Thoughts About Bread And Angel Wing Deformities

By *Corvid Isle 2020*

Whilst doing a bit of research around this contentious topic, it became quickly apparent that there is no study or paper to find, which conclusively proves that feeding bread to waterfowl is the sole cause for the development of angel wing deformities.

Despite this fact, most wildlife and waterfowl experts seem to agree that the overwhelming cause of angel wing is an unhealthily high protein and/or carbohydrate based diet.

Unsurprisingly, it was not difficult to find plenty of advice and warnings suggesting not to feed bread to birds and in particular not to waterfowl. However, with all the advice being provided no scientific references were given which would certainly help to clarify and understand the situation.

When angel wing occurs, the developing wings of the young birds twist outward, leaving the wingtips parallel to the ground and the bird unable to fly.

On the other hand we did find a variety of research which has been undertaken with the aim to establish possible causes for angel wing deformities. Most of the available literature has been produced by using, and abusing, domestic birds raised for human food production or by doing questionable feeding trials with captive raised wild bird species. However, we didn't find any useful research which has been undertaken to establish the causes for angel wing deformities at the source -meaning in the wild. In this context please note that the list of research reviewed, and used for this blog post, is not meant to be exhaustive.

What Is An Angel Wing Deformity?

An angel wing deformity, also known as slipped wing or carpometacarpal deformity, is a disease that mainly but not exclusively affects waterfowl. One or both wings initially droop and turn outwards later.

The condition is permanent if not corrected in the early stages and affected birds are unable to fly. The left wing is more commonly affected than the right wing. However, no plausible scientific explanation has been found for this phenomenon. An angel wing deformity becomes initially apparent whilst the flight feathers are growing, with the weight of the primary feathers appearing to be too great for the carpal joint muscles, leading to drooping of the wing tip.

The birds most likely to contract angel wing deformities are those residing in parks, on ponds and in public areas where people feed them.

What Are The Causes Of An Angel Wing Deformity?

The most common factors cited to contribute to the development of angel wing deformities are excessively fast growth in relatively slow growing temperate and tropical species. Overfeeding, both with a too high protein and too high energy diet, is thought to be important. Vitamin E deficiency has also been suggested as being relevant. Canada Geese fed on high protein levels (20%) developed this condition more frequently than those fed lower protein diets.

Kreeger, T.J. & Walser, M.M., Carpometacarpal deformity in giant Canada geese (Branta canadensis maxima Delacour), 1984, volume 20, pages 245-248.

Incorrect incubation conditions and hatching problems have also been suggested as possible causes. Angel wing has been reported more commonly in geese and swans than in ducks. The possibility of genetic predisposition has also been considered.
Domestic breeds, which have been bred for rapid weight gain, appear more susceptible. Males may be more affected than females. The reason for the disproportionate occurrence affecting the left wing is unknown.
Kreeger, T.J. & Walser, M.M., Carpometacarpal deformity in giant Canada geese (Branta canadensis maxima Delacour), 1984, volume 20, pages 245-248. Zoological Society of London, London, UK, Kear, J., Notes on the nutrition of young waterfowl, with special reference to slipped-wing, 1973, volume 13, pages 97-100. Yeisley, C.L., Surgical correction of valgus carpal deformities in waterfowl, Proceedings of the Association of Avian Veterinarians, 1993, pages 161-163

Kear reported that angel wing deformities in wild geese are affected by several factors including lack of exercise, large flock size, improper feeding, rearing under heat stress because of high ambient temperatures, feeling frightened frequently and improper management.
Zoological Society of London, London, UK, Kear, J., Notes on the nutrition of young waterfowl, with special reference to slipped-wing, 1973, volume 13, pages 97-100.

Similar factors have been found in captive raised greater sandhill cranes. Angel wing deformities were seen in 16% of greater sandhill crane chicks raised on a 24% protein diet with 0.87% sulphur containing amino acids.
T.N. Tully, M.P.C. Lawton & G.M. Dorrenstein (Eds.), Butterworth Heinemann, Oxford, UK, 2000, Cranes, Olsen, G.H., pages 215-227

It is important to note that the development of angel wing deformities are only a problem in very young birds and are not a concern at all later in life. It is suggested that these deformities can be associated with too rapid growth particularly during the 7 to 28 day old period. They are not seen in parent reared birds in a large enclosure or human reared chicks which are constantly exercised.
Tully, T.N. Jr., Dorrestein, G.M., & Jones, A.K., Saunders, Elsevier Limited., 2009, Cranes, Olsen, G.H. , pages 243-257

Studies on white roman geese have revealed that parental, and genetic factors, do play a substantial role in the occurrence of angel wing deformities.
Lin, M. J., Chang, S. C., Lin, T. Y., Cheng, Y. S., Lee, Y. P., & Fan, Y. K. (2015). Factors Affecting the Incidence of Angel Wing in White Roman Geese: Stocking Density and Genetic Selection. Asian-Australasian journal of animal sciences, 29(6), 901-7

Recommendations given for hand rearing wild birds in captivity clearly advise to avoid excessive growth rates, particularly of temperate and tropical species. It is advised to restrict the protein level to about 16% to 19%. One should not solely use turkey or chicken grower crumbs as they do often contain up to 28% protein. If using crumbs, with this kind of relatively high protein level, then one has to ensure that the diet also includes substantial amounts of other low protein items like green foods such as grass or lettuce.
Zoological Society of London, London, UK, Kear, J., Notes on the nutrition of young waterfowl, with special reference to slipped-wing, 1973, volume 13, pages 97-100. B.W. Ritchie, G.J. Harrison & L.R. Harrison, Wingers Publishing Inc., Lake Worth, Fl., 1994, Anseriformes, Olsen, J.H., pages 1237-1275. D. Brown, ABK Publications, South Tweed Heads, NSW, Australia, 1998

Similar recommendations have been made for rearing sand hill cranes in captivity. Reducing the energy content of the diet (from 2,830 kcal/kg to 2,160 kcal/kg diet) also slowed growth and reduced the development of leg and wing abnormalities.
Serafin, J.A. The influence of diet composition upon growth and development of sandhill cranes, 1982, volume 84, pages 427-434.

Angel wing deformities have been found in wild and captive trumpeter swan, Canada goose, swan goose, Hawaiian goose, Andean goose, Magellan goose, blue-winged goose, Egyptian goose, Indian spotbill, New Zealand grey duck, Pacific black duck, African yellow-bill, chestnut-breasted teal, crested duck, red-crested pochard, mountain duck and wild-type muscovy ducks, mute swan, Cape Barren goose, mallards, black swan, Pacific black duck and Australian shoveler. However, angel wing deformities have also been found in Northern goshawk, black stilt, grey heron, bustard and masked boobies.
Bilateral Valgus Deformity of the Distal Wings (Angel Wing) in a Northern Goshawk (Accipiter gentilis), Petra Zsivanovits, Deborah J. Monks, and Neil A. Forbes, Journal of Avian Medicine and Surgery 2006 20 (1), 21-26. L. Pitman, Robert & Ballance, Lisa & Bost, Charles. (2012). Incidence of Wing Deformities ('Angel Wing') Among Masked Boobies at Clipperton Island: Life History Consequences and Insight into Etiology. The Wilson Journal of Ornithology. 124. 597-602. 10.2307/23324568

Interestingly pollution may also play an important part in the development of skeletal deformities. The levels of polychlorinated biphenyls (PCBs), polychlorinated dibenzo-p-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs) detected in affected heron nestlings were sufficiently high to suggest that this may be the underlying cause of the deformities, possibly due to effects on deposition of calcium in bone.

Helen M. Thompson, Alwyn Fernandes, Martin Rose, Shaun White, Adrian Blackburn, Possible chemical causes of skeletal deformities in grey heron nestlings (Ardea cinerea) in North Nottinghamshire, UK, Chemosphere, volume 65, Issue 3, 2006, pages 400-409

Contributing Factors

These are listed as:

- Only young birds are susceptible to develop angel wing deformities. Juveniles and adults cannot be affected anymore.
- Birds are particularly vulnerable within the first weeks of their lives, which is their rapid growth phase. The critical growth periods include the first three weeks of age for leg and between two and four weeks for wing abnormalities.
- Environmental factors do contribute to the development of this deformity, which include lack of exercise, large flock size, improper feeding, rearing under heat stress, feeling frequently frightened and improper management.
- High protein and high energy diets do play an important role.
- Genetic links have been found, which increase the likelihood of disease occurrence.
- Pollution and poisoning with for example PCBs and PCDDs may also play a significant part in the occurrence of developmental disorders.

What Has This To Do With Bread?

An important aspect to consider when calculating feed quantities is the determination of the energy content in the food consumed. Energy content is determined by the nutrient composition of the food which includes mainly protein, carbohydrates and fat. Fat contains about twice the energy per gram than either protein or carbohydrate so higher fat foods are more energy dense.

Generally speaking the protein content of high quality bread is about 14% plus carbohydrates and fat. 100 g of white bread provide about 244 kcal.

The protein content of swan pellets* is around 18%. Swan pellets also contain protein, carbohydrates and fat. 100 g of commercial swan pellets provide about 410 kcal.

*Interestingly, as far as swan pellets are concerned, there is consistently no information about the carbohydrate contents being provided.

The protein content of swan pellets is slightly higher than the protein contents of bread. However, the fat contents of swan pellets is at least twice as high compared to bread. This implies that like bread ***commercial* swan pellets are also high energy-food items**.

100 g whole meal bread (221 kcal) contain 37.8 g carbohydrates, 10 g protein and 1.8 g fat
100 g white bread (244 kcal) contain 44.6 g carbohydrates, 8.7 g protein and 2.8 g fat
100 g wheat (329 kcal) contain 68 g carbohydrates, 15.4 g protein and 1.9 g fat
100 g maize (361 kcal) contain 77g carbohydrates, 6.9 g protein and 3.9 g fat
100g commercial swan pellets (410 kcal) contain about 18% protein and up to 5.5% fat (wheat, wheat feed, soya, maize, fishmeal and soya oil).

Conclusions

There doesn't seem to be any definite answer or absolute truth.

As with any diet feeding should be balanced in a responsible way. This means that neither bread, swan pellets or any other high energy food like chicken crumbs should be exclusively fed to waterfowl -in particular not during their first four weeks of life.
However, it also means that bread and swan pellets can form part of a balanced diet, when fed responsibly, in addition to wheat, cereals, grains, leafy greens and dried grass.
Birds should only ever be fed on the water. Only small amounts should be given to make sure that all food has been eaten before giving more.
Mouldy food must never be given.

Many people have a romantic view of nature and of what it means for animals to live in the wild. They believe nature is some kind of paradise, where animals live happy lives. Many people forget that what they know as 'nature' is in fact a mostly manmade landscape with fragmented and isolated habitats, which in itself can be a big problem.
Reed, D. H. (2004), Extinction risk in fragmented habitats. Animal Conservation, 7: 181-191. doi:10.1017/S1367943004001313

All man's actions have an impact. This is also true for feeding. There are significant reasons to care for animals as sentient beings who can experience suffering as humans do. This is why we should be concerned about what happens to them.

In most situations feeding of any animal will create a dependency. Obviously this will impact on the ability of an animal to survive, in particular during winter, feeding is not maintained.
During prolonged periods of severe or cold weather disturbance of wild birds should be reduced. Bird watchers, bird ringers, walkers, dog-walkers, horse-riders and water-based sports should avoid disturbing groups of resting birds otherwise they will get exhausted.

Overfeeding wild birds can potentially cause problems. This is in particularly relevant to pigeons and waterfowl living in public areas and parks. Large numbers of ducks and geese in a small area can have a serious impact on the surrounding environment. Faeces generated by congregating waterfowl results in increased deposition of carbon, phosphorus and nitrogen in the water and surrounding grasslands, which can lead to a severe contamination of water sources.

Increasing population numbers and habitat degradation due to overcrowding also increases chances of potential conflicts between animals themselves and between animals and humans. Increased waterfowl abundance leads to increased competition for food resulting into more aggression during breeding season and changing breeding behaviour. Mallards are the textbook example for this problem.

Disease transmission is will occur more readily in dense populations. Habituation of swans, geese and ducks being fed in parks potentially creates further conflict, if for example large geese or swans are defending a nesting female or a brood of goslings or cygnets.

The best solution for waterfowl problems situated around public parks is to minimise uncontrolled excessive supplemental feeding. Feeding a balanced diet will decrease the likelihood of nutritional disorders to occur. However, feeding a balanced diet will not prevent overcrowding, disease concerns, habitat degradation, habituation or the risks associated with premature breeding attempts or delayed migration.

Blog by Rook on: corvid-isle.co.uk/thoughts-bread-angel-wing-wild-birds