a day and growing faster than parent-reared young. They may be encouraged to stand and walk at an earlier age than normal. They may be fed inappropriate foods and may not receive adequate UV light. This can result in clinical metabolic bone disease, in a patient that was previously only sub-clinically affected and/or conformational dysmorphisms.

#### Metabolic bone disease

It is well recognized that all raptors should be provided with a 'whole carcass diet' or equivalent, i.e. an appropriate balance of bone to meat, i.e. calcium to phosphorus, together with appropriate activated vitamin D<sub>3</sub> levels<sup>3</sup>. Some captive-bred raptors are maintained under cover without exposure to natural sunlight. Alternative sources of UV light are appropriate full-spectrum tubes or supplementation with activated vitamin D<sub>3</sub>. When a whole carcass diet is not available, chopped-up bone (30-40g/kg) can be added to red meat.

Metabolic bone disease occurs when a growing chick has an incorrect Ca:P:D<sub>3</sub> ratio. A long bone increasing rapidly in length with insufficient time or available calcium to mineralize and strengthen the bone will suffer longitudinal deviations or folding fractures. The faster a chick is growing, the more critical the Ca:P:D<sub>3</sub> ratio. A chick fed a marginal diet and growing slowly will often develop normally, but the same chick growing fast, or those on an inadequate diet or defective husbandry (in relation to Ca:P:Vit D<sub>3</sub>), will suffer clinical disease.

#### Conformation Dysmorphisms

When a handler is imprinting a chick, the chick will typically be fed 3-5 times a day (with cast-free food). The result of this can often be an increased total daily food intake, leading to an elevated growth rate, pushing a bird with sub-clinical disease into one with overt clinical metabolic bone disease. Weight gain should be monitored daily and plotted as a percentage of the previous day's body weight. Weight gain should never exceed 10% and in some species will need to be less. Abnormalities seen comprise bends, bows, deviations or rotations along the longitudinal length of long bones.

Any deviations which arise should be corrected as soon as possible<sup>4</sup>. Corrections should be made prior to joint abnormalities or tendon malpositioning occurring.

- **Other Skeletal Developmental Abnormalities**

Chicks for imprinting are taken from their nest prior to natural fledging age and may be encouraged to bear weight on limbs at an earlier age than is natural<sup>5</sup>, resulting in bending and deviations of long bones.

Splay leg occurs when birds attempt to stand up on a substrate that is smooth and allows the feet to abduct. This can lead to a lateral rotation of one or all of the following bones: femur, tibio-tarsus, tarso-metatarsus, and must be prevented by employing good husbandry practices. If diagnosed whilst long bone growth is still active, any method which draws the legs back into a normal physiological position (i.e. centrally under the body) will effect a correction within a few days.

Angel wing is a well-recognized condition of waterfowl. In such cases, a bird which normally grows up on a diet with protein content of 17% (i.e. grass) is fed on a cereal-based diet (cereal or soaked bread with a protein content of 23-24%) and will grow too fast, suffering a differential bone: tendon

growth rate. This can result in a slight outward rotation of the common metacarpal. As the primary flight feathers start to develop, the additional weight of blood filled flight feathers causes a further lateral rotation of the common metacarpal bone, resulting in an outward displacement of the flight feathers. This is also encountered in raptors which are growing too fast. The author has been presented with six such cases, all in hand fed imprint birds and never in parent reared youngsters.

- Atherosclerosis

Birds have been a model for atherosclerosis research for years<sup>6</sup>, because of their increased susceptibility. The author has managed a number of hand fed young raptors with acute onset of clinical signs associated with hyper-cholesterolaemia and atherosclerosis, with cholesterol levels as high as 18 mmol/L (n=4.8-6.5). The birds have been as young as 12 weeks of age. Whilst it is recognized that there is a genetic predisposition in some avian species, triglyceride analysis of clinical cases presented to this author, has indicated that disease in these cases has arisen predominantly due to dietary issues. Diet change, supportive medication (isoxoprine and essential fatty acid supplementation) and increase in exercise have resolved issues in affected birds. Published research on the development of atherosclerosis in birds would suggest that this problem may be associated with excessive feeding of high fat diets (in particular high egg yolk) and minimal exercise.

- **Ingestion of casting (indigestible fibrous dietary material – fur and feather) at too young an age**

It is generally recommended that young raptors should not be given casting until they are 10 days old, and merlin chicks (*Falco columbarius*) not until 20 days of age. Feeding casting (especially hard casting such as rodent fur) to a chick at too young an age may cause an obstruction. Affected birds will be small for their age, anorexic, thin and dehydrated, with a proventriculus distended with hard casting material. In essence the casting is too large for the chick. Medical or surgical approaches are typically met with failure. Whilst one cannot reduce the size of the casting one can by the use of force feeding (with a convalescent diet such as Emerald Carnivore Care) increase the growth of the chick, such that in 3-5 days the casting is regurgitated naturally.

- **Consumption of 'household items' resulting in gastro-intestinal foreign bodies**

Raptors are dissimilar to parrots, being designed to eat one large or 'outsize' food item per day, rather than several small feedings throughout the day. Imprint raptors living in a household may be accustomed to playing with objects such as socks, under garments etc. On occasions these are consumed (as a dog would), typically resulting in proventricular impaction. On occasions the bird will 'cast up' the offending items. In other, endoscopic removal per os or proventriculotomy may be necessitated. On occasion raptors will eat shiny objects such as nails, screws. When this is known to have occurred and ferrous objects are involved, these may be removed from the crop or proventriculus using a gastric tube with a micro-magnet glued within.

### **Aspergillosis**

It is well recognized that certain species of raptor are prone to Aspergillosis, in particular when exposed to high environmental spore contamination or when immune suppressed. Imprinting tends to minimize the stress that would otherwise occur during initial training. However in creating a 'full imprint' one creates a bird which has a greater need for attention and requires close proximity to the handler. For such a bird any breach of the trust or bond which has developed such as restraint to apply furniture, or the handler being away from home for 48 hours, can give rise to the stress which precipitates clinical aspergillosis. .

## **Inhaled toxicosis: Toluene / polytetrafluoroethene / carbon monoxide / air or room fresheners**

Raptors have traditionally been housed outdoors.. With the rearing of imprints, birds are now managed for at least part of their lives inside and therefore may be at higher risks of inhaled toxins. These vary from house fires, toluene (present in some contact adhesives), PTFE (Teflon) toxicity associated with over-heating of such products which now include non-stick cookware, grill sheets, self-cleaning ovens, agents in some household paints, and water proofer in water proof clothing. Other previously recognized inhaled avian toxicosis include carbon monoxide and certain air freshening agents. Such risks are hopefully well recognized by parrot keepers, but they are new to the falconry fraternity.

### **Behavioral Benefits of Imprinting**

Konrad in 1938<sup>1</sup> demonstrated that the experiences and exposures of early bird life can have a major effect on the later choice of breeding partner, however it also influences choice of food and nest site in later life.

If a breeder's intent is to breed 'hybrid falcons', then creating a bird which will 'display' to a handler, to enable voluntary semen donation or insemination is a desirable consequence. Wild raptor orphans cannot be released if imprinted on humans, or inappropriate food that they would not consume in the wild or on a nest site or nesting material which they would not find in the wild. However imprinting can be used in a positive manner. The Saker falcon (*Falco cherrug*), listed by CITES (the Convention on the International Trade on Endangered Species) has been negatively impacted in Kazakhstan, where harvesting of firewood has led to a decline in available nesting material. A program in that country introducing imprinted young birds into artificial nests situated on electricity pylons has been effective in reversing the decline in natural breeding success, by imprinting (teaching) young birds to build and use nests on electricity pylons.

### **Behavioral Disadvantages of Imprinting**

A raptor which is not parent reared by their own species, may not demonstrate or recognize normal courtship behavior and as such may fail to breed naturally with their own species. In situations where the lack of breeding sites is the limiting factor on natural breeding success, the occupation of a nest site by a non-breeding individual can be a serious issue. Imprinted raptors, coming into breeding condition and orientated towards the handler, can exhibit enhanced territorial behavior; occasionally resulting in significant and dangerous aggression towards the handler or other humans in their territory or proximity.

- **Mal-imprinting**

The age at which a chick is at risk of imprinting varies with species. Most birds are only imprintable up to 12 days of age, whilst others such as Harris hawks (*Parabuteo unicinctus*) will still imprint at 30 days of age. Mal-imprinting is a term which refers to the problem of a bird growing up with undesirable 'imprint effects'. This is most common where the bird is reared by itself or where the bird is allowed to appreciate that the handler is the provider of food. In such cases, the bird may grow up as a 'screamer', i.e. screaming for food or attention whenever it sees the handler. There is no easy solution to this problem. Re-homing the bird may reduce the effect, but typically the bird recognizes the new handler in a similar manner. Devoicing the bird is not a reliable or humane solution. Adverse effects can also arise when a chick is imprinted on the owner and it reaches sexual maturity. During the breeding season it may demonstrate courtship behavior towards the owner, aggression towards other humans, and aggressive territorial behavior within its chosen nesting area. In such cases GnRh agonists have proven efficacious<sup>2</sup>.

## Summary

Avian vets are well accustomed to both the positive and negative effects of hand rearing and imprinting psittacine chicks. Imprinting is a complex subject and its application and outcome varies between species. Falconers and raptor biologists have increasingly used the imprinting of young raptors, aspiring to achieve the beneficial effects presented. The author has become aware of several deleterious effects of imprinting through the experience of working closely with many raptor breeders in the UK, where the practice is common. It is not suggested that this practice be discouraged, but rather that by the education of colleagues and clients, that the negative effects can where possible be minimized and when they do occur, recognized and addressed.

## References

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